

A LAKE PROTECTION AND RECREATIONAL USE PLAN FOR HUNTERS LAKE

WAUKESHA COUNTY WISCONSIN

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MEMORANDUM REPORT
NUMBER 120

**A LAKE PROTECTION AND RECREATIONAL USE PLAN FOR HUNTERS LAKE
WAUKESHA COUNTY, WISCONSIN**

Prepared by the
Southeastern Wisconsin Regional Planning Commission
for
the Town of Ottawa and the Hunters Lake Association
with Grant Assistance Provided by the
Wisconsin Department of Natural Resources

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Chapter I

INTRODUCTION

Hunters Lake, located in the Town of Ottawa, Waukesha County, Wisconsin, is a valuable resource offering a variety of recreational and related opportunities to the resident community and its visitors. The Lake is an integral part of this lake-oriented community. However, the recreational and visual value of the Lake is perceived to be adversely affected by changing land use conditions in the drainage area tributary to Hunters Lake. Seeking to improve the usability and to prevent deterioration of the natural assets and recreational potential of Hunters Lake, the riparian residents formed the Hunters Lake Association which has undertaken a lake-oriented program of community involvement, education, and management. The Association participates in the Wisconsin Department of Natural Resources Self-Help Monitoring Program.

This report sets forth a lake protection and recreational use plan for Hunters Lake, and represents part of the ongoing commitment of the Hunters Lake Association and the Town of Ottawa to sound planning with respect to the Lake. This plan was prepared during 1995 and 1996 by the Southeastern Wisconsin Regional Planning Commission in cooperation with the Hunters Lake Association, and includes the results of field surveys conducted by the Commission in 1995 and 1996, and water quality data collected by the Hunters Lake Association in 1995 and 1996. The planning program was funded, in part, by a Wisconsin Department of Natural Resources Lake Management Planning Grant awarded to the Town of Ottawa under the Chapter NR 190 Lake Management Planning Grant program.

This plan is intended to form an integral part of any future comprehensive lake management plan for Hunters Lake. The scope of this report is limited to a consideration of those management measures which can be determined to be effective in the protection of lake water quality and lake use based upon the available data. The preparation of a comprehensive lake management plan for Hunters Lake will require additional water quality and biological data collection and analysis.

The lake protection and recreational use plan goals and objectives for Hunters Lake were developed in consultation with the Town of Ottawa and the Hunters Lake Association. The 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 vegetation, fishery, and wildlife populations in and around Hunters Lake;
2. To provide for high-quality, water-based recreational experiences by residents and visitors to Hunters Lake, and manage the Lake in an environmentally sound manner; and,
3. To effectively maintain the water quality of Hunters Lake so as to 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.

This plan, which conforms to the requirements and standards set forth in the relevant Wisconsin Administrative Codes,¹ should serve as an initial guide to achieving these objectives over time.

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

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Chapter II

INVENTORY FINDINGS

INTRODUCTION

Hunters Lake is located immediately south and east of the Village of Dousman in the Town of Ottawa, Waukesha County (see Map 1). The Lake is a drainage lake, located on the western edge of a significant complex of wetlands drained by the Scuppernong Creek. The drainage area tributary to Hunters Lake, situated wholly within Waukesha County, approximates 15.9 square miles. The surrounding land uses in this area are primarily agriculture, with the balance being wetlands, woodlands, and single-family residential. Lake-oriented urban residential lands and transportation and utility corridors—including STH 67—are the principal urban features in the vicinity of Hunters Lake.

WATERBODY CHARACTERISTICS

Hunters Lake is a 57-acre impoundment with a low head rock structure at the outlet. The hydrographical characteristics of Hunters Lake are set forth in Table 1. The Lake has two distinct basins, with two well-defined “deep holes” nearly equal in depth. The larger of the two basins, sometimes referred to as Upper Hunters Lake, is situated due north of the smaller basin, or Lower Hunters Lake. A narrow gravel-bottomed ridge at a depth of less than five feet separates the two basins. The northeast corner of the large basin contains three channels that have been dredged to provide lake access to riparian owners in this lowland area. The waterbody has a maximum depth of about 36 feet, a mean depth of 20 feet, and a volume of 1,140 acre-feet. The bathymetry of the Lake is shown on Map 2.

Two streams flow into Hunters Lake (see Map 2). The Scuppernong Creek, which enters the Lake from the north, is the primary inflow to the Lake. An unnamed creek, draining a portion of the wetland area to the east of the Lake basin, also enters Hunters Lake from the east in the vicinity of the south central portion of the Upper Hunters Lake basin. This latter stream is unusual in that it branches within the wetland complex, with the southern branch bypassing the Lake and joining the Scuppernong Creek south of Hunters Lake in the vicinity of the Manor House Road bridge. Water leaves Hunters Lake via the Scuppernong Creek which drains the Lower Hunters Lake basin (see Map 2).

LAND USE AND SHORELINE DEVELOPMENT

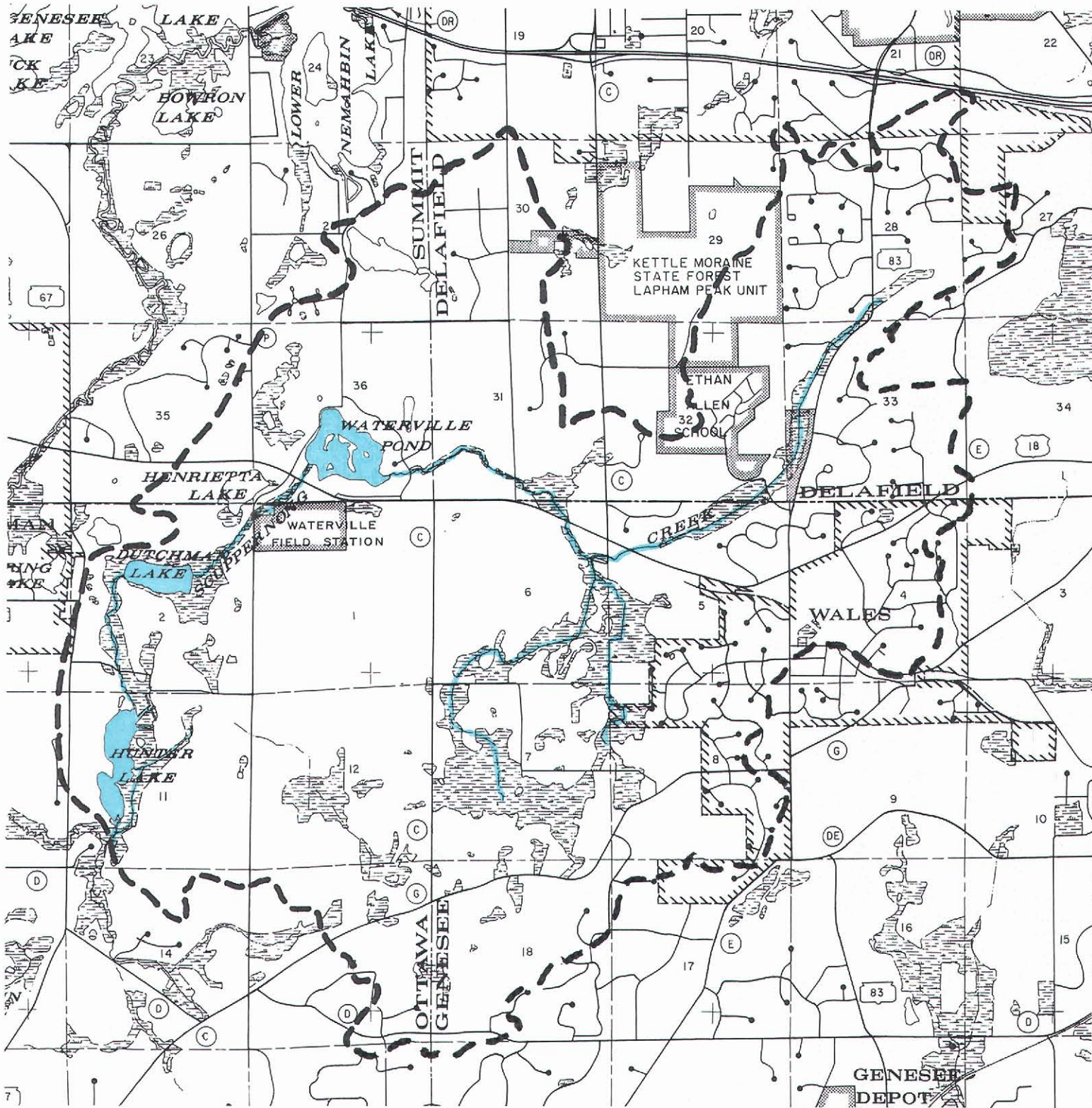
Population

As of 1990, there were approximately 148 persons residing within the drainage area directly tributary to Hunters Lake. Of these persons, about 112, or about 76 percent, were resident within the drainage area year round, and about 36 were resident for only part of the year. There were 58 housing units located within the drainage area directly tributary to Hunters Lake, about 45, or 78 percent, of which were occupied year round. About 13, or 22 percent, of housing units were occupied for part of the year. The riparian residential lands are located primarily on the northern and western shores of Hunters Lake. As of 1995, a total of 41 additional residential lots, of which 14 were built upon, had been provided within the area immediately to the east of Hunters Lake within The Preserve Subdivision.

Land Use

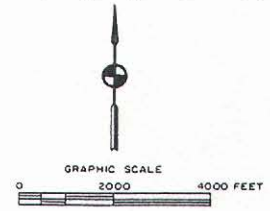
Residential land uses are located on the northern and western shorelands of Hunters Lake, while the southern and eastern riparian shorelines are comprised of undeveloped wetland, much of which is owned

LOCATION OF HUNTERS LAKE



LEGEND

 BOUNDARY OF DRAINAGE AREA TRIBUTARY TO HUNTERS LAKE



by the residents of The Preserve Subdivision. Private access is provided to the residents of this subdivision via a boardwalk through the wetland on the eastern shore. A publicly owned boat launch and access site is proposed to be developed by the Town of Ottawa and the Wisconsin Department of Natural Resources (DNR) on the southwestern shore of the southern basin (see Map 2).

The existing (1990) land use pattern in the drainage area tributary to Hunters Lake is shown in Map 3 and is quantified in Table 2. About 3.7 square miles, or about 24 percent of the tributary drainage area, were devoted to urban uses. The dominant urban land use was residential, encompassing 2.6 square miles, or about 72 percent of the area in urban use. About 12.2 square miles, or about 76 percent of the Hunters Lake drainage area, were still devoted to rural land uses. About 5.3 square miles, or about 44 percent of the rural area, were in agricultural land uses. Woodlands, wetlands, and surface water, including the surface area of Hunters Lake, accounted for approximately 4.7 square miles, or about 39 percent of the rural land uses (see Map 4).

Under year 2010 conditions, only limited additional conversion of rural land to urban land uses within the drainage area tributary to Hunters Lake is envisioned in the regional land use plan.¹ However, infilling of existing platted lots and additional low-density, single-family residential development within the tributary drainage area and in the vicinity of the Lake within The Preserve Subdivision located to the east of the Lake basin was expected to occur. Some additional medium-density residential development was also expected to occur in the Village of Dousman to the north of Hunters Lake. However, the major part of this development was expected to occur outside of the drainage area tributary to Hunters Lake.

In 1996, the Commission refined and extended the regional land use plan within Waukesha County under a county development plan.² Forecast development within the drainage area tributary to Hunters Lake under the recommended plan buildout conditions set forth in the Waukesha County development plan indicates the potential for significant large-lot subdivision development, with overall densities of three to five acres per dwelling unit, in areas where such development was not envisioned in the adopted regional land use plan, as shown on Map 5. Such development is anticipated to occur primarily to the north and west of Hunters Lake in the Town of Ottawa, and in the northern portion of the drainage area tributary to Hunters Lake in the Town of Delafield. If this development is realized, much of the open space area remaining in the drainage area may be replaced over time with large-lot residential development. This may significantly increase the pollutant loadings to the Lake associated with urbanization and increase the pressure for recreational use of the Lake. However, this development could also occur in the form of residential clusters on smaller lots having the same overall density but preserving significant portions of the remaining open space. The use of this concept as recommended in the county development plan would reduce the potentially negative impacts of additional development on the Lake. Expansion of the extractive and landfill uses,

Table 1

**HYDROGRAPHIC CHARACTERISTICS
OF HUNTERS LAKE**

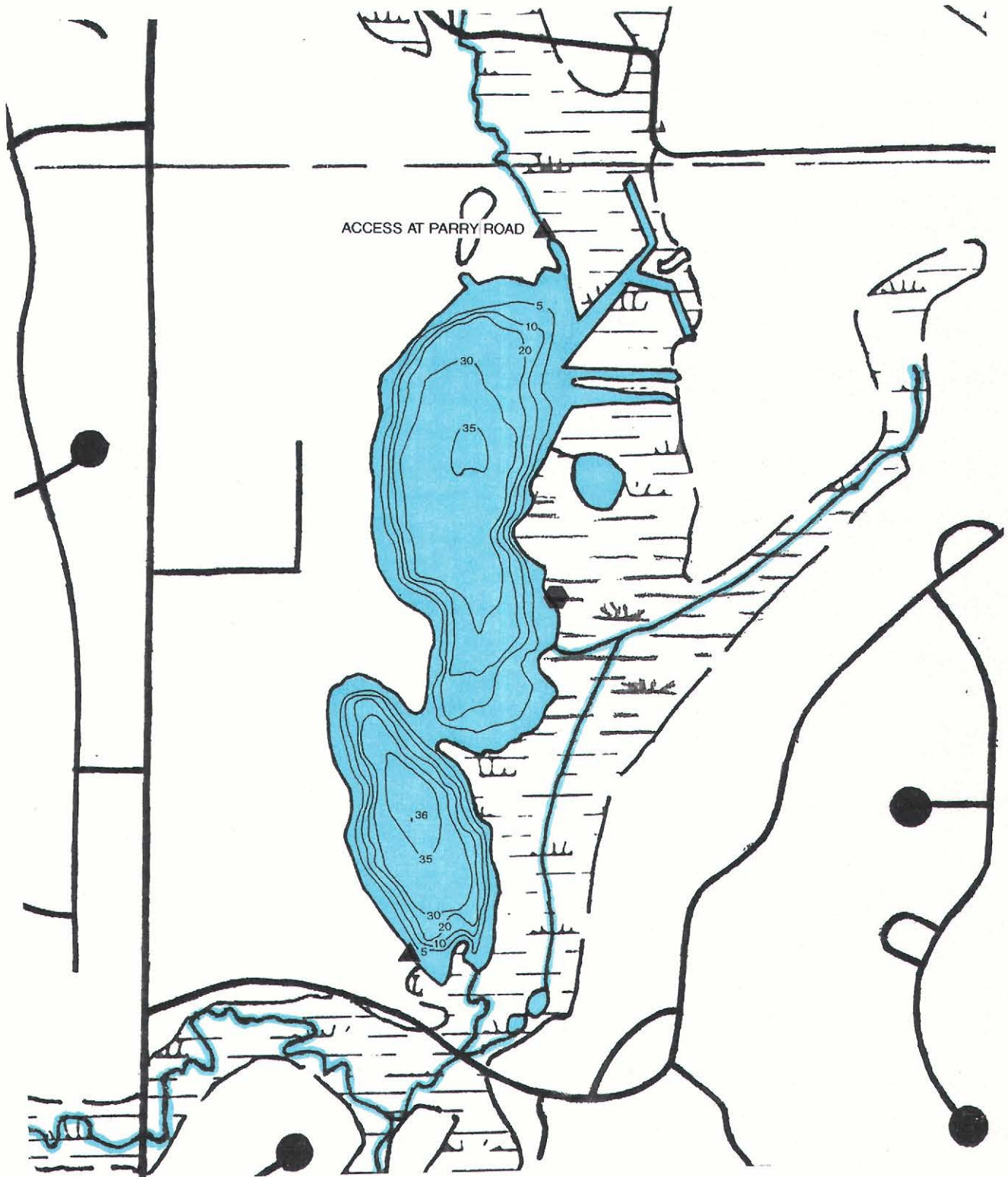
Parameter	Characteristic Data
Surface Area	57 acres
Volume	1,140 acre-feet
Shoreline Length	1.8 miles
Maximum Depth	46 feet
Mean Depth	20 feet
Tributary Drainage Area	10,145 acres

Source: SEWRPC.

¹SEWRPC Planning Report No. 40, A Regional Land Use Plan for Southeastern Wisconsin—2010, January 1992.

²SEWRPC Community Assistance Planning Report No. 209, A Development Plan for Waukesha County, Wisconsin, August 1996.

BATHYMETRIC MAP OF HUNTERS LAKE

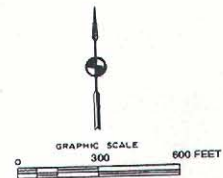


LEGEND

 20 WATER DEPTH CONTOUR IN FEET

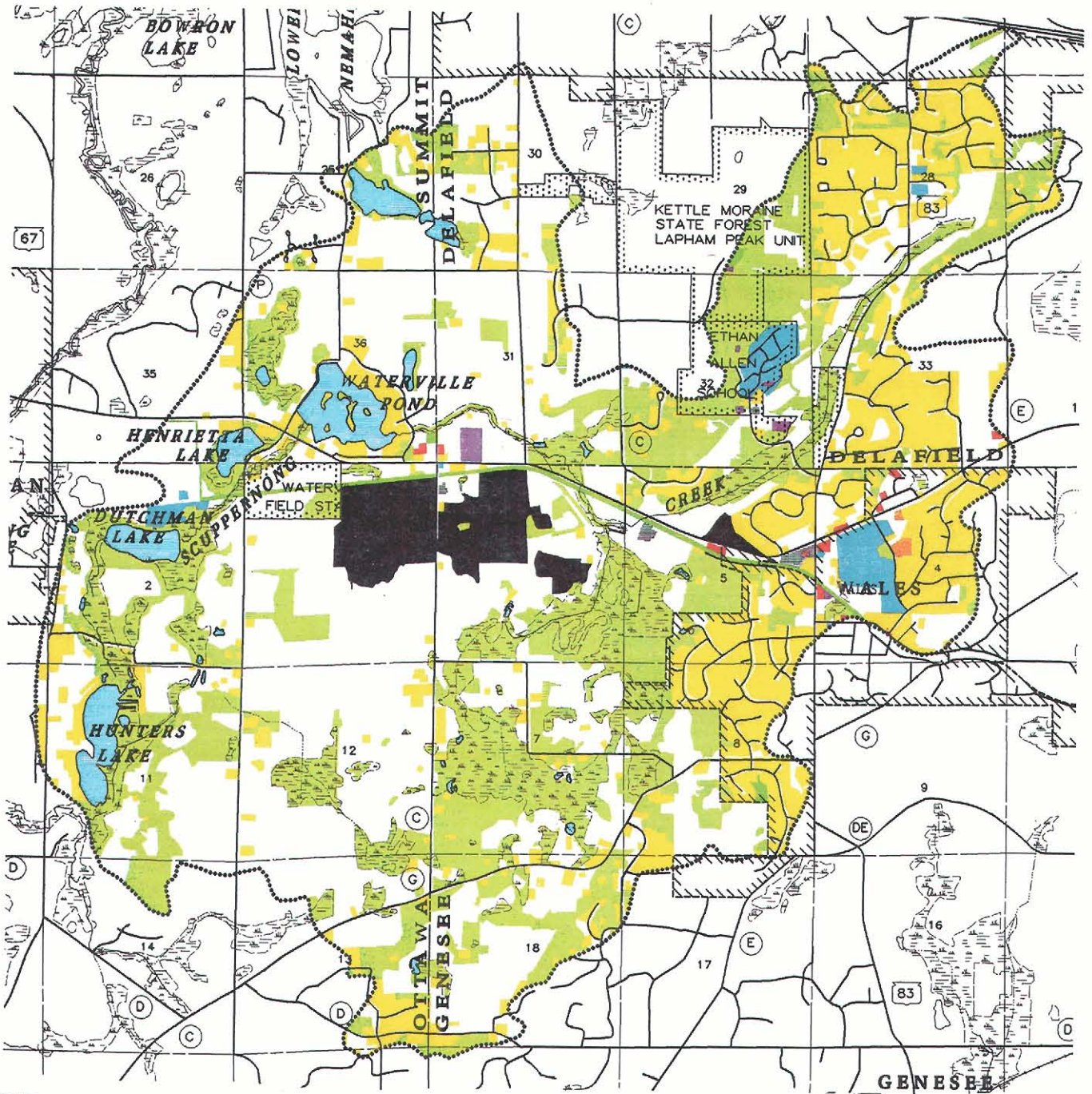
 PUBLIC ACCESS SITES

 PRIVATE ACCESS SITE



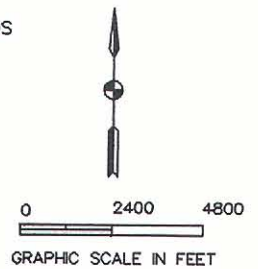
Map 3

EXISTING LAND USES WITHIN THE DRAINAGE AREA TRIBUTARY TO HUNTERS LAKE: 1990



LEGEND

- SINGLE-FAMILY RESIDENTIAL
- MULTI-FAMILY RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL
- TRANSPORTATION, COMMUNICATIONS AND UTILITIES
- GOVERNMENT AND INSTITUTIONAL
- RECREATIONAL
- SURFACE WATER
- WOODLANDS AND WETLANDS
- AGRICULTURAL, UNUSED AND OTHER OPEN LANDS
- EXTRACTIVE AND LANDFILL



Source: SEWRPC.

Table 2

EXISTING LAND USE FOR THE DRAINAGE AREA TRIBUTARY TO HUNTERS LAKE: 1990

Land Use Category	Acres	Percent of Category	Percent of Total Area
Urban			
Residential	1,695.4	72.1	17.0
Commercial	10.3	<1.0	<1.0
Industrial	12.5	<1.0	<1.0
Transportation, Communication, and Utilities	450.7	19.2	4.4
Governmental and Institutional	122.8	5.2	1.2
Recreational	58.2	2.5	1.0
Subtotal	2,349.9	100.0	23.6
Rural			
Agricultural	3,411.9	43.8	34.0
Wetland	1,099.4	14.2	10.8
Woodland	1,672.2	21.4	16.4
Open Lands	1,014.8	13.0	10.0
Surface Water	269.3	3.4	3.0
Extractive	327.8	4.2	3.2
Subtotal	7,795.4	100.0	76.4
Total	10,145.3	--	100.0

Source: SEWRPC.

northeast of Hunters Lake in the Towns of Ottawa and Genesee, is also anticipated under the county development plan (see Map 5).

WATER QUALITY

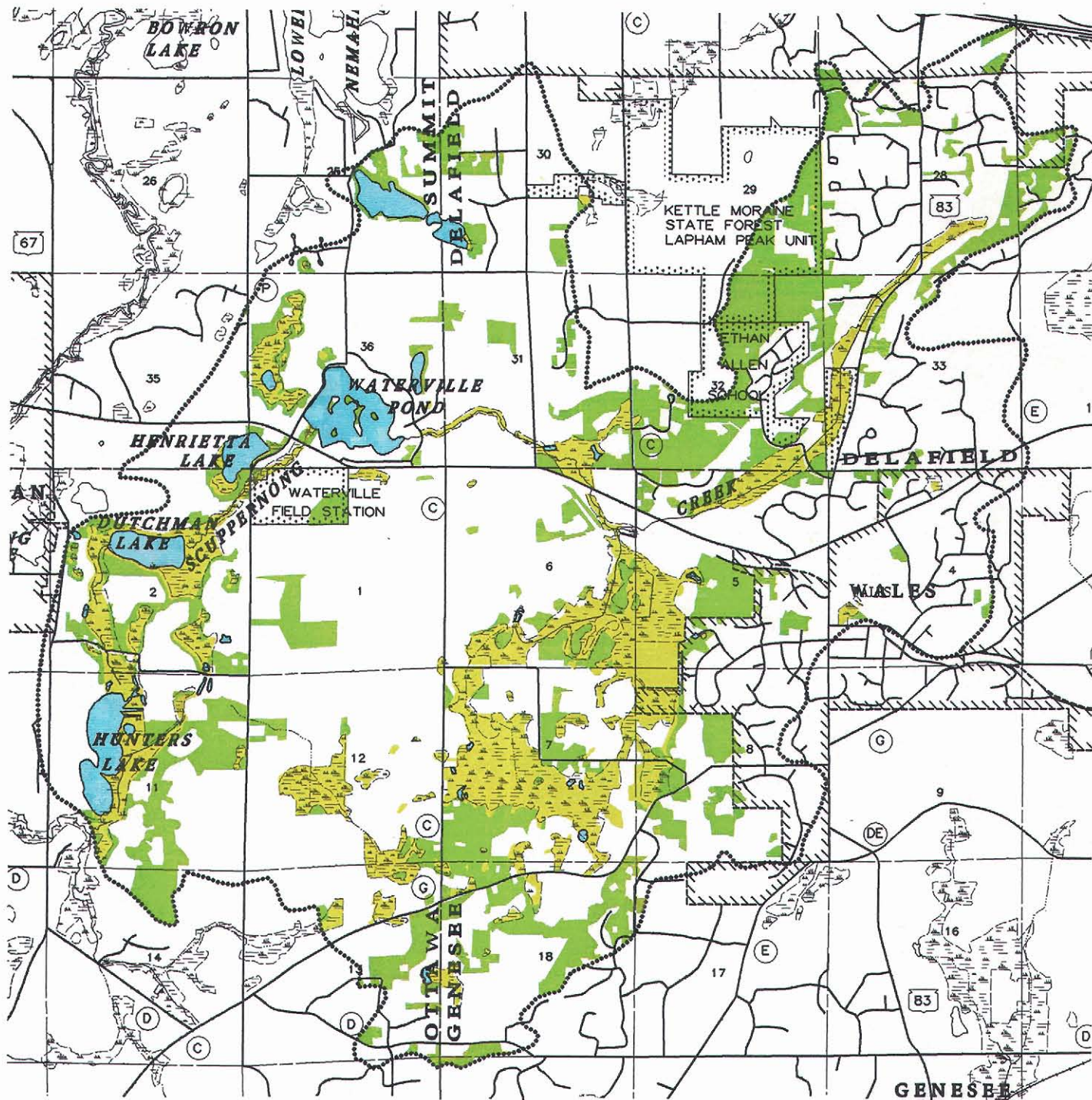
Based on Secchi-disk transparency measurements obtained by the Hunters Lake Association under the auspices of the DNR Self-Help Monitoring Program, Hunters Lake has good to very good water quality. The Lake has a Wisconsin Trophic State Index value of 44, indicating the Lake is a mesotrophic waterbody which status is supported by data shown in Figure 1.³ Mesotrophic lakes are moderately fertile lakes that support abundant aquatic plant growths 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.⁴

³R.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.

⁴See 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 Water Quality Management Plan for Southeastern Wisconsin: Update and Status Report*, March 1995.

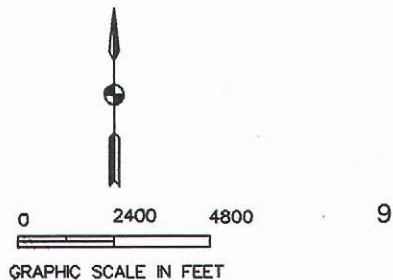
Map 4

EXISTING WETLANDS AND WOODLANDS WITHIN THE DRAINAGE AREA TRIBUTARY TO HUNTERS LAKE



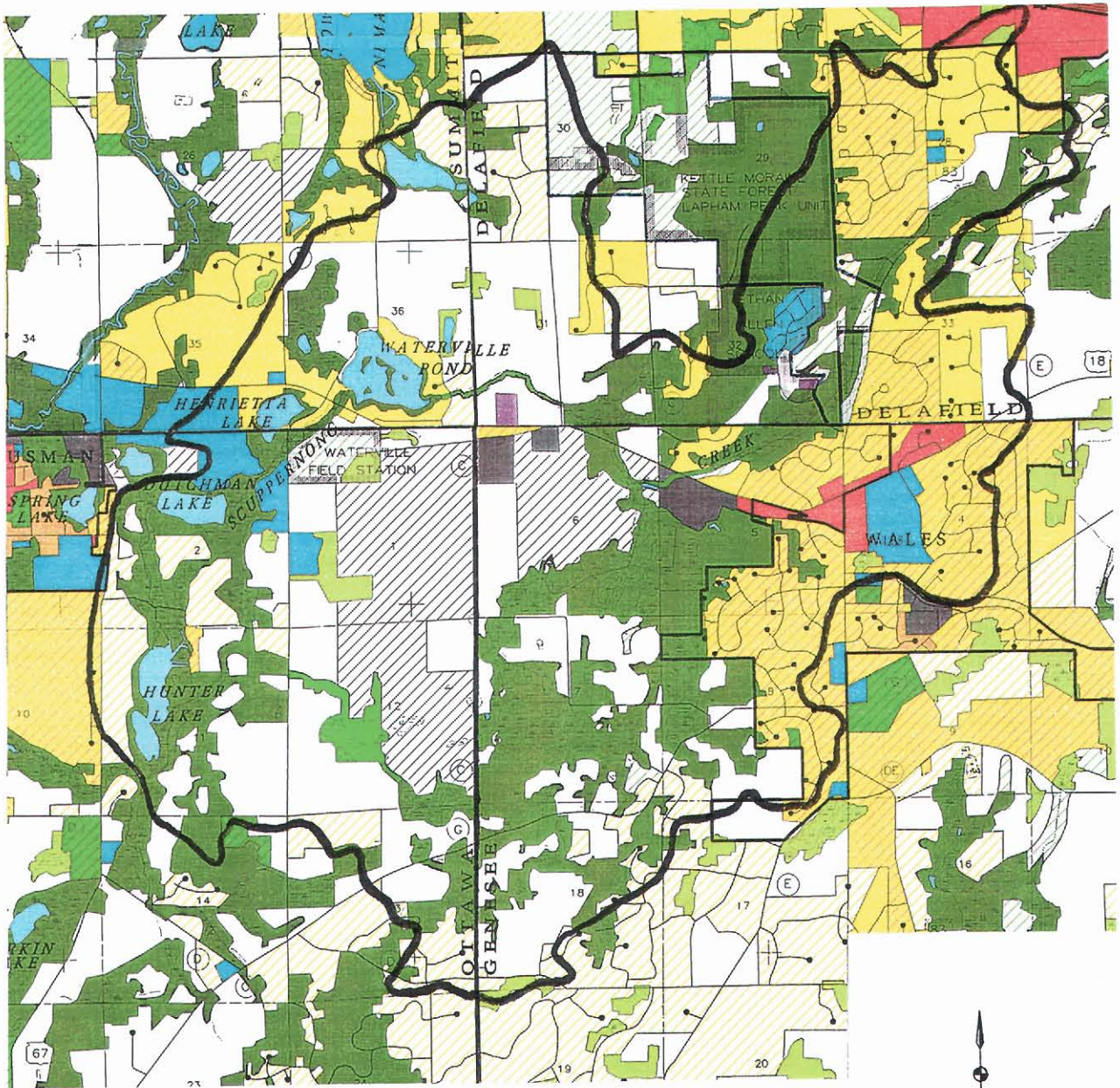
- LEGEND**
- WOODLANDS
 - WETLANDS
 - SURFACE WATER

Source: SEWRPC.



Map 5

PLANNED LAND USES WITHIN THE DRAINAGE AREA TRIBUTARY TO HUNTERS LAKE: BUILDOUT



LEGEND

GENERALIZED PLANNED LAND USE CATEGORY

- HIGH DENSITY RESIDENTIAL
(less than 6,000 square feet of lot area per dwelling unit)
- MEDIUM DENSITY RESIDENTIAL
(6,000-19,999 square feet of lot area per dwelling unit)
- LOW DENSITY RESIDENTIAL
(20,000 square feet to 1.4 acres of lot area per dwelling unit)
- SUBURBAN I DENSITY RESIDENTIAL
(1.5 to 2.9 acres of lot area per dwelling unit)
- SUBURBAN II DENSITY RESIDENTIAL
(3.0 to 4.9 acres of lot area per dwelling unit)
- RURAL DENSITY RESIDENTIAL
AND OTHER AGRICULTURAL LANDS

- COMMERCIAL
- INDUSTRIAL
- GOVERNMENTAL AND INSTITUTIONAL
- RECREATIONAL
- TRANSPORTATION, COMMUNICATION, AND UTILITIES
- EXTRACTIVE
- LANDFILL

- PRIMARY ENVIRONMENTAL CORRIDOR
- SECONDARY ENVIRONMENTAL CORRIDOR
- ISOLATED NATURAL RESOURCE AREA
- OTHER OPEN LANDS TO BE PRESERVED
- PRIME AGRICULTURAL
- WATER

0 2400 4800

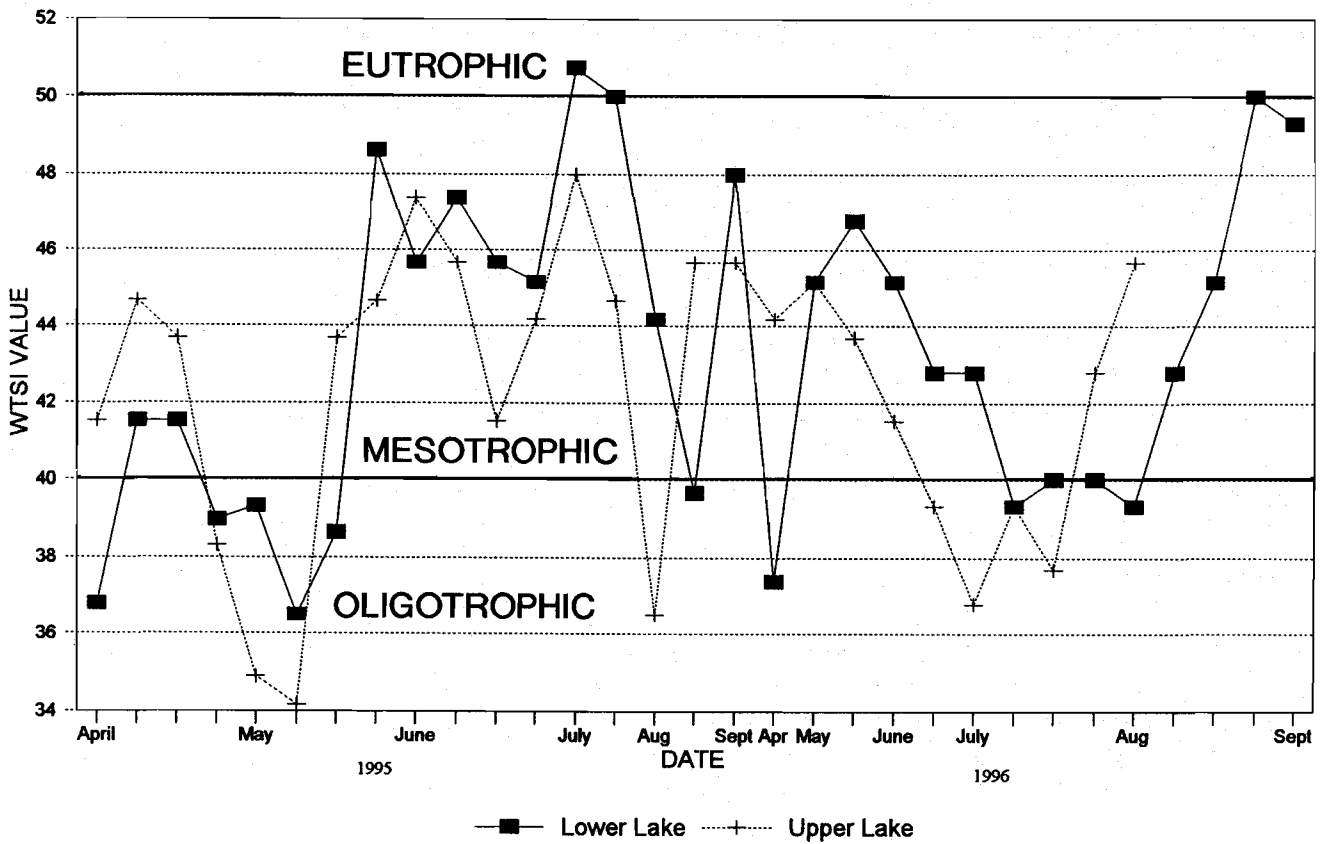
GRAPHIC SCALE IN FEET



ADOPTED WISCONSIN DEPARTMENT OF NATURAL RESOURCE PROJECT BOUNDARY

Figure 1

TROPHIC STATUS INDEX FOR CLARITY



Source: Mr. Patrick Buckley, Hunters Lake Self-Help Monitor and SEWRPC.

Because of the limited amount of field data available, estimates of long-term annual average phosphorus and chlorophyll-a concentrations were calculated from Secchi-disk transparency values using the regression relationships, or Vollenweider suite of trophic state equations, developed by the Organization for Economic Co-Operation and Development (OECD).⁵ An annual average phosphorus value of 30 micrograms per liter ($\mu\text{g/l}$), and an annual average chlorophyll-a concentration of 5.4 $\mu\text{g/l}$ were calculated. These values compared well with the observed Lake data collected by the Commission staff and the Hunters Lake Association citizen monitors during the summers of 1995 and 1996. Observed phosphorus concentrations during this period were reported as 10 to 30 $\mu\text{g/l}$, with a corresponding chlorophyll-a concentration of about 1.8 to 3.8 $\mu\text{g/l}$. This would suggest that the Lake had some humic coloration which depressed the chlorophyll-a value relative to the suite of lakes used to develop the Vollenweider models, although neither the predicted nor the observed chlorophyll-a concentrations are indicative of water quality problems.

⁵ Organization for Economic Co-operation and Development, *Eutrophication Of Waters Monitoring, Assessment and Control*, Paris, 1982.

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, and by way of inflowing streams. Pollutants transported by the atmosphere are deposited onto the surface of the lake as dry fallout and direct precipitation. Pollutants transported 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 drainage, or through-flow lakes, like Hunters Lake, pollutant 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 loads transported to Hunters Lake by inflowing streams.

The nonpoint source pollutant loads to Hunters Lake were estimated on the basis of land use inventory data and unit area load coefficients determined for Southeastern Wisconsin.⁷ Annual contaminant loads entering Hunters Lake were calculated to be approximately 885 tons of sediment, 3,828 pounds of phosphorus, and 16 pounds and 533 pounds of copper and zinc, respectively (see Table 3). Copper and zinc were used in this analysis as surrogates for metals and other pollutants that are contributed primarily from urban sources.

To validate the estimated contaminant loads to Hunters Lake, Commission staff applied the estimated phosphorus load of 3,828 pounds in the aforementioned 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 between 30 and 35 $\mu\text{g/l}$, which values correspond closely to the observed phosphorus concentration of 10 to 30 $\mu\text{g/l}$ measured in the Lake. This agreement would suggest that the estimated contaminant loads are a reasonable representation of the loads entering Hunters Lake, and that other pollutant sources, including internal loading, to Hunters Lake are relatively small compared to the loading from external sources. No data are available from which to assess the magnitude of loading to Hunters Lake from internal, atmospheric, or groundwater sources.

As noted above, under buildout conditions, significant urban development, largely in the form of residential development at overall low densities, is expected to occur in the drainage area tributary to Hunters Lake. This change has the potential to increase the pollutant loadings to the Lake associated with urbanization. Such impacts would be minimized by use of residential development clusters on smaller lots, preserving the majority of the remaining open spaces, and by the use of stormwater management and construction site erosion controls.

A field survey of the single-family residential development in The Preserve Subdivision was conducted by Commission staff during August 1995. The sites that were under construction at that time were served by adequately installed and maintained erosion control measures. The installed erosion control structures were observed to have contained materials eroded by the heavy rains that preceded the field inspection.

Table 3 shows the relative percentage contributions of the various land uses to the pollutant loads to Hunters Lake. The data indicate that, based on 1990 land use conditions in the Hunters Lake watershed, 81 percent

⁶Sven-Olof Ryding and Walter Rast, *The Control of Eutrophication of Lakes and Reservoirs*, *Unesco Man and the Biosphere Series, Volume 1*, Parthenon Press, Carnforth, 1989.

⁷See SEWRPC Memorandum Report No. 101, *Upper Nemahbin Lake Watershed Inventory Findings*, *Waukesha County, Wisconsin, May 1995, for a description of the methodology employed.*

Table 3

FORECAST ANNUAL POLLUTANT LOADINGS TO HUNTERS LAKE BY LAND USE CATEGORY: 1990

Land Use Category	Pollutant Loads							
	Sediment		Phosphorus		Zinc		Copper	
	Tons	Percent	Pounds	Percent	Pounds	Percent	Pounds	Percent
Urban								
Residential	17	2	343	9	23	4	1	6
Commercial	4	<1	12	<1	15	3	2	13
Industrial	5	<1	15	<1	19	4	3	19
Communication, Utilities, and Transportation	24	3	49	1	378	71	1	6
Governmental and Institutional	31	3	166	4	98	18	9	56
Recreational	1	<1	16	<1	0	0	0	0
Subtotal	82	9	601	16	533	100	16	100
Rural								
Agricultural	767	87	2,934	77	0	0	0	0
Wetlands	2	<1	44	<1	0	0	0	0
Woodlands	3	<1	67	2	0	0	0	0
Open Lands	6	<1	147	4	0	0	0	0
Surface Water	25	3	35	1	0	0	0	0
Subtotal	803	91	3,227	84	0	0	0	0
Total Load	885	100	3,828	100	533	100	16	100

Source: SEWRPC.

of the phosphorus load to Hunters Lake is contributed from agricultural and open lands within the tributary drainage area; about 4 percent from wetlands, woodlands, and surface waters; and, about 9 percent from residential areas. Nine percent of the sediment load is generated from urban sources, 87 percent from agricultural and open lands, and about 4 percent from woodlands, wetlands and surface water sources, as set forth in Table 3.

Of the controllable pollutant sources, the most significant sources under existing land use conditions vary with the particular pollutants of concern. Agricultural lands are the principal sources of sediment and phosphorus loads to Hunters Lake, while urban lands generate the largest percentage of the metals loadings. Control of contaminants from these various sources can be effected through a variety of measures as set forth in Chapter IV.

GROUNDWATER RESOURCES

Groundwater resources constitute an extremely valuable element of the natural resource base related to Hunters Lake, both as a source of water supply and as a component of the surface water system. Groundwater in the vicinity of Hunters Lake moves within two distinct systems: a shallow water table system,⁸ and a deep artesian system. The shallow water table system consists of glacial deposits and bedrock near the surface. The deep artesian system is separated from the surface and the water table by a relatively impermeable layer of Maquoketa shale, and includes all bedrock, mostly sandstone, below the Maquoketa shale and above the crystalline Precambrian basement rocks. In the area immediately west of

⁸The water table is the upper limit of the portion of the ground which is fully saturated with water.

Hunters Lake, the sandstone is overlain directly by glacial deposits with no complete, confining layer of shale, as shown on Map 6 and in Figure 2.

Groundwater is available from three aquifers.⁹ From the land surface downward, they are the sand and gravel glacial drift aquifer, part of the shallow system; the Niagara aquifer, also part of the shallow system; and, the sandstone aquifer, comprising the deep artesian system. The glacial drift aquifer, consisting of water-bearing sand and gravel, is relatively thin, less than 100 feet in thickness, in the vicinity of Hunters Lake. The Niagara aquifer thickness is also less than 100 feet in thickness in the vicinity of Hunters Lake. The deep sandstone aquifer ranges from 800 to 1,200 feet in thickness in the vicinity of Hunters Lake. The shallow sand and gravel aquifer is the most significant in terms of its relationship with Hunters Lake and its tributary surface waters and adjacent wetlands. The groundwater in that aquifer flows from east to west across the Lake, as shown on Map 7.¹⁰

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 structure 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 Hunters Lake area in 1966.¹¹ Using the regional soil survey, an assessment was made of the hydrologic characteristics of the soils in the tributary drainage area to Hunters Lake. Soils within the tributary area to Hunters Lake were categorized into four main hydrologic soil groups, as well as an "other" category, as indicated on Map 8. Approximately 82 percent of the total tributary drainage area is covered by moderately drained soils, and about 10 percent of the tributary drainage area by very poorly drained soils, with the remaining areas of the watershed being surface water as shown on Map 8.

The regional soil survey also contained interpretations for planning and engineering applications. The suitability of the soils for urban residential development was assessed using three common development scenarios: development with conventional onsite sewage disposal systems; development with alternative onsite sewage disposal systems; and development with public sanitary sewers. At present, all residential lands in the drainage area tributary to Hunters Lake are served by private onsite sewage disposal systems. The soil suitability interpretations for the use of such systems were updated by the Regional Planning Commission based upon the soil characteristics provided by the detailed soil surveys and the field experience of County and State technicians responsible for overseeing the location and design of such systems. The classifications reflect the current soil and site specifications set forth in Chapter ILHR 83 of the Wisconsin Administrative Code. As shown on Map 9, about 55 percent of the drainage area tributary to Hunters Lake is covered by soils considered suitable for onsite sewage disposal using conventional onsite sewage disposal systems. About 16 percent of the drainage area is covered by soils unsuitable for such systems. The remainder of the drainage area has not been classified—about 3 percent, or is undetermined—about 24 percent, with the balance consisting of surface waters—about 2 percent. Considering the use of alternative

⁹An aquifer is a water-bearing stratum of rock, sand or gravel.

¹⁰J.B. Gonthier, *U.S. Geological Survey Water-Resources Investigations Open-File Report No. 79-43, Water-Table Map of Waukesha County, Wisconsin, May 1979.*

¹¹SEWRPC Planning Report No. 8, *The Soils of Southeastern Wisconsin, June 1966.*

Map 6

BEDROCK GEOLOGY AND STRUCTURE CONTOURS ON THE BASE OF THE MAQUOKETA SHALE

LEGEND

DEVONIAN

 DEVONIAN DOLOMITE AND SHALE, UNDIFFERENTIATED

SILURIAN

 SILURIAN DOLOMITE, UNDIFFERENTIATED

ORDOVICIAN

 MAQUOKETA SHALE

 GALENA-PLATTEVILLE UNIT; GALENA DOLOMITE, DECORAH AND PLATTEVILLE FORMATIONS, UNDIFFERENTIATED

 ST. PETER SANDSTONE

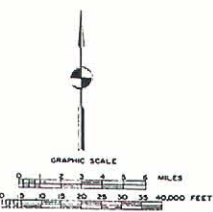
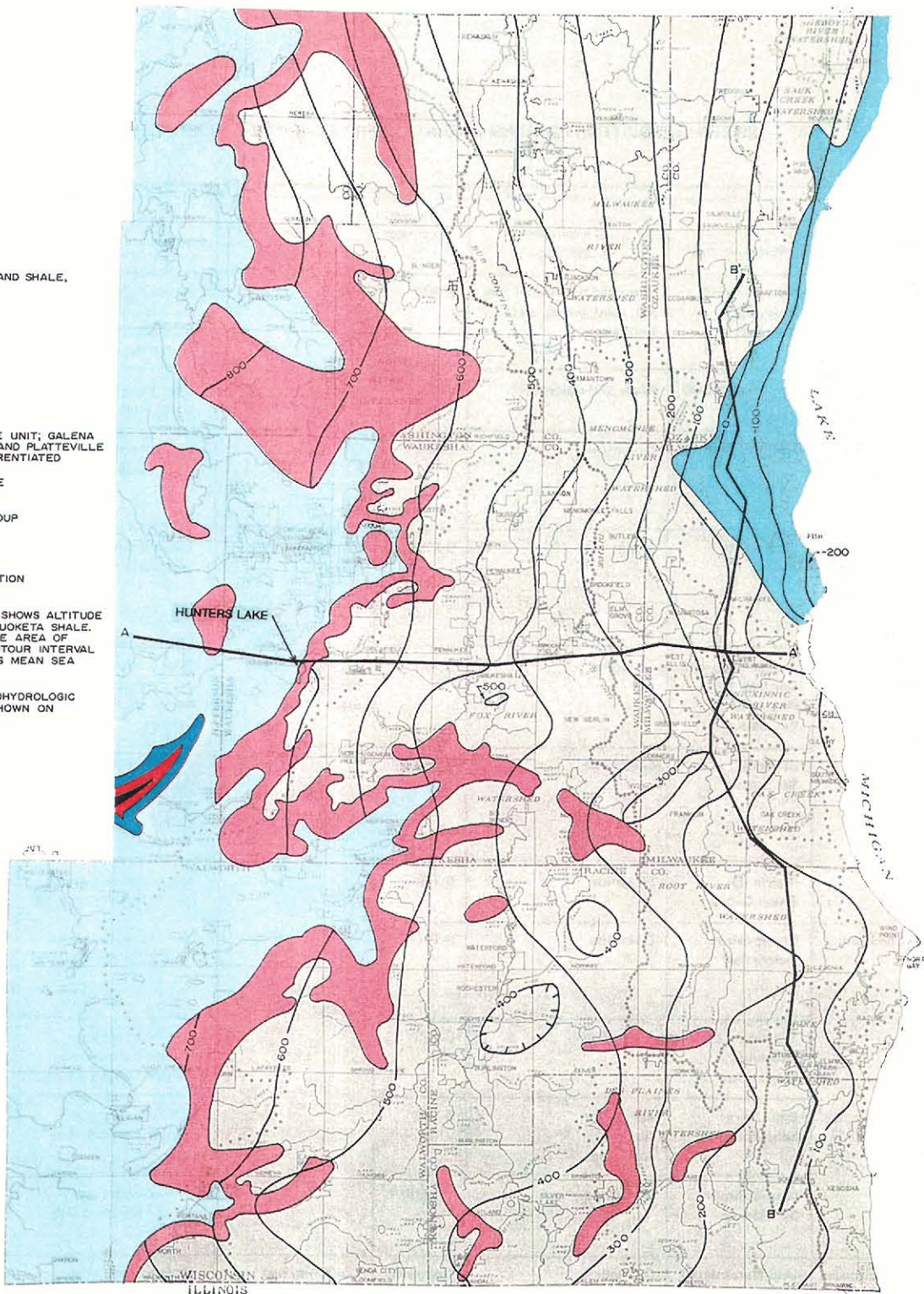
 PRAIRIE DU CHIEN GROUP

CAMBRIAN

 TREMPLEALEU FORMATION

-400- STRUCTURE CONTOUR SHOWS ALTITUDE OF BASE OF THE MAQUOKETA SHALE. HACHURED TO INDICATE AREA OF LOWER ALTITUDE CONTOUR INTERVAL IS 100 FEET. DATUM IS MEAN SEA LEVEL.

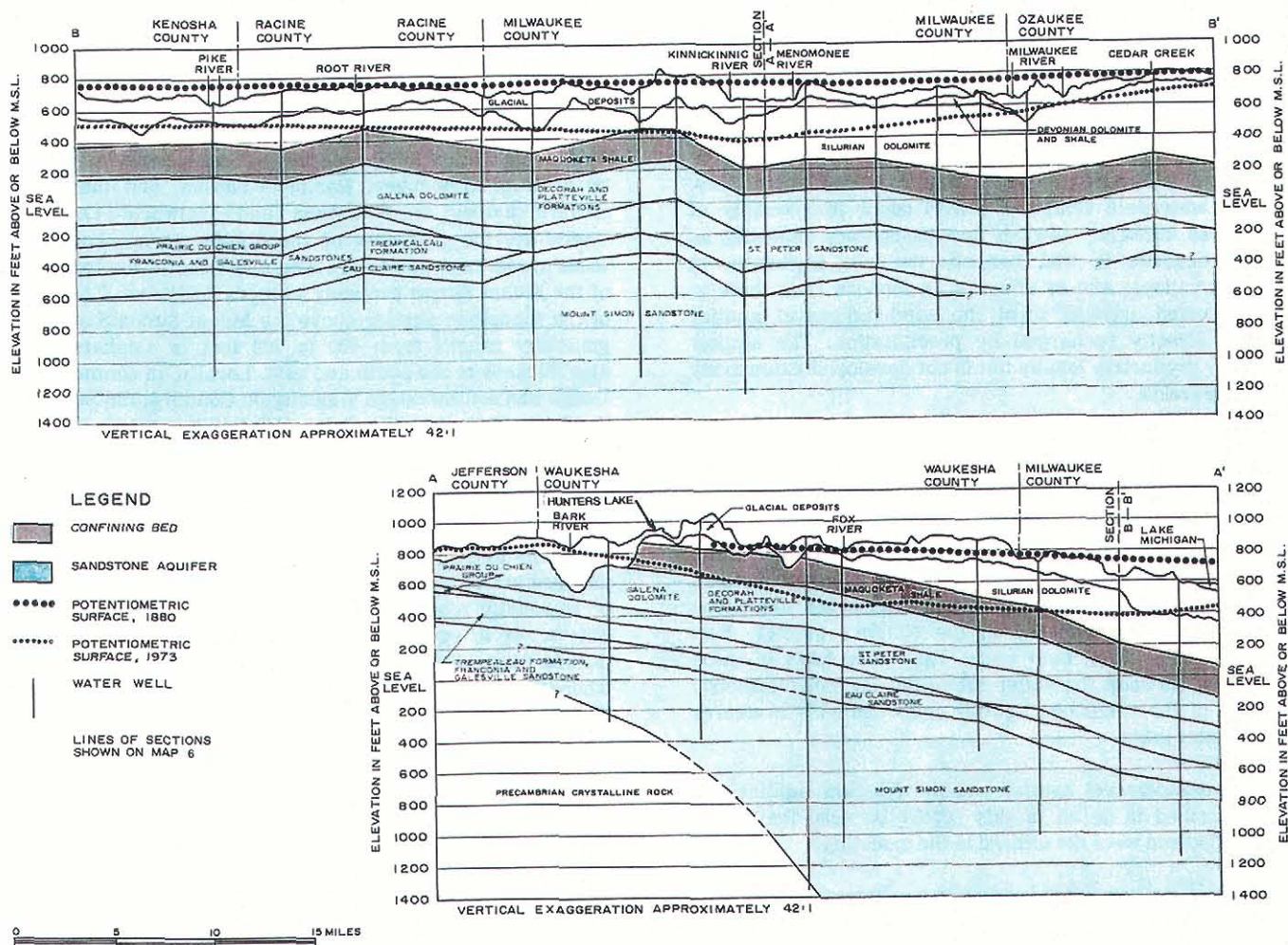
A—A' DENOTES LINE OF GEOHYDROLOGIC SECTION, SECTIONS SHOWN ON FIGURE 2



Source: U. S. Geological Survey.

Figure 2

GEOHYDROLOGIC SECTION THROUGH SOUTHEASTERN WISCONSIN



Source: U. S. Geological Survey.

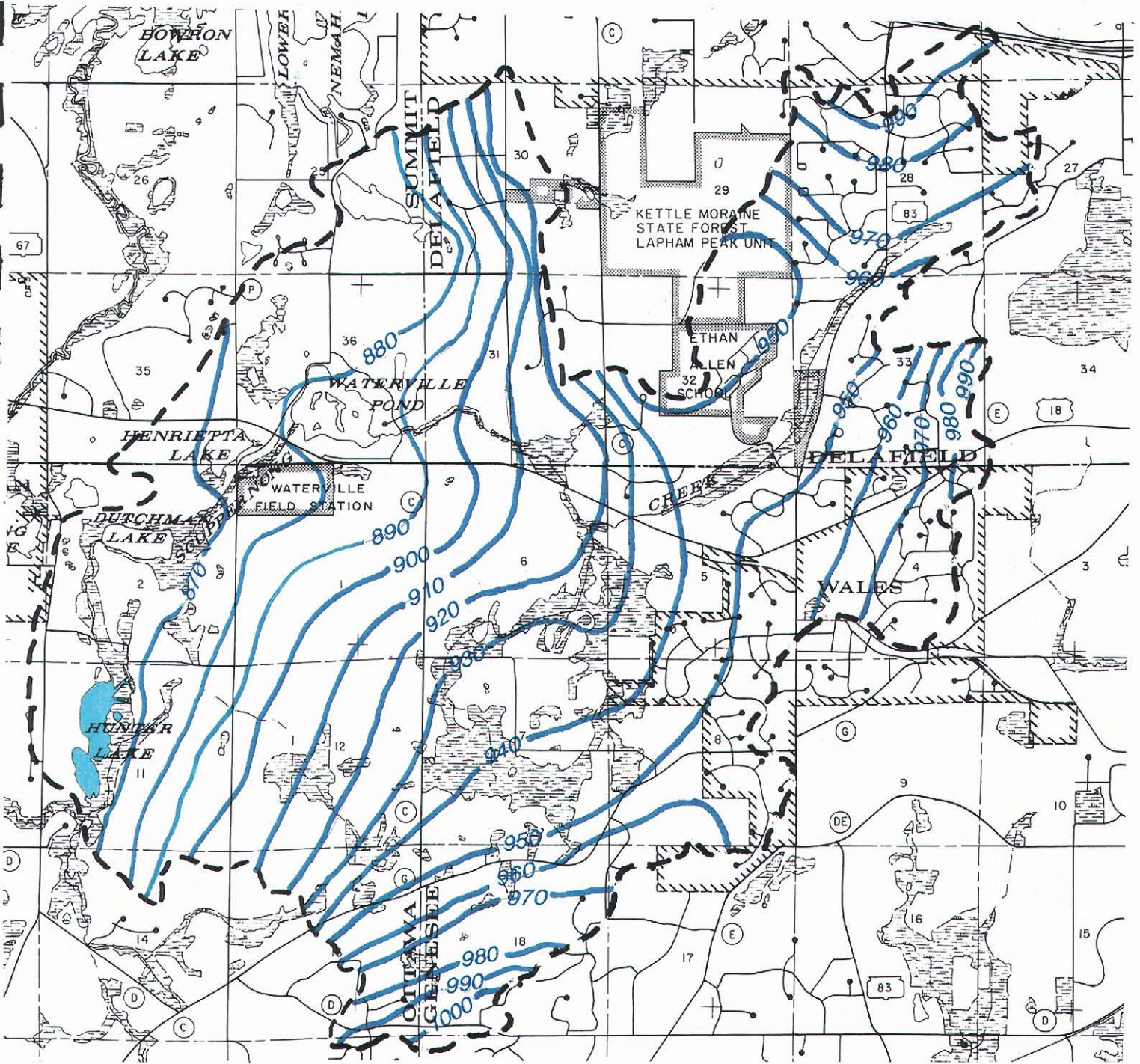
onsite wastewater treatment methods, as shown on Map 10, such as mound systems, does not appreciably change these determinations. About 28 percent of the tributary drainage area has soils unsuited to residential development even with public sanitary sewer service (see Map 11).

AQUATIC PLANTS, DISTRIBUTION, AND MANAGEMENT AREAS

A survey of aquatic plant species in the Lake basin was conducted by Commission staff during July 1995. The results of this survey are presented in Table 4, and graphically depicted on Map 12. Illustrations of the common aquatic plants found in Hunters Lake are included in Appendix A.

The flora of the lake basin is relatively impoverished compared with that of the wetlands and shorelands along the eastern, northern, and southern edges of the Lake. The flora of the Lake basin was extremely sporadic and sparse relative to other Lakes in the Region. Fourteen species of aquatic plants were recorded within the Lake basin. All of the plants are commonly observed in lakes within the Region. However, all

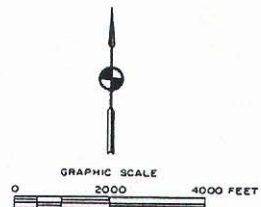
WATER TABLE DEPTH WITHIN THE DRAINAGE AREA TRIBUTARY TO HUNTERS LAKE



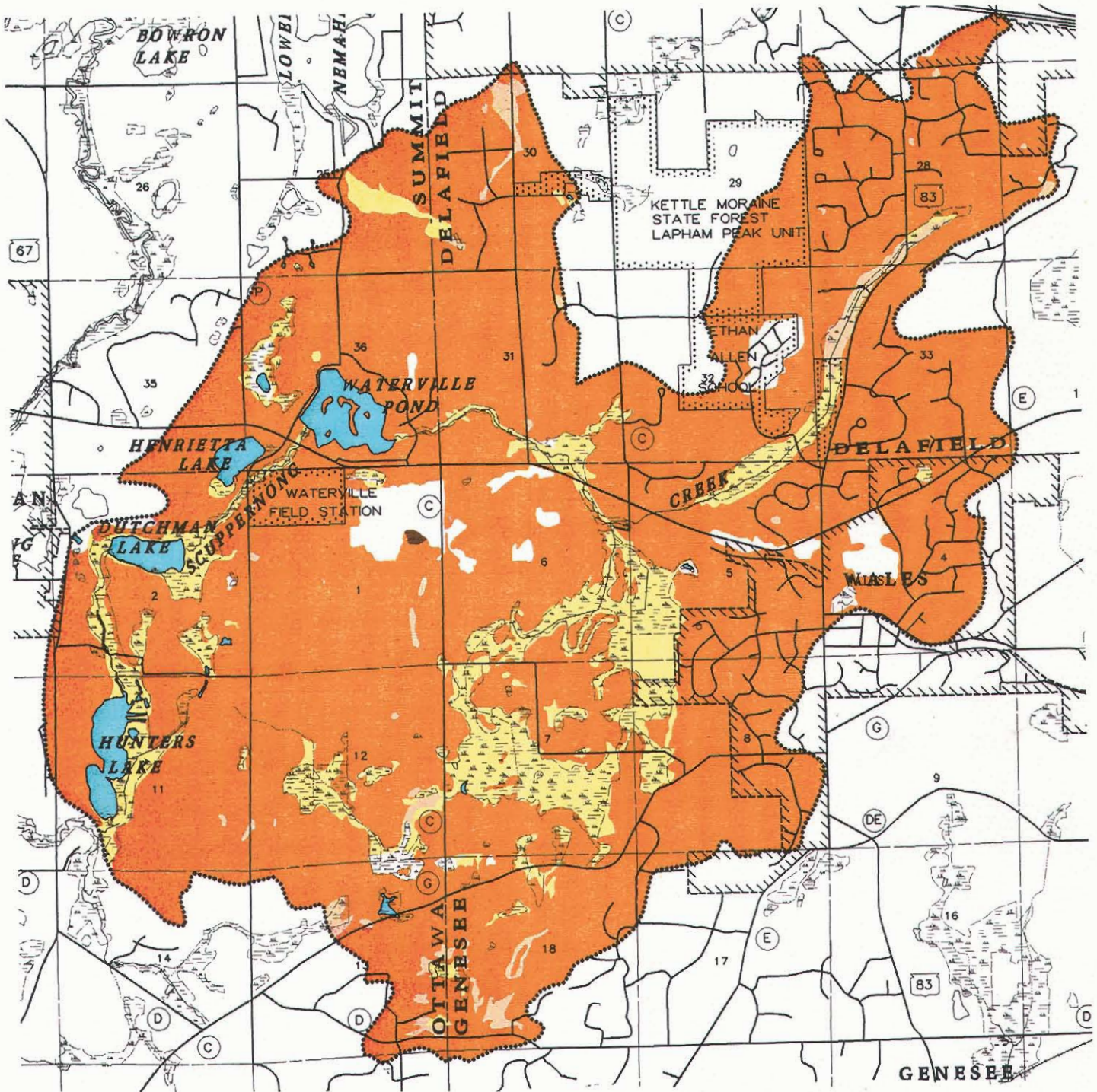
LEGEND

 BOUNDARY OF DRAINAGE AREA TRIBUTARY TO HUNTERS LAKE

 CONTOUR OF GROUNDWATER IN FEET



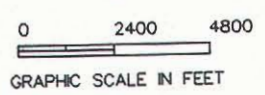
HYDROLOGIC SOIL GROUPS WITHIN THE DRAINAGE AREA TRIBUTARY TO HUNTERS LAKE



LEGEND

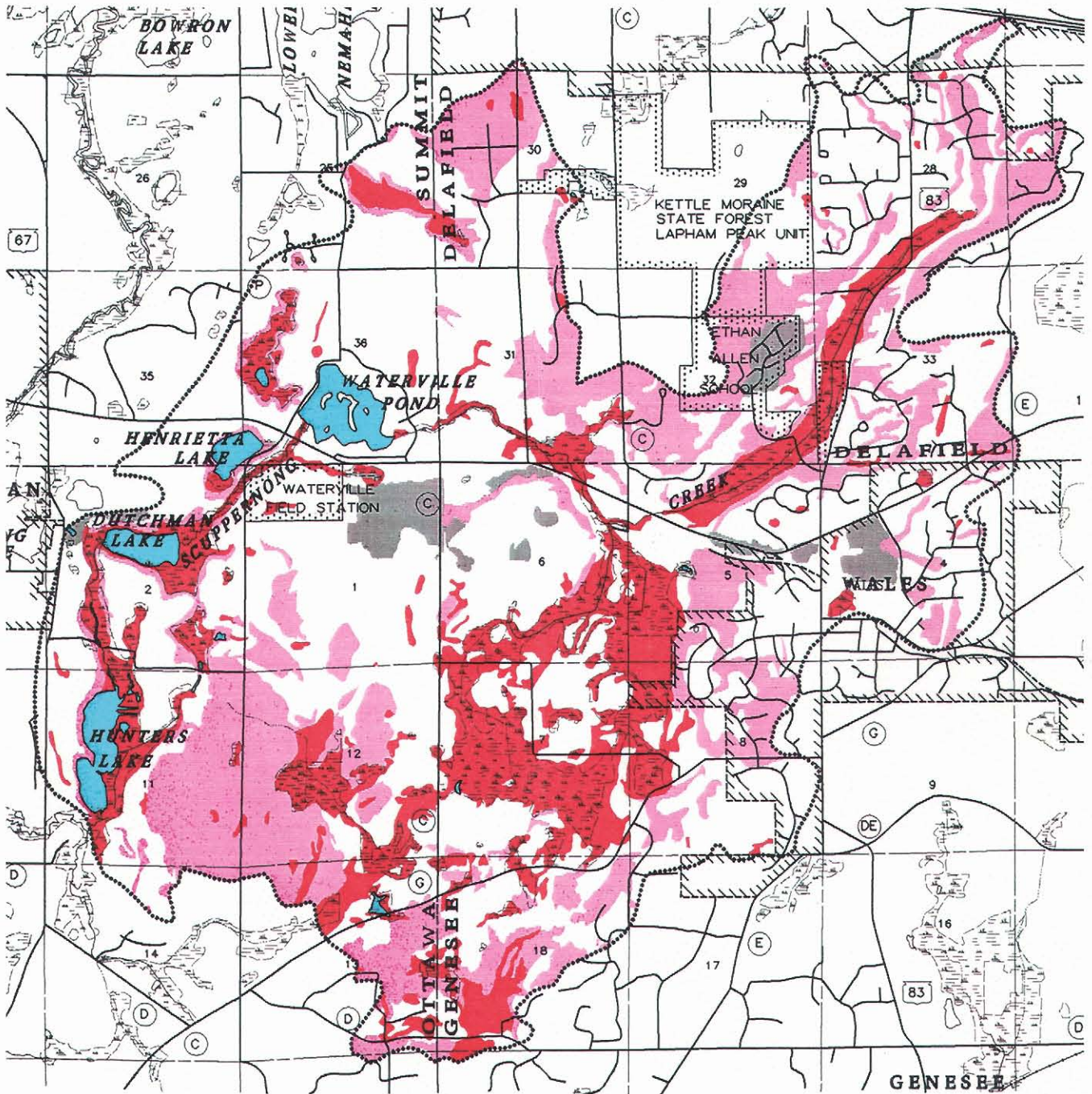
- GROUP A: Well-drained soils
- GROUP B: Moderately-drained soils
- GROUP C: Poorly-drained soils
- GROUP D: Very poorly-drained soils
- Hydrologic soil group not determined
- SURFACE WATER

Source: SEWRPC.



Map 9

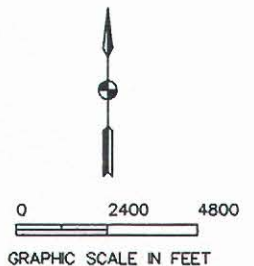
SUITABILITY OF SOILS WITHIN THE DRAINAGE AREA TRIBUTARY TO HUNTERS LAKE FOR CONVENTIONAL ONSITE SEWAGE DISPOSAL SYSTEMS UNDER CURRENT ADMINISTRATIVE RULES: FEBRUARY 1991



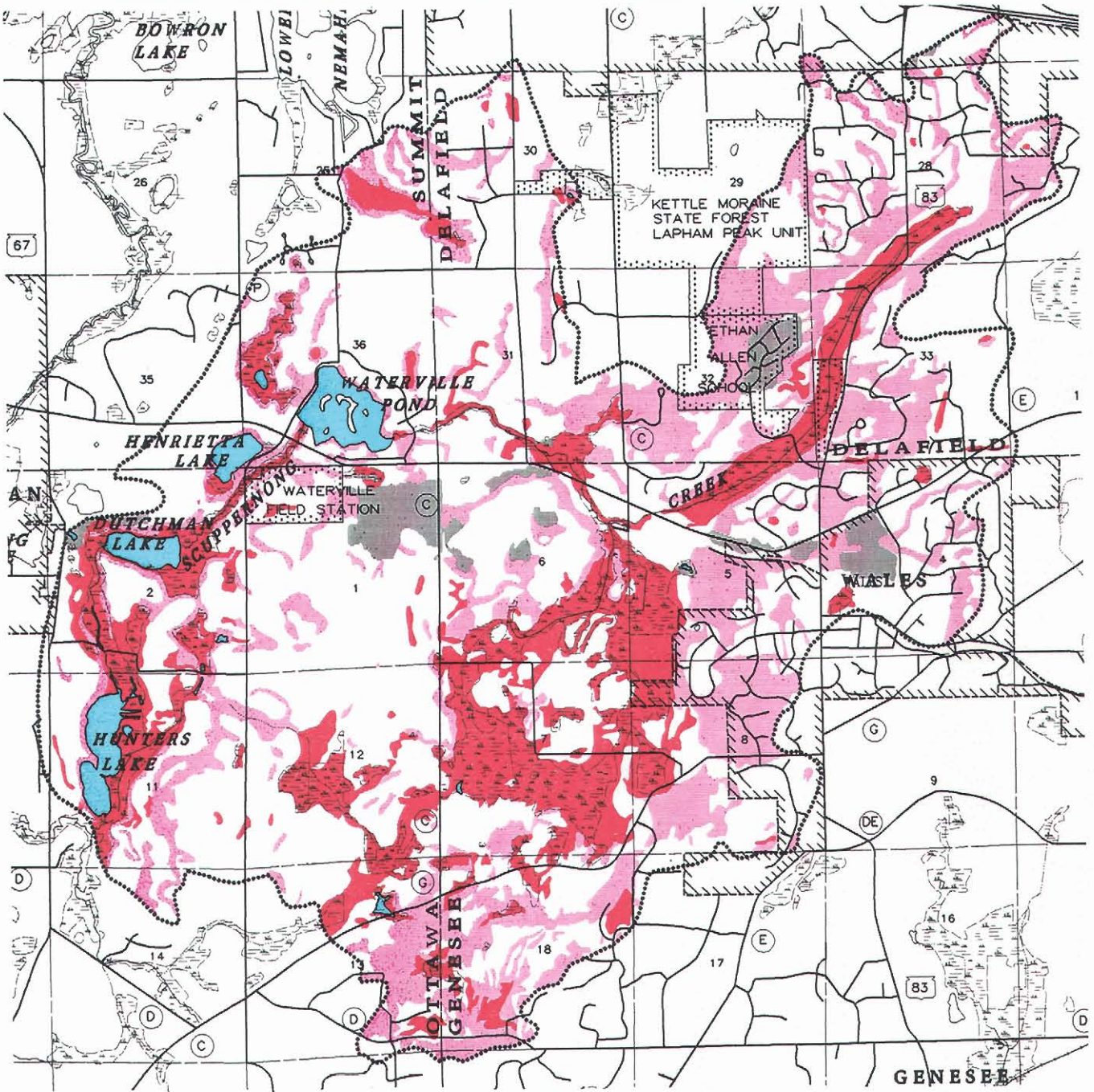
LEGEND

- UNSUITABLE: Areas covered by soils which have a high probability of not meeting the criteria of Chapter ILHR 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 criteria of Chapter ILHR 83 of 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 criteria of Chapter ILHR 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

Source: SEWRPC.

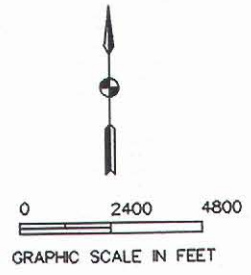


SUITABILITY OF SOILS WITHIN THE DRAINAGE AREA TRIBUTARY TO HUNTERS LAKE FOR MOUND SEWAGE DISPOSAL SYSTEMS UNDER CURRENT ADMINISTRATIVE RULES: FEBRUARY 1991

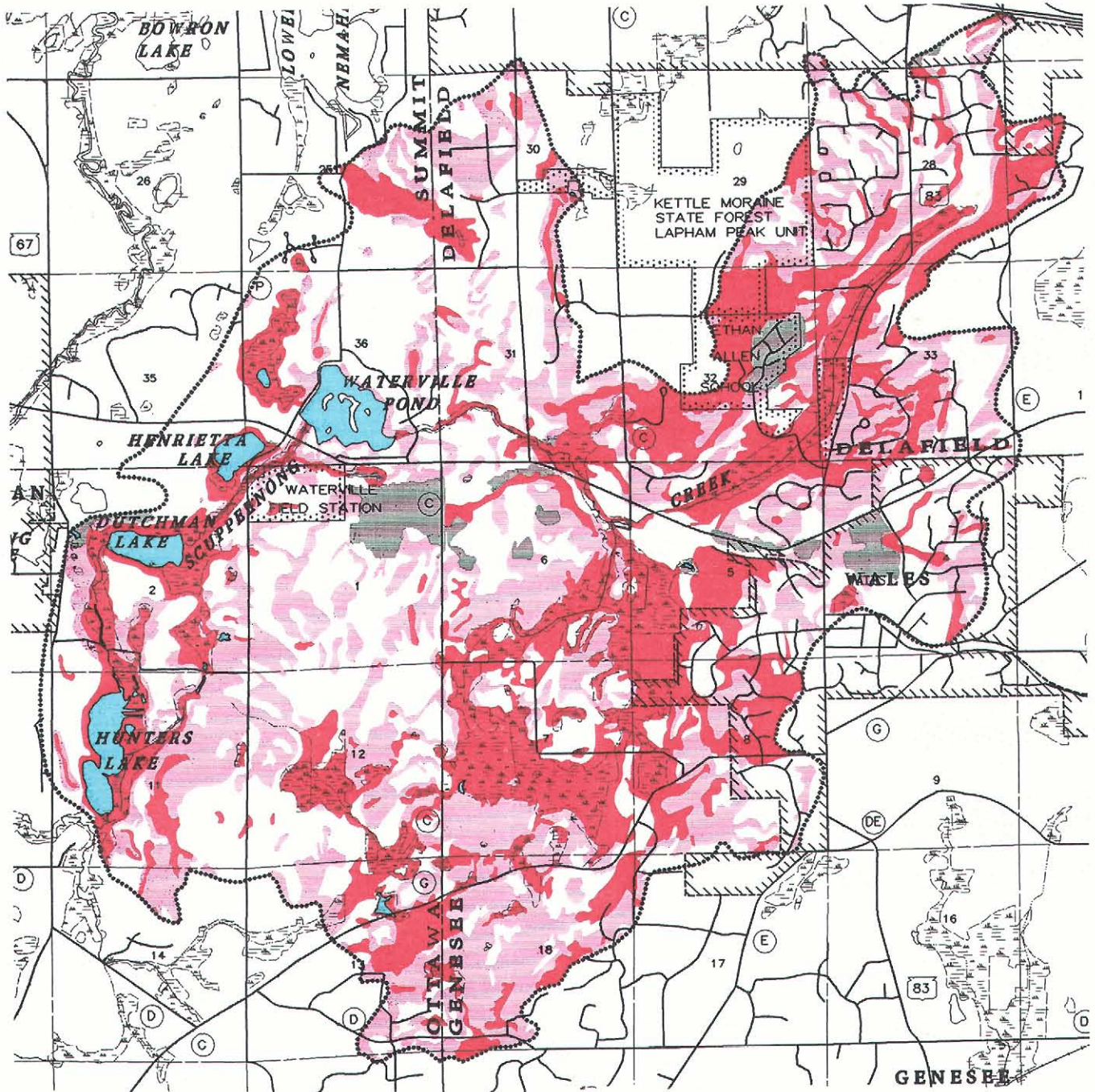


LEGEND

- UNSUITABLE: Areas covered by soils which have a high probability of not meeting the criteria of Chapter ILHR 83 of the Wisconsin Administrative Code governing mound sewage disposal systems.
- UNDETERMINED: Areas covered by soils having a range of characteristics and/or slopes which span the criteria of Chapter ILHR 83 of the Wisconsin Administrative Code governing mound sewage disposal systems so that no classification can be assigned.
- SUITABLE: Areas covered by soils having a high probability of meeting the criteria of Chapter ILHR 83 of the Wisconsin Administrative Code governing mound 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 HUNTERS LAKE FOR RESIDENTIAL DEVELOPMENT WITH PUBLIC SANITARY SEWER



LEGEND

- Areas covered by soils which have SEVERE limitations for residential development with public sanitary sewer service.
- Areas covered by soils having MODERATE limitations for residential development with public sanitary sewer service.
- Areas covered by soils having SLIGHT limitations for residential development with public sanitary sewer service.
- UNCLASSIFIED SOILS
- SURFACE WATER

Source: SEWRPC.

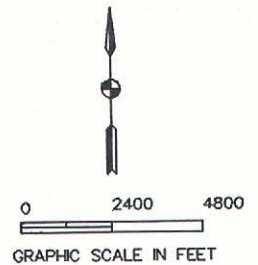


Table 4

**AQUATIC PLANT SPECIES PRESENT IN HUNTERS LAKE
AND THEIR POSITIVE ECOLOGICAL SIGNIFICANCE**

Aquatic Plant Species Present	Ecological Significance ^a
<u>Ceratophyllum demersum</u> (coontail)	Provides good shelter for young fish, and supports insects valuable as food for fish and ducklings
<u>Chara vulgaris</u> (muskgrass)	Excellent producer of fish food especially for young trout, bluegill, small and largemouth bass, stabilizes bottom sediments, and has softening effect on the water by removing lime and carbon dioxide
<u>Elodea canadensis</u> (waterweed)	Provides shelter and support for insects valuable as fish food
<u>Myriophyllum spicatum</u> (Eurasian water milfoil)	None known
<u>Najas marina</u> (spiny naiad)	Provides good food and shelter for fish and food for ducks
<u>Nuphar</u> sp. (yellow water lily)	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
<u>Nymphaea tuberosa</u> (white water lily)	Provides shade and shelter for fish; seeds eaten by wildfowl; rootstocks and stalks eaten by muskrat; roots eaten by beaver, deer, moose, and porcupine
<u>Potamogeton crispus</u> (crispy leaf pondweed)	Provides food, shelter and shade for some fish and food for wildfowl
<u>Potamogeton pectinatus</u> (sago Pondweed)	This plant is the most important pondweed for ducks in addition to providing food and shelter for young fish
<u>Potamogeton richardsonii</u> (Richardson's pondweed)	Provides good food and cover for fish and supports insects
<u>Typha augustifolia</u> (cattail)	Supports insects, stalks and roots important food for muskrat and beaver, attracts marsh birds, wildfowl and songbirds, in addition to being used as spawning grounds by sunfish and shelter for young fish
<u>Utricularia</u> sp. (Bladderwort)	Provides good food and cover for fish
<u>Vallisneria americana</u> (water celery)	Provides good shade and shelter, supports insects, and is valuable fish food

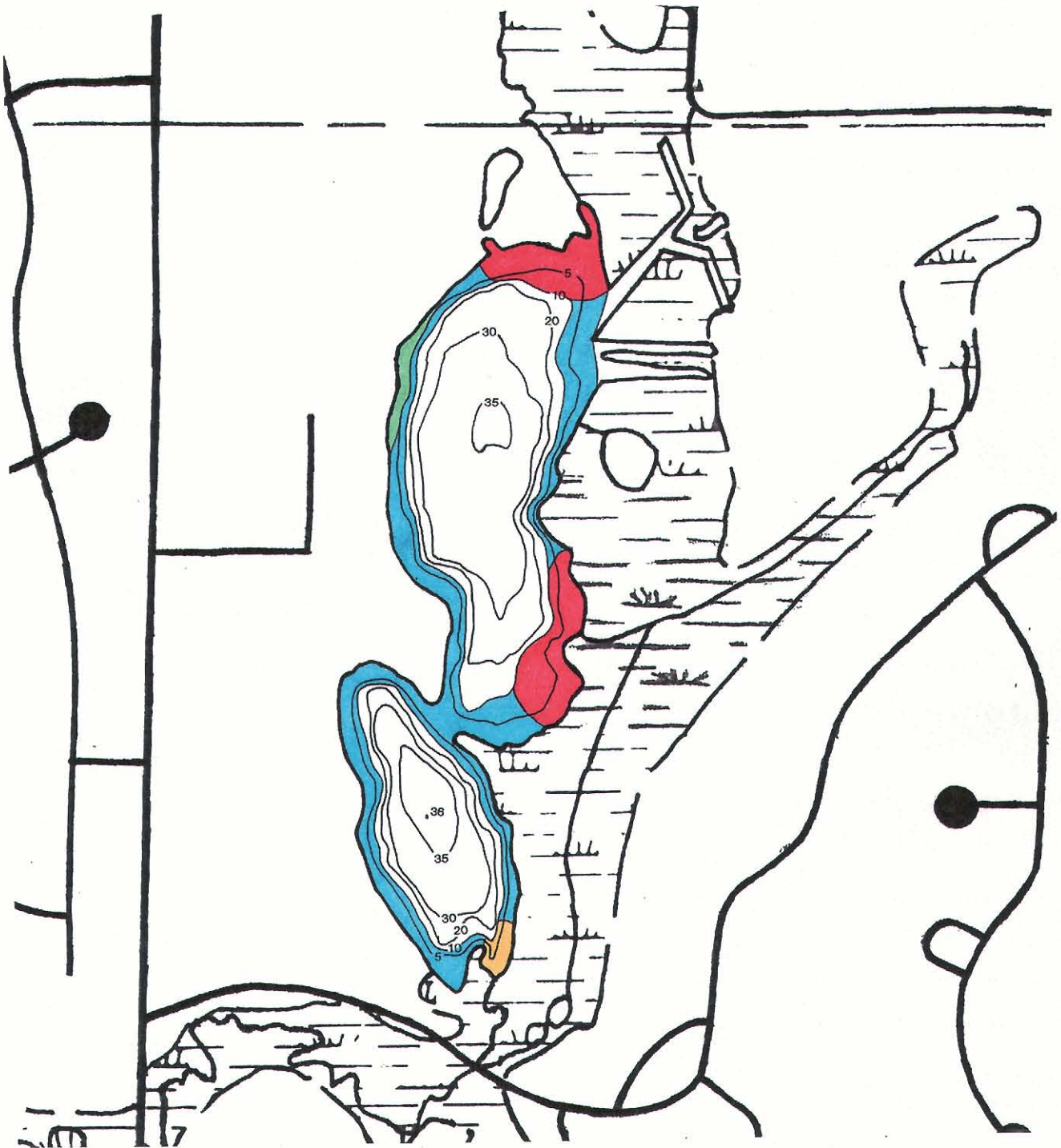
^aInformation obtained from *A Manual of Aquatic Plants* by Norman C. Fassett and *Guide to Wisconsin Aquatic Plants*, Wisconsin Department of Natural Resources.

Source: SEWRPC.





of the plants were found at levels which are considered scarce during the July 1995, survey, with the exception of Eurasian water milfoil, Myriophyllum spicatum, which was considered abundant in the northern lake basin in the vicinity of the Scuppernong Creek inlet.

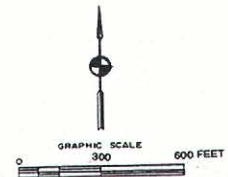
Subsequently, Mr. Patrick Buckley of the Hunters Lake Association conducted a field inspection of the Lake in September 1996, as part of the DNR Self-Help Aquatic Plant Monitoring program. At that time, the aquatic plant growths were found to be more dense, especially in the northern inlet area and along the eastern shoreline, and the mass of Eurasian water milfoil was estimated to have increased in these areas

AQUATIC PLANT COMMUNITY DISTRIBUTION FOR HUNTERS LAKE: 1995



LEGEND

-  MILFOIL SPECIES, COONTAIL, CURLY-LEAF PONDWEED COMMUNITY
-  SAGO PONDWEED, SPINY NAIAD
-  MILFOIL SPECIES COMMUNITY
-  DIVERSE AND SPARSE AQUATIC PLANTS TO 10 FEET DEPTH



Source: SEWRPC.

(see Map 12). This is consistent with the position of Lake residents that aquatic plant growth is typically more dense in the Lake than determined during the 1995 survey. Nevertheless, the relative distribution of aquatic plant species within the Lake remained similar to that observed during the 1995 survey despite the difference in densities. Thus, the differences in aquatic plant densities most likely reflects year-to-year variability in the extent of aquatic plant growth in the Lake.

The two lake inflows, located on the northern and eastern edges of the northern basin, and western outflow and wetland areas in the southern basin, contained the most diverse aquatic flora. However, these areas were dominated also by Eurasian water milfoil. Eurasian water milfoil is one of eight milfoil species found in Wisconsin and the only one that is known to be exotic or nonnative. Because of its nonnative nature, Eurasian water milfoil has few natural enemies and can tend to exhibit “explosive” growth under suitable conditions, such as the presence of organic-rich sediments as at the inflows and outflow of Hunters Lake. This plant, which reproduces by rooting of plant fragments, has been known to cause severe recreational use problems in lakes within the Southeastern Wisconsin Region.

Purple loosestrife, Lythrum salicaria, another nonnative nuisance plant, was also present throughout the wetlands and riparian areas. Like Eurasian water milfoil, purple loosestrife is known to spread profusely, outcompeting native plant growth and reducing the quality of fish and wildlife habitat while adding little significant ecological benefit. Purple loosestrife is a declared weed in the State of Wisconsin and is subject to an ongoing eradication program. The distributions of both of these plants should be monitored as part of the proposed aquatic plant monitoring program within the DNR Self-Help Monitoring Program.

In addition to the aquatic plant survey within the Lake basin, Commission staff conducted a survey of wetland vegetation in four wetland areas adjacent to Hunters Lake in May 1993,¹² the results of which are set forth in Appendix B. These wetlands were determined to be of intermediate quality, containing no State or Federally designated threatened or endangered species. Evidence of past disturbances was present, including evidence of dredging and dredge spoil disposal, tree-cutting, and agricultural activity. The wetlands inventoried included wet mesic, wet meadow, and shallow marsh plant communities.

FISHERIES

DNR Publication No. PUBL-FM-800-95 REV, Wisconsin Lakes, 1995, indicates that northern pike, large mouth bass, and panfish are present in Hunters Lake. Based upon a 1967 lake inventory conducted by the DNR, the panfish community was comprised of black crappie, bluegills, pumpkinseeds, yellow perch, warmouth, and green sunfish. In addition, rough fish, including bullheads and carp, were found. Some of these fish species were probably introduced into the Lake during an aggressive stocking program undertaken from 1937 through 1944. Bass and northern pike populations in Hunters Lake are presently naturally sustaining. Numerous areas along the less steeply sloping shores of the Lake present suitable habitats for the spawning of bass and northern pike. Spawning takes place in spring, between the time of the spring thaw and mid-June. The carp population of Hunters Lake currently presents no serious threat to the lake ecosystem, probably due to more conducive habitat elsewhere in the Scuppernong Creek drainage area, but should continue to be monitored.

¹²A previous survey, conducted in July 1973 by staff from the Retzer Nature Center, identified a shrubby fen adjacent to the Lake, which was described as “an excellent example of the classical zones of wetland successional communities.” However, ongoing degradation of this system—especially tamarack die-off—was noted at the time of that survey. Notwithstanding, many of the plant species recorded during this survey were observed during the more recent Commission studies.

WILDLIFE AND WATERFOWL

Given the single-family residential nature of much of the Lake's western and northern shoreline and close proximity to the Village of Dousman, only small upland game animals, such as rabbit and squirrel; predators, such as coyote, fox, and raccoon; game birds, such as pheasant; marsh furbearers, such as beaver and muskrat; migratory and resident song birds; and waterfowl generally inhabit these areas. A more diverse animal community and greater number of waterfowl make use of the extensive wetland areas adjacent to the northern, southern, and eastern shores of the Lake. White-tailed deer have also been reported in these areas. The character of wildlife species, along with the nature of the 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 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 13, wildlife habitat areas in the drainage area tributary to Hunters Lake generally occur in association with existing surface water, wetland, and woodland resources located along Hunters Lake and the Scuppernong Creek. Such areas covered about 4,385 acres, or about 43 percent, of the drainage area. Of this total habitat acreage, about 2,269 acres, or about 22 percent, were rated as Class I habitat; about 1,455 acres, or about 14 percent, were rated as Class II habitat; and about 659 acres, or 6 percent, were rated as Class III habitat.¹³

The habitat areas shown on Map 13 are largely coincident with the Commission-delineated environmental corridors in this watershed, as shown on Map 14. Primary environmental corridors extended over 2,829 acres, or 28 percent, of the drainage area tributary to Hunters Lake. Secondary environmental and isolated natural resource features covered 222 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.¹⁴

RECREATIONAL USES AND FACILITIES

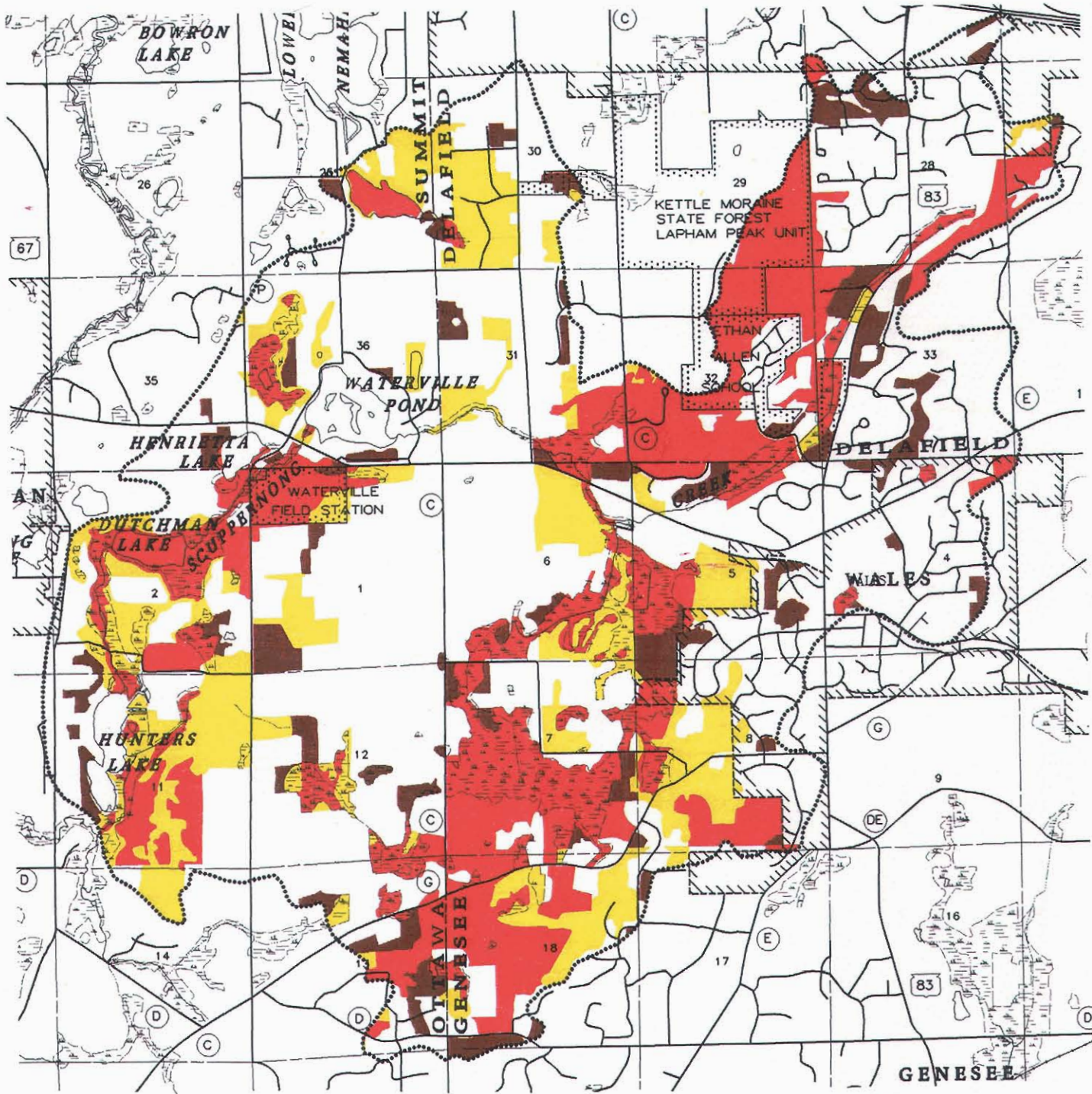
Hunters Lake is a multi-purpose recreational use waterbody serving all forms of recreation, including boating, waterskiing, swimming, and fishing during the summer months; and snowmobiling and ice-fishing during the winter. The Lake is used year around as a visual amenity—walking, bird-watching and picnicking, being popular passive recreational uses of the waterbody. A segment of the 1,000-mile-long Ice Age Trail winds through the upland woods east of the eastern shoreline of the Lake. Private trails within The Preserve Subdivision lands link Hunters Lake with this public trail system.

Public boating access to Hunters Lake is limited at present to carry-in access from the Parry Road-Scuppernong Creek Bridge, upstream of Upper Hunters Lake, as indicated on Map 2. This is

¹³For details on these classifications, see SEWRPC Planning Report No. 40, *A Regional Land Use Plan for Southeastern Wisconsin—2010, January 1992.*

¹⁴SEWRPC Planning Report No. 40, *A Regional Land Use Plan for Southeastern Wisconsin—2010, January 1992, p. 438; see also SEWRPC Community Assistance Planning Report No. 209, A Development Plan for Waukesha County, Wisconsin, August 1996, p. 509.*

WILDLIFE HABITAT AREAS WITHIN THE DRAINAGE AREA TRIBUTARY TO HUNTERS LAKE



LEGEND

CLASS I, High value habitat

CLASS II, Medium value habitat

CLASS III, Good value habitat

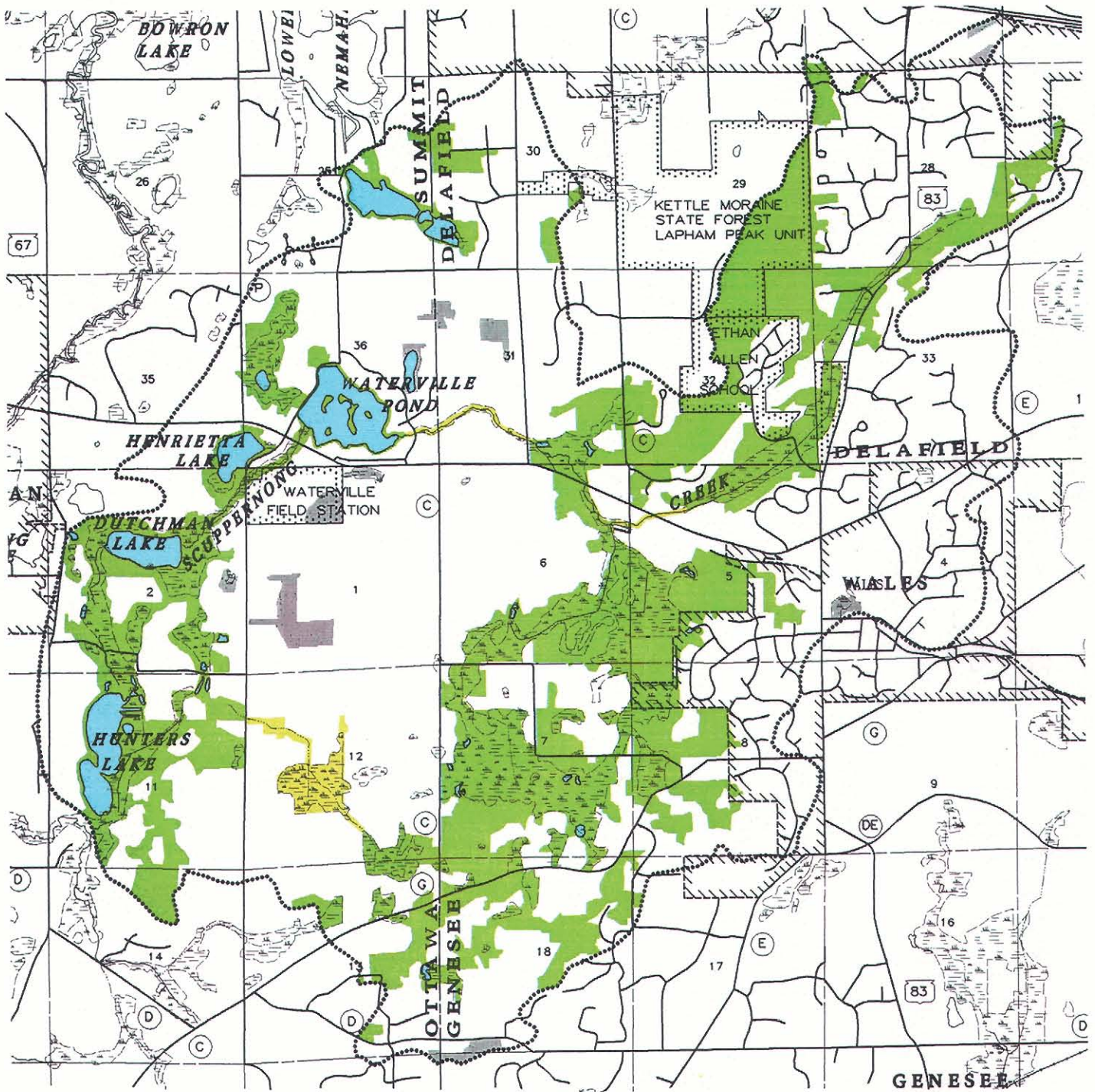
Source: SEWRPC.







0 2400 4800

GRAPHIC SCALE IN FEET

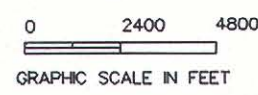
ENVIRONMENTALLY VALUABLE AREAS WITHIN THE DRAINAGE AREA TRIBUTARY TO HUNTERS LAKE



LEGEND

-  PRIMARY ENVIRONMENTAL CORRIDOR
-  SECONDARY ENVIRONMENTAL CORRIDOR
-  ISOLATED NATURAL RESOURCE AREA
-  SURFACE WATER

Source: SEWRPC.



an undeveloped partially improved public access site.¹⁵ Additional public access is proposed to be developed on the southwestern shore of Lower Hunters Lake at a site adjacent to Manor House Road, as shown on Map 2. This access site is proposed to provide trailered boat access to Hunters Lake. The Manor House Road site is considered part of the Town of Ottawa park and open space system and was being deeded to the Town as part of development of The Preserve Subdivision pursuant to the open space requirements set forth in Chapter 236 of the Wisconsin Statutes.

Private access to Hunters Lake is provided to residents of The Preserve Subdivision by means of a boardwalk constructed through a portion of the wetlands on the eastern shore of the Lake, as shown on Map 2. The boardwalk provides residents of The Preserve with carry-in access to the Lake.

Shoreline Protection Structures

Although much of the shoreline of Hunters Lake is generally maintained in a natural state, shoreland erosion is not a major problem on Hunters Lake. However, it is noteworthy that some structures have been built to protect the Lake's shoreline. These structures, shown on Map 15, were generally well maintained when inspected by Commission staff during July 1995. However, shoreline erosion could be expected to increase as lake usage increases, and erosion-related problems could worsen in the future.

Local Ordinances

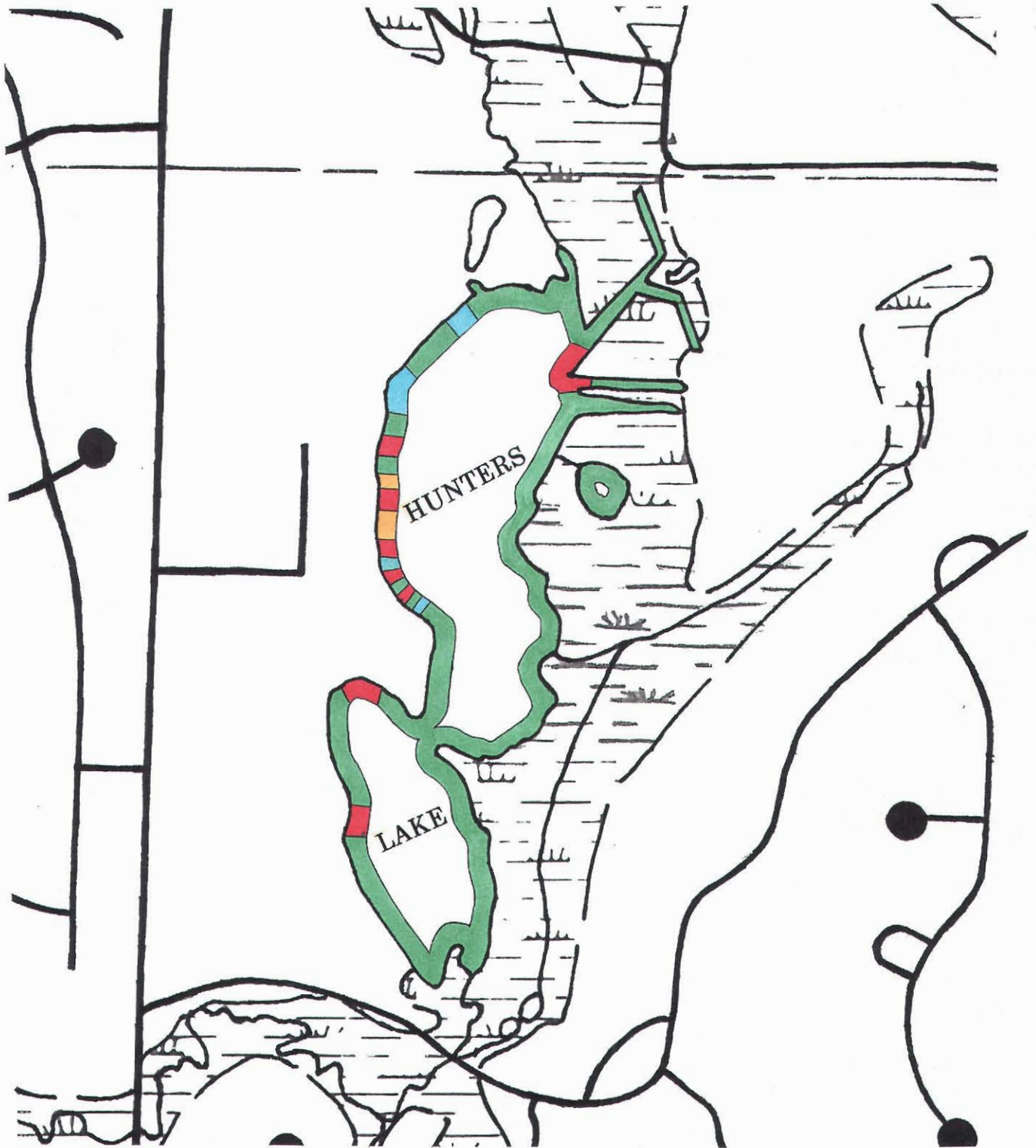
Hunters Lake is subject to a boating ordinance promulgated by the Town of Ottawa. This ordinance provides generally applicable rules for all waters within the jurisdiction of the Town, as set forth in Appendix C. These rules limit the times during which boats may operate on Hunters Lake and allow for the enactment and enforcement of boating restrictions and limitations. Boats are required to operate at slow-no-wake speeds between the hours of 6:00 p.m. and 11:00 a.m. daily, and within a shoreland zone defined as within 100 feet of the shoreline. The ordinance conforms to State of Wisconsin boating and water safety laws pursuant to Chapter 30, Wisconsin Statutes.

The Town of Ottawa also has an erosion control ordinance that supplements a similar Waukesha County ordinance. These ordinances are based on the model ordinance developed by the League of Wisconsin Municipalities and the Wisconsin Department of Natural Resources.¹⁶

¹⁵*The Parry Road access site consists of a partially paved, gravel landing located on the southeastern side of the Parry Road-Scuppernong Creek bridge. The site is served by a graveled, on-street parking area approximately 10 feet in width and 175 feet in length, without parking stall demarcations, located on the southwestern side of the Parry Road bridge over Scuppernong Creek. Assuming that each parking bay is 25 feet in length, this site could contain up to eight vehicles. Trailered, small-boat access may be possible, but should be discouraged due to the lack of space to allow an unimpeded flow of traffic in the eastbound lane of Parry Road.*

¹⁶*See Wisconsin Department of Natural Resources Publication Mo. WR-222-92, Wisconsin Construction Site Best Management Practice Handbook, 1992; and Wisconsin Department of Natural Resources Briefing Memo for WPDES Permit No. WO-0067821-1, Construction Site Erosion Control and Storm Water Management, November 1992; and Wisconsin Department of Natural Resources Briefing Memo for WPDES Permit No. WI-0067849-1, Draft General Permit to Discharge Storm Water Associated with Industrial Activity, November 1992.*

SHORELINE PROTECTION STRUCTURES ON HUNTERS LAKE: 1995



LEGEND

- RIPRAP
- BULKHEAD
- BEACH
- NATURAL

Source: SEWRPC.

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Chapter III

LAKE USE PROBLEMS AND ISSUES

INTRODUCTION

Although Hunters Lake is in relatively good condition and is capable of supporting a wide variety of water uses, there are a number of existing and potential future problems and issues which should be addressed in this lake protection and recreational use plan. These problems or issues of concern include the potential changes in ecologically valuable areas and aquatic plants, lake water levels, construction site erosion and nonpoint source pollution, wastewater pollution, public recreational use and boating access to the Lake, protection of the shoreline, and groundwater quality and quantity.

ECOLOGICALLY VALUABLE AREAS AND AQUATIC PLANTS

The ecologically valuable areas within the drainage area tributary to Hunters Lake, as documented in Chapter II, include wetlands and woodlands, and wildlife habitat. Most of these areas are included in the land designated as primary environmental corridors. Critical sites within the Lake include prime fish spawning habitat, macrophyte beds—especially those containing a diverse native flora—and the shoreline areas supporting the more productive aquatic habitat, primarily the eastern and southern shorelines. Protection of these areas is an important issue which should be considered.

The presence of Eurasian water milfoil in limited areas of the Hunters Lake basin, and the presence of purple loosestrife in the wetlands adjoining Hunters Lake, represent another important issue which should be considered. These plants often outcompete native aquatic plants, dominating the plant communities in lakes and wetlands in Southeastern Wisconsin to the detriment of fish and wildlife habitat and native species of plants. The dominance of Eurasian water milfoil and purple loosestrife in aquatic ecosystems in Southeastern Wisconsin degrades the natural resource base and commonly interferes with human recreational and aesthetic use of the natural resources.

As discussed in Chapter II, four wetland plant communities adjacent to Hunters Lake were surveyed by Commission staff in 1993. These areas contained a diverse plant community consisting of flora that is typical of the Region. These areas, along with the whole wetland community to the east and north of Hunters Lake, provide important habitat for wildlife. Those wetland areas that are physically connected to the Lake provide valuable fish spawning habitat, especially during the early spring. In addition to providing habitat, these areas also contribute to the scenic vistas which characterize the Hunters Lake watershed. Floodplain wetlands also help to absorb flood waters, and, by retaining sediments and nonpoint source pollutants, can help to protect the Lake from degradation.

The environmental corridors in the Hunters Lake tributary drainage area, as shown on Map 14, contain almost all of the best remaining woodlands, wetlands and wildlife habitat. The protection of these resources from additional intrusion by incompatible land uses which degrade and destroy the environmental values, and the preservation of the corridors in an essentially open and natural state, is an important issue to be considered.

FLUCTUATING LAKE WATER LEVELS

Riparian residents have reported that water levels in Hunters Lake in the past several years have been generally lowered by three to six inches unless the lake outlet is restricted. While water level management

in a lake is a common technique for managing fish and aquatic macrophytes, the consequences of manipulating lake water levels can be both beneficial and deleterious. The major impact from the Lake users' standpoint is that the decreased water depths can severely limit lake usage. In Hunters Lake, slight changes in water level can interrupt boating traffic between the upper and lower Lake basins.

Periodic changes in precipitation and weather patterns between years often result in fluctuating water loads to lakes. These fluctuations in turn can affect lake levels. Most plant and animal species can cope with this level of water surface fluctuation without experiencing the consequences, both positive and negative, noted above. Nevertheless, it is desirable from the point of view of aquatic habitat that water levels be maintained within these natural limits. Control of lake levels at Hunters Lake is, then, an important management issue to be considered.

CONSTRUCTION SITE EROSION AND NONPOINT SOURCE POLLUTION

Erosion during construction and nonpoint source pollutants associated with new urban development in the drainage area tributary to Hunters Lake represents a potentially significant threat to the Lake's water quality. Therefore, control of construction site erosion and stormwater nonpoint source pollution is an important issue to be considered.

WASTEWATER TREATMENT AND DISPOSAL

At present, only limited portions of the drainage area tributary to Hunters Lake are included in planned public sanitary sewer service areas served by public wastewater treatment facilities operated by the Village of Dousman and the Delafield-Hartland Water Pollution Control Commission.¹ Thus, most of the tributary area, including the riparian development around Hunters Lake, is expected to continue to be served by onsite sewage disposal systems. While such systems represent only a relatively small potential source of pollution to Hunters Lake, they have a potential to cause localized water quality problems and are important considerations in groundwater quality protection. Thus, proper system maintenance and replacement as necessary is an important issue to be considered.

PUBLIC RECREATIONAL USE AND BOATING ACCESS

Overcrowding and excessive recreational boating use are problems in many lakes in the Southeastern Wisconsin Region, especially those offering high-quality recreational opportunities within a one- to two-hour drive of the Chicago-Milwaukee metropolitan areas. Given the location and good water quality of Hunters Lake, recreational and boating use pressures on the Lake may be expected to increase in the future. Use of the Lake by boating traffic is also likely to increase with the proposed construction of the public boating access on the Lake. The size of the Lake, however, will tend to minimize the demands for fast boating activities.

Current requirements contained in Sections NR 1.91(4) and NR 1.91(5), respectively, of the Wisconsin Administrative Code, mandate standards for public boating access development to qualify waters for resource enhancement services provided by the Wisconsin Department of Natural Resources such that, at a minimum, public access sites accommodate a combination of carry-in and car-trailer units totaling five units, and, at a maximum, five car-trailer units. In addition, one handicapped accessible unit would be

¹ *SEWRPC Memorandum Report No. 93, A Regional Water Quality Management Plan For Southeastern Wisconsin: An Update and Status Report, March 1995.*

provided in each case. Standards set forth in the Waukesha County park and open space plan,² and the regional park and open space plan,³ would provide for the use of a maximum of no more than two fast boats on Hunters Lake. Section NR 1.91(6) also provides procedures for determining alternative public access standards which may differ from the minimum and maximum standards set forth in Sections NR 1.91(4) and NR 1.91(5). The optimum number of parking spaces for Hunters Lake can be estimated by the number of fast boats which the Lake can accommodate reduced by the number of fast boats in use at any one time by owners of property with Lake frontage. Assuming the latter figure at 5 percent of the number of dwelling units on this Lake, this would indicate no car-trailer parking spaces suitable for fast boat transportation would be warranted.

The number of parking spaces proposed for the Manor House Road access site would accommodate five car-trailer units, plus one handicapped accessible unit. This is consistent with the guidelines as set forth in the Administrative Code. The existing Parry Road site is a carry-in site served by on-street parking, and is not considered to be handicapped accessible. The private access site at The Preserve is not subject to a private provider agreement as set forth in Section NR 1.91(7), and, hence, is not considered in evaluating the current access suitability under the provisions of Chapter NR 1 of the Wisconsin Administrative Code.

The addition of the proposed boat access site is expected to result in increased lake usage which potentially could impact the ecological structure and functioning of Hunters Lake, and degrade public safety. Potential ecosystem impacts of enhanced lake access opportunities include depletion of the sport fish resource due to angling pressures; intensification of the risk of boating accidents associated with fast boating activities; interruption of sport fish spawning patterns due to increased turbidities arising from resuspension of the sediments on the lake bottom, increased shoreline erosion, and modification of plant community structure due to use-related damages; and contamination of the lake waters by motor fuels and lubricants, exhaust fumes and other substances released from or exposed on the lake bottom due to the erosional effects of high-speed boat traffic. Given the size and shape of the Lake and the potential for increased recreational usage, public recreational boating access on Hunters Lake is considered an important issue to be considered.

SHORELINE PROTECTION

Although much of the shoreline of Hunters Lake is kept in a fundamentally natural state, shoreland erosion is not a major problem on Hunters Lake. However, it is noteworthy that some structures have been built to protect the Lake's shoreline. Shoreline erosion could be expected to increase as lake usage increases, and erosion-related problems could worsen in the future. Hence, shoreline protection is an issue to be considered.

GROUNDWATER QUALITY

Domestic water supplies to households in the drainage area tributary to Hunters Lake are primarily drawn from the local shallow groundwater aquifer. Potential contamination of the aquifers by pollutants leaching into the groundwater from the land surface or from onsite sewage disposal systems is an issue of concern. In addition, groundwater uses have the potential to impact upon surface water quantities including the groundwater flows into and out of Hunters Lake and its tributaries.

²SEWRPC Community Assistance Planning Report No. 137, A Park and Open Space Plan for Waukesha County, December 1989.

³SEWRPC Planning Report No. 27, A Regional Park and Open Space Plan for Southeastern Wisconsin: 2000, November 1977.

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Chapter IV

ALTERNATIVE AND RECOMMENDED LAKE PROTECTION PRACTICES

INTRODUCTION

Chapter III described seven issues of concern to be considered as part of this lake protection and recreational use plan. These issues are related to: 1) ecologically valuable areas and aquatic plants; 2) lake water levels; 3) nonpoint source pollution; 4) wastewater pollution; 5) public recreational use and boating access; 6) shoreline erosion; and 7) groundwater quality and quantity. Following a brief summary of the ongoing lake management program, alternatives and recommended measures to address each of these issues and concerns are described in this chapter. The alternatives and recommendations set forth herein are focused primarily on those measures which are applicable to the Hunters Lake Association and the Town of Ottawa, with lesser emphasis given to those measures which are applicable to others with jurisdiction within the broader total drainage area tributary to Hunters Lake.

PAST AND PRESENT LAKE MANAGEMENT ACTIONS

The residents of Hunters Lake, in conjunction with the Town of Ottawa, have long recognized the importance of informed and timely action in the management of Hunters Lake. The initial action in this regard was the formation of the Hunters Lake Association, which provides the forum for many of the lake management activities of the Lake's residents. The Association undertakes a regular water quality and aquatic plant monitoring program under the auspices of the Wisconsin Department of Natural Resources (DNR) Self-Help Monitoring Program. In addition, the Association carries out an ongoing citizen education and involvement program related to lake management activities. The Hunters Lake Association has also undertaken an evaluation, in cooperation with the DNR, of options for lake level management. This current lake protection and recreational use planning program is designed to supplement the ongoing citizen-based actions being undertaken by the Hunters Lake Association.

ECOLOGICALLY VALUABLE AREAS AND AQUATIC PLANTS

Hunters Lake and its tributary drainage area contain ecologically valuable areas, including significant areas of diverse aquatic and wetland vegetation suitable for fish spawning and located within and immediately adjacent to the Lake. As described in Chapter III, the potential problems associated with ecologically valuable areas in and near Hunters Lake include the potential loss of wetlands and other important ecologically valuable areas due to urbanization or other encroachments; the degradation of wetlands and aquatic habitat due to the presence of invasive species, including purple loosestrife and Eurasian water milfoil; and disturbances associated with recreational boating.

Array of Protection Measures

Four measures to protect and maintain the biodiversity of Hunters Lake and its tributary drainage area have been identified as being potentially viable; namely, 1) boating ordinances, 2) land use measures, 3) in-lake management measures, and 4) citizen information and education.

Boating Ordinances: The promulgation of more stringent controls on the use of powered water craft along the southern and eastern shores of Hunters Lake is one means of regulating the conduct of boat traffic which could be harmful to the most important ecologically valuable areas in the Lake. These areas include the extensive wetland plant communities of the eastern shoreline and the extensive aquatic plant communities on shore at the inlets and outlet of the Lake. Control of boating traffic in these areas also could have the

advantage of managing boating traffic in the areas of the Lake most affected by Eurasian water milfoil in a manner that would help to prevent the further spread of this plant. Controls on boat traffic could be put in place using the following three options:

1. Provide for slow-no-wake boating within a specified distance of the shoreline, such as in the "shore zone," within 100 feet of the shoreline, as defined in the Town of Ottawa boating ordinance and DNR boating ordinance guidelines;¹
2. Limit boating activity within specific areas of the Lake such as in "boat excluded areas" or "motorboat prohibition zones;"
3. Limit the speed at which boat traffic travels in specific areas of the Lake such as in "slow-no-wake" areas or by some other form of "speed restriction."

Boat excluded areas must be designated by approved regulatory markers. These areas are preferable to motorboat prohibition areas as the latter can lead to legal challenges based on the right of free use of navigable waters. Similarly, slow-no-wake restrictions are preferable to speed limits designated in miles per hour terms owing to implementation and enforcement considerations. Placement of regulatory markers must conform to Section NR 5.09 of the Wisconsin Administrative Code, and all restrictions placed on the use of the waters of the State must be predicated upon the protection of public health, safety, or welfare. 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.

Buoyage can be expensive to obtain, install and maintain, but has the advantage of being visible to recreational boaters. It also clearly demarcates the affected areas. Two general options exist regarding the use of buoyage: the establishment of regulated areas using regulatory buoys, such as slow-no-wake or exclusionary areas, or the enhancement of public awareness using informational buoys. Establishment of additional slow-no-wake areas within Hunters Lake, outside of the 100-foot slow-no-wake shoreland zone, will require amendment of the Town of Ottawa boating ordinance, and a DNR permit. Only regulatory markers are enforceable.

Buoys placed within the waters of the State of Wisconsin are subject to the requirements set forth in Chapter 30, Wisconsin Statutes. Such buoys are white in color, cylindrical in shape, seven or more inches in diameter, and extend 36 or more inches above the water line. Regulatory buoys include buoys used to demarcate restricted areas, prohibit boating or types of boating activities in specific areas, and control the movements of watercraft. Buoys used to demarcate regulated areas display their instructions in black lettering. Prohibition buoys display an orange diamond with an orange cross inside. Control buoys display an orange circle. Local authorities having jurisdiction over the waters involved may place danger buoys or informational buoys without an ordinance, although a DNR permit is still required. Informational buoys are similar in construction to the regulatory buoys, but contain an orange square on the white background. Informational buoys are not enforceable.

Land Management Measures: The recommended future condition land use plan for the drainage area tributary to Hunters Lake is set forth in the Waukesha County development plan.² That plan recommends

¹ Wisconsin Department of Natural Resources, Guidelines: Ordinance Writing and Buoy Placement for Wisconsin Waters, s.d.

² SEWRPC Community Assistance Planning Report No. 209, A Development Plan for Waukesha County, Wisconsin, August 1996.

the preservation of primary environmental corridor lands in essentially natural, open space use. Most of the wetlands and other ecologically valuable lands adjacent to Hunters Lake and within the drainage area tributary to Hunters Lake are included within these primary environmental corridors. The county development plan recommends that such protection be afforded through the placement of such 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 lowland conservancy or floodplain protection districts. The existing zoning for the lands in the vicinity of Hunters Lake and in the tributary drainage area to Hunters Lake is generally consistent with the recommended future buildout land use pattern set forth in the Waukesha County development plan. However, should urban development not proposed or envisioned under the county development plan threaten to destroy or degrade natural resources located within the primary environmental corridors, appropriate public or private agencies should consider acquisition of such lands for resource and open space preservation purposes.

The purchase of specific critical properties or the acquisition of conservation easements, as a means of protecting them from encroachment or further degradation, or as a means of facilitating their rehabilitation and restoration, is possible through the Chapters NR 50/51 of the Wisconsin Administrative Code Stewardship Grant Program and Chapter NR 191 Lake Protection Grant Program promulgation in the Wisconsin Administrative Code. 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 DNR, and must be subject to a land management plan setting forth the process 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.

In-Lake Management Measures: Various potential in-lake management actions may be considered for purposes of control of aquatic plants. These actions include harvesting, chemical treatment, lake drawdown, and lake bottom covering. Because the current aquatic plant problems on Hunters Lake, as described in Chapters II and III, are limited in nature, these in-lake measures are generally not considered applicable. The only in-lake measures related to aquatic plant management considered viable are manual harvesting of selected nuisance species such as Eurasian water milfoil and purple loosestrife, and limited chemical treatment of these two species in situations where extensive infestations occur.

Citizen Information and Education: As part of the overall citizen informational and educational programming to be conducted in Hunters Lake, residents and visitors in the vicinity of Hunters Lake should be made aware of the value of the ecologically significant areas in the overall structure and functioning of the ecosystems of Hunters Lake. Specifically, informational programming related to the protection of ecologically valuable areas in and around Hunters Lake 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. Citizens participating in water-based recreation on Hunters Lake and along the Scuppernong Creek should also be encouraged to participate in boater education programs. Other informational programming offered by the DNR, 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, and lake basin of, Hunters Lake.

Recommended Protection Measures

The following management actions are recommended for the management of ecologically valuable areas and aquatic plants.

1. The Town of Ottawa, through its existing boating ordinance and amendment thereof, should undertake the following boating regulation measures:
 - a. Continue to limit boat speeds 100 feet from shore to slow-no-wake as defined in Chapter 30 of the Wisconsin Statutes, and exclude motorized boat traffic from the pond in the eastern shore of the northern basin of the Lake. This 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 sites as set forth in Section 30.77(4) of the Wisconsin Statutes.
 - b. Demarcate the ecologically sensitive areas located on the northeast shoreline with regulatory buoys and signs to help enforce the recommended restrictions.
 - c. Demarcate the aquatic macrophyte beds containing Myriophyllum spicatum (Eurasian water milfoil) with slow-no-wake regulatory buoyage to diminish proliferation of this plant to other areas of the Lake.

Such regulations would have to be approved by the DNR, posted at the private—The Preserve Subdivision—and proposed and existing public boat landings, published in an approved manner in the community, and demarcated by suitable buoyage. These boating regulations will help to reduce ecological damage, safety hazards, and recreational use conflicts associated with powered watercraft activities. These ordinance provisions should also be beneficial in reducing the incidence of shoreland and lake bottom erosion arising from the passage of boats in the shallow areas of the Lake.

2. The Hunters Lake Association and the Town of Ottawa should support the preservation of the primary environmental corridor lands in the drainage area tributary to Hunters Lake in essentially natural, open-space uses, primarily through public land use controls. Such preservation should be promoted through the placement of such resources in appropriate conservancy zoning districts, and through the enforcement of existing regulations intended to protect such natural resources.
3. The Town of Ottawa and the Hunters Lake Association should consider public acquisition of the wetlands immediately adjacent to the Lake, or acquisition of conservancy easements over such wetlands, to facilitate future management actions that may be necessary to ensure the habitat quality of the wetlands—actions such as the control of purple loosestrife or other invasive plants which might degrade the habitat quality of the wetlands. Public acquisition meets the criteria for cost-shared acquisition under the Chapter NR 191 Lake Protection Grant program administered by the DNR. Monies granted in terms of this program provide up to 75 percent of the purchase price, or the cost of acquisition of a conservancy easement, subject to a cap of \$200,000 on the State share per parcel.
4. The Wisconsin Department of Natural Resources should prohibit dredging and placement of materials, and should limit herbicide usage, within ecologically valuable areas of Hunters Lake. The use of chemical herbicides should be limited to small areas for the control of purple loosestrife and Eurasian water milfoil in the Lake. Selected manual harvesting of these plant species is recommended.
5. The Town of Ottawa and the Hunters Lake Association, through a joint education and information 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 main body of the Lake, and limit boating and other water sports in the ecologically valuable areas, especially along the eastern shores of the Lake. 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.

FLUCTUATING WATER LEVELS

As discussed in Chapter III, small fluctuations in the level of the water surface in Hunters Lake can affect the recreational boating use of the Lake and the ability to navigate freely between the upper and lower lake basins. In addition, concerns have been expressed regarding the impact of decreased lake levels on the wetlands riparian to Hunters Lake.

Options Considered

Two options were considered regarding the potential control of water levels in Hunters Lake. Under the first option, no specific actions would be undertaken and the lake levels would be the result of natural fluctuations. Under the second option, structural control measures would be placed at the lake outlet.

Natural Fluctuations: Under the first option considered, the variations in year-to-year rainfall amounts and the distribution of rainfall and associated runoff within the Region would continue to result in natural variations in inflows to Hunters Lake, and, consequently, to variations in lake levels. Without structural interventions at the lake outflow, the level of Hunters Lake would vary naturally as a result of the changes in inflow volumes. Lake levels in this situation would be controlled by the hydraulic capacity of the outlet channel. During recent years this has resulted in the low water level problem noted above during some times of the year.

Water Level Control: Under the second option considered, the low water problems identified could be mitigated by placing a control structure at the outlet of the Lake. In recent years, the stabilization of water levels in Hunters Lake at or near the ordinary high water mark has been attempted by the construction of a rubble weir at the outlet to the Lake. However, this structure has been only partially effective because of tampering. Consideration of alternative structures is warranted. Alternatives could include a more robust weir constructed of larger rocks, gabion baskets or inter-locking blocks, a low weir with removable gates, or the use of an inflatable barrier. Providing the structure with an adjustable crest height will allow water levels in Hunters Lake to more effectively be maintained at a minimum level during periods of low water levels.

Recommended Control Measures

It is recommended that the Hunters Lake Association and the Town of Ottawa cooperatively have an outlet structure designed, permitted, and installed in order for the lake level to be managed near the elevation of 866.1 feet National Geodetic Vertical Datum of 1929 (NGVD-29).³ Such a structure could possibly take the form of a low head weir at the lake outlet, similar to that shown in Figure 3. The details of the structure will have to be provided through a design study. The final configuration should specifically provide for fish passage and have an adjustable control elevation in order to be flexible in meeting future conditions. A hydrologic and hydraulic analysis of the impacts of a structure, such as shown in Figure 3, on upstream stages is included in Appendix D.

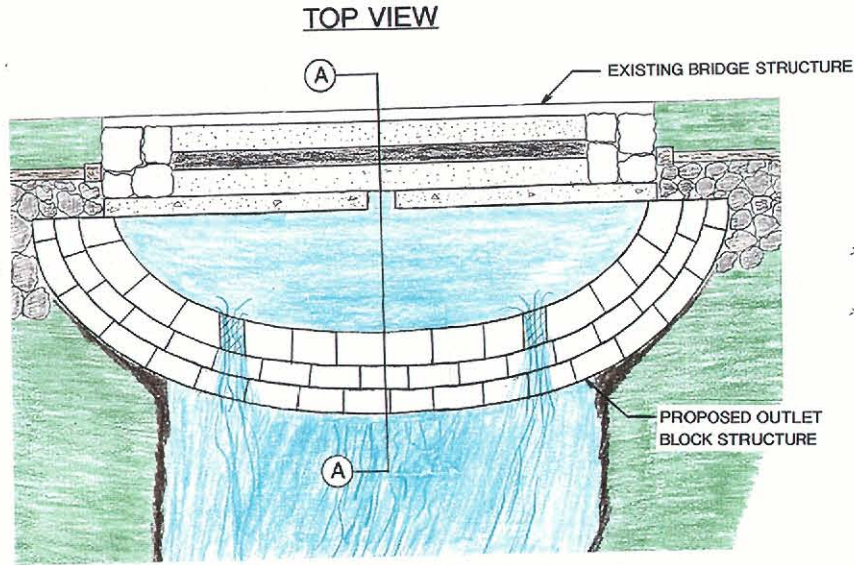
NONPOINT SOURCE POLLUTION CONTROLS

As described in Chapter II, the primary sources of pollutant loadings to Hunters Lake are nonpoint sources generated in the drainage area tributary to the Lake. The Waukesha County development plan provides for

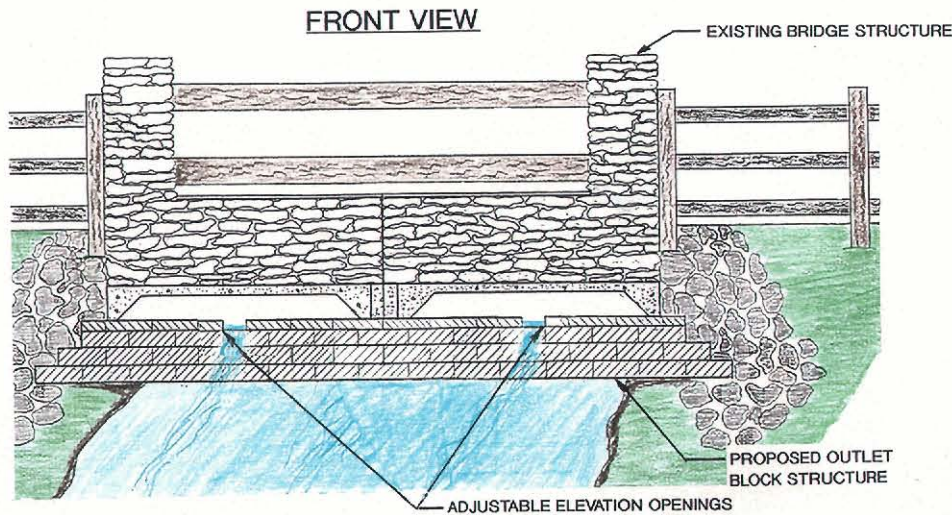
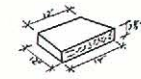
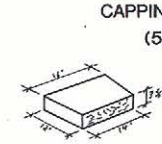
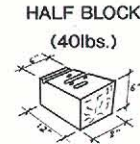
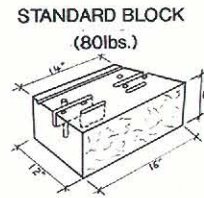
³SEWRPC Technical Record, Volume 4, No. 5, Lake Levels and Datum Differences, December 1989.

Figure 3

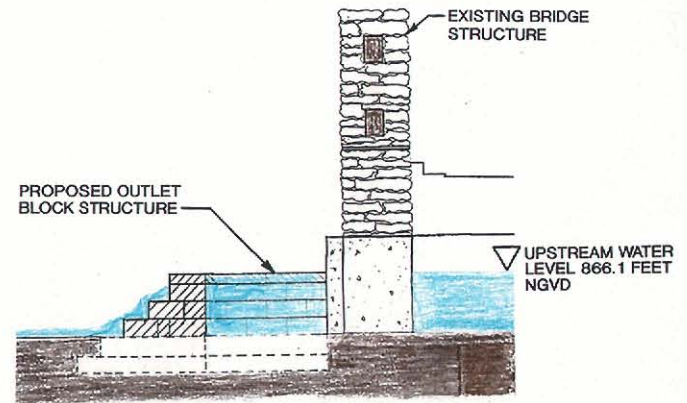
PROPOSED OUTLET CONTROL STRUCTURE FOR HUNTERS LAKE



STRUCTURE BLOCKS



SIDE SECTION VIEW A-A



Source: SEWRPC.

SEE APPENDIX D FOR PRELIMINARY NOTCH SIZING AND ELEVATIONS

a significant increase in urban residential lands in the drainage area tributary to Hunters Lake under buildout conditions. Such development could result in a potential increase in the loadings of some pollutants associated with urban development being transported into Hunters Lake from nonpoint sources and construction sites.

Array of Control Measures

Watershed management measures may be used to reduce nonpoint source pollutant loadings from such rural sources as runoff from cropland and pastureland; from such urban sources as runoff from residential, commercial, transportation, and recreational land uses; and from construction activities. The alternative, nonpoint source pollution control measures considered in this report are based upon the recommendations set forth in the regional water quality management plan,⁴ the Waukesha County soil erosion control plan,⁵ and information presented by the U.S. Environmental Protection Agency.⁶

Two options to control nonpoint source pollution to Hunters Lake and its tributary drainage area have been identified as being potentially viable; namely, 1) urban nonpoint source controls, and 2) rural nonpoint source controls.

Urban Nonpoint Source Controls: The regional water quality management plan recommends that the nonpoint source pollutant loadings from the urban areas tributary to Hunters Lake be reduced by about 25 percent in addition to reductions from urban construction erosion control, onsite sewage disposal system management, and streambank and shoreline erosion control measures.

Potentially applicable urban nonpoint source control measures include wet detention basins, grassed swales, and good urban "housekeeping" practices. Generally, the application of low-cost urban housekeeping practices may be expected to reduce nonpoint source loadings from urban lands by about 25 percent. Public education programs can be developed to encourage such good urban housekeeping practices, to promote the selection of building and construction materials which reduce the runoff contribution of metals and other toxic pollutants, and to promote the acceptance and understanding of the proposed pollution abatement measures and the importance of lake water quality protection. Urban housekeeping practices and source controls include restricted use of fertilizers and pesticides; improved pet waste and litter control; the substitution of plastic for galvanized steel and copper roofing materials and gutters; proper disposal of motor vehicle fluids; increased leaf collection; and reduced use of street deicing salt.

Proper design and application of urban nonpoint source control measures such as grassed swales and detention basins requires the preparation of a detailed stormwater management system plan that addresses stormwater drainage problems and controls nonpoint sources of pollution. Based on a preliminary evaluation, however, it is estimated that the practices which could be effective in the existing urban areas within the immediate vicinity of Hunters Lake are limited largely to good urban housekeeping practices and

⁴*SEWRPC Planning Report No. 30, A Regional Water Quality Management Plan for Southeastern Wisconsin: 2000, Volume One, Inventory Findings, 1978; Volume Two, Alternative Plans, 1979; and Volume Three, Recommended Plan, 1979.*

⁵*SEWRPC Community Assistance Planning Report No. 159, Waukesha County Agricultural Soil Erosion Control Plan, June 1988.*

⁶*U.S. Environmental Protection Agency, Report No. EPA-440/4-90-006, The Lake and Reservoir Restoration Guidance Manual, 2nd Edition, August 1990; and its technical supplement, U.S. Environmental Protection Agency, Report No. EPA-841/R-93-002, Fish and Fisheries Management in Lakes and Reservoirs: Technical Supplement to the Lake and Reservoirs Restoration Guidance Manual, May 1993.*

grassed swales. However, structural measures could be considered for installation as part of the development process in urbanizing areas of the tributary drainage area.

Developing areas can generate significantly higher pollutant loadings than established areas of similar size. Developing areas include a wide array of activities, including urban renewal projects, individual site development within the existing urban area, and new land subdivision development. As previously noted, additional residential development is planned for within the drainage area tributary to Hunters Lake.

Construction sites, especially, may be expected to produce suspended solids and phosphorus loadings at rates several times higher than established urban land uses. Control of sediment loss from construction sites can be provided by measures set forth in the model ordinance developed by the Wisconsin Department of Natural Resources in cooperation with the Wisconsin League of Municipalities.⁷ These controls are temporary measures taken to reduce pollutant loadings from construction sites during stormwater runoff events. Construction erosion controls may be expected to reduce pollutant loadings from construction sites by about 75 percent. Such practices are expected to have only a minimal impact on the total pollutant loading to the Lake due to the relatively small amount of land proposed to be developed. However, such controls are important pollution control measures that can abate localized short-term loadings of phosphorus and sediment from the drainage area and the upstream tributary area. The control measures include such revegetation practices as temporary seeding, mulching, and sodding and such runoff control measures as filter fabric fences, straw bale barriers, storm sewer inlet protection devices, diversion swales, sediment traps, and sedimentation basins.

Waukesha County has adopted a construction site erosion control ordinance which is administered and enforced by the County in both the shoreland and nonshoreland areas of the unincorporated areas of the drainage area tributary to Hunters Lake. The provisions of this ordinance apply to all development except single- and two-family residential construction. Single- and two-family construction erosion control measures are to be specified as part of the building permit process. In addition, the Town of Ottawa has construction site erosion control and stormwater management provisions within its Land Division and Development Ordinance, Chapter 18 of the Town's Zoning Ordinance, and the Village of Wales and the Towns of Delafield and Genesee have construction site erosion control ordinances. The Town of Summit has construction site erosion provisions within its building code. Because of the potential for development in the drainage area tributary to Hunters Lake, it is important that adequate construction erosion control programs, including enforcement, be in place in the entire tributary drainage area.

Rural Nonpoint Source Controls: Upland erosion from agricultural and other rural lands is a contributor of sediment to streams and lakes in the tributary drainage area to Hunters Lake. Estimated phosphorus and sediment loadings from croplands, woodlots, pastures, and grasslands in the drainage area tributary to Hunters Lake were presented in Chapter II. These loadings are recommended to be reduced to the target level of agricultural erosion control of three tons per acre per year identified in the Waukesha County agricultural soil erosion control plan as the tolerable levels which can be sustained without impairing productivity. Implementation of these recommendations is considered to be an important water quality management measure for Hunters Lake.

Detailed farm conservation plans will be required to adapt and refine erosion control practices for individual farm units. Generally prepared with the assistance of the U.S. Natural Resources Conservation Service or County Land Conservation Department staffs, such plans identify desirable tillage practices, cropping patterns, and rotation cycles, considering the specific topography, hydrology, and soil characteristics of the

⁷ *Wisconsin League of Municipalities and Wisconsin Department of Natural Resources, Wisconsin Construction Site Best Management Practices Handbook, 1989.*

farm; identify the specific resources of the farm operator; and articulate the operator objectives of the owners and managers of the land.

Recommended Control Measures

The following management actions are recommended for the management of nonpoint source pollution sources.

1. The stormwater and construction site erosion control ordinances adopted by Waukesha County, the Village of Wales, the Town of Ottawa, and the Towns of Delafield, Genesee, and Summit should be strictly enforced to reduce sediment and contaminant loadings from the urbanizing areas in the tributary drainage area to Hunters Lake, especially in those areas nearest to the Lake.
2. The Hunters Lake Association, in conjunction with the Town of Ottawa, should assume the lead in the development of a public educational and informational program for the residents around and in the immediate vicinity of Hunters Lake, which encourage the institution of good urban housekeeping practices including, pesticide and fertilizer use management, improved pet waste and litter control, and yard waste management, as well as other lake management-related topics. It is recommended that informational programming related to nonpoint source pollution abatement and other lake management topics be included at the annual meetings of the Hunters Lake Association.

WASTEWATER POLLUTION

Public sanitary sewer service is not expected to be provided to the development in the tributary drainage area to Hunters Lake.⁸ Thus, there is a need to manage the onsite sewage disposal systems in the drainage area tributary to Hunters Lake in order to avoid surface and groundwater pollution problems. As discussed in Chapter II, onsite sewage disposal systems are estimated to contribute only a very small portion of the pollutant loadings to Hunters Lake. However, failing or overloaded systems in the vicinity of the Lake can cause localized lake water quality problems. In addition, such systems are a potential threat to groundwater quality.

Array of Control Measures

Two options to manage wastewater in the drainage area tributary to Hunters Lake have been identified; namely, 1) individual action, and 2) community-based action.

Given the expected continued use of onsite sewage disposal systems, consideration should be given to developing a septic system management program. The basic objective of an onsite sewage disposal management program is to ensure the proper installation, operation, and maintenance of existing systems, and of any new systems that may be required to serve existing urban development in the drainage area tributary to Hunters Lake. Under the first option, the management program would be the responsibility of the individual property owners. The Hunters Lake Association could assist through an integrated homeowner information and education program. In addition, the Waukesha County Department of Parks and Land Use, Environmental Health Division, would serve as a resource in this program and would continue to perform its regulatory, permitting, and advisory functions related to onsite sewage disposal systems.

As an alternative, the Hunters Lake Association or the Town of Ottawa could facilitate an onsite sewage disposal system management program by contracting with a hauler on behalf of all Hunters Lake residences, thereby potentially reducing the costs to individuals while ensuring community benefit. Under

⁸SEWRPC Memorandum Report No. 93, A Regional Water Quality Management Plan For Southeastern Wisconsin: An Update and Status Report, March 1995.

an expanded version of this option, the onsite sewage disposal system management program could potentially include the establishment of an active Sanitary District or Lake Management District with sanitary district powers to raise and administer funds; inspect, design, and construct upgraded systems; ensure proper operation and maintenance of the systems; and monitor the performance of the systems.

Recommended Control Measures

It is recommended that the management of onsite sewage disposal systems be maintained as the primary responsibility of the private property owners and Waukesha County, as is currently the case. However, it is recommended that the Hunters Lake Association work with the Waukesha County Department of Parks and Land Use, Environmental Health Division, to develop a public informational and educational program to encourage property owners to have the onsite system inspected and to have any needed remediation measures undertaken.

PUBLIC RECREATIONAL BOATING ACCESS

Hunters Lake provides opportunities for high-quality, water-based recreational use to the residents of the Town of Ottawa and within the Southeastern Wisconsin Region. As described in Chapter III, potential problems associated with increased recreational boating use of Hunters Lake include over-crowding, higher traffic densities, and potential environmental damage arising from intrusion of boats into ecologically valuable areas.

Array of Options

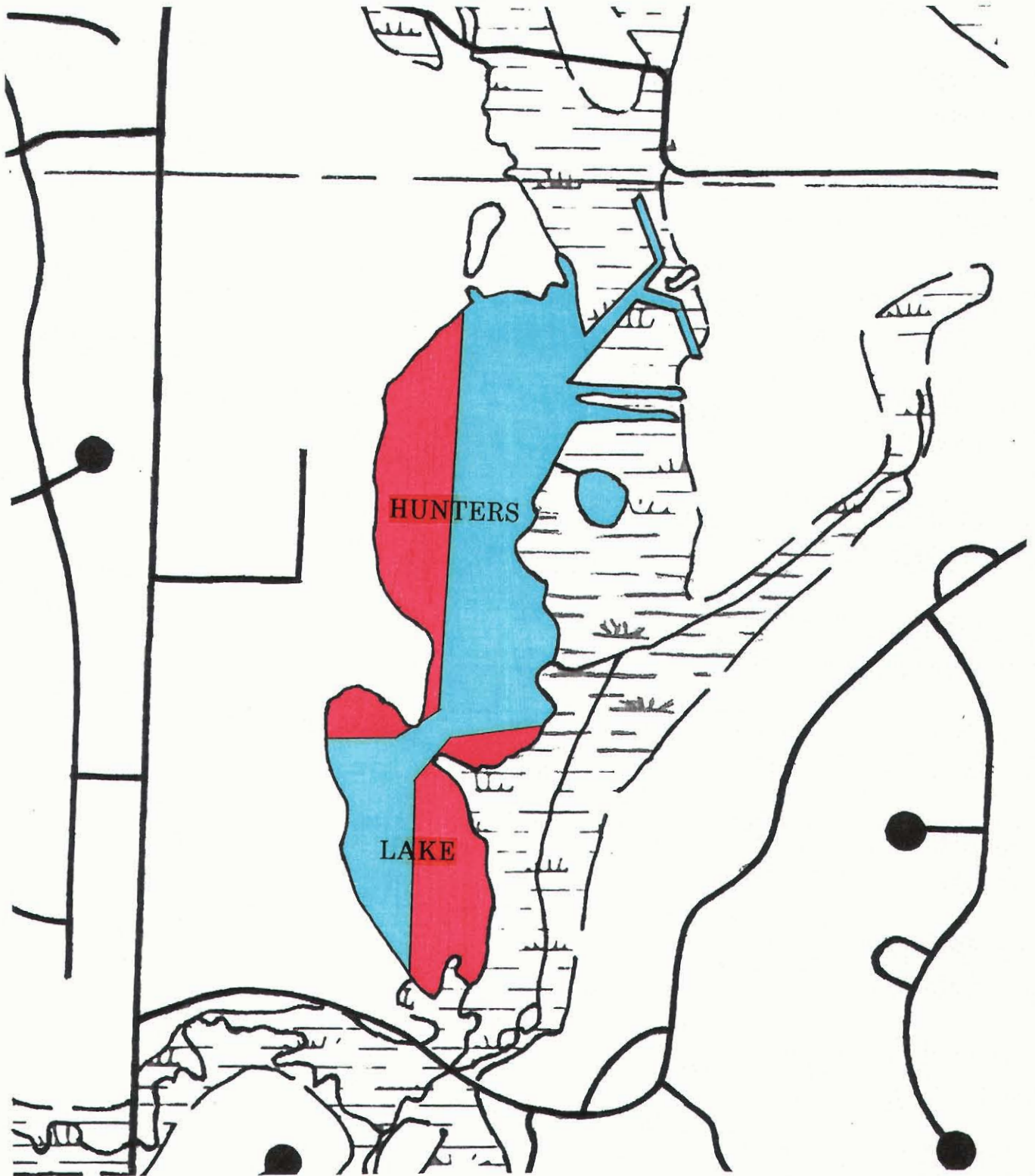
Two options to provide public recreational boating access to Hunters Lake have been identified; namely, 1) to provide a level of access fully consistent with the standards set forth in Chapter NR 1 of the Wisconsin Administrative Code, and 2) to provide a level of access that differs from the standards set forth in Chapter NR 1.

Access Standards: The Wisconsin Department of Natural Resources staff have been in regular communication over the past four years with the Town of Ottawa and the Hunters Lake Association regarding the provision of public access to Hunters Lake. As previously noted, the Department has developed a plan for a public boat launch to be located at Manor House Road on the southern shore of the south basin. Determination of the amount of access that should be accommodated at Hunters Lake is dependent on the areal extent of the open water lake surface. Hunters Lake, with a surface area of 57 acres, falls in the 50- to 99-acre category for recreational use lakes established in Section NR 1.91 of the Wisconsin Administrative Code. As previously noted, the minimum number of car-trailer units that could be accommodated at Hunters Lake, in a manner consistent with the Section NR 1.91 guidelines, would be a combination of five cartop and car-trailer units plus a handicapped accessible unit, for a total of six units. The maximum number of car-trailer units would be five car-trailer units plus a handicapped accessible unit, for a total of six units. Furthermore, standards set forth in the county and regional park and open space plans indicate that the fast or high-speed boating capacity of the Lake is very limited, with the safe use capacity likely to be exceeded with consideration of only riparian-owned boat usage. Given the site geometry and the depth limitations pertaining to parts of Hunters Lake, smaller crafts suitable for slower-speed boating activities are best suited for use of the Lake.



Access Considerations: The shallow and narrow nature of the waterway linking the northern and southern basins of Hunters Lake is a basis for considering Hunters Lake to be two separate basins. This separation is even more strongly identifiable during periods of low water levels, as have occurred in recent years. This morphological feature is a constraint to high-speed boat traffic in the Lake, yet passage through this constriction has been noted as essential for watercraft towing skiers in order to gain the length of run necessary for this sport. The absence of clear sight lines—shown schematically in Figure 4—and the potential for nonpowered small craft to be in use in and around this waterway gives rise to concern for the

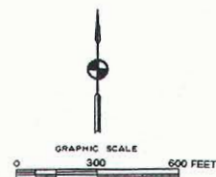
Figure 4

AREAS WITH RESTRICTED VISIBILITY FOR BOATING ON HUNTERS LAKE



LEGEND

-  AREAS WITH RESTRICTED VISIBILITY
-  AREAS WITH UNRESTRICTED VISIBILITY



Source: SEWRPC.

public safety at this point in the Lake. The numbers of such nonpowered vessels using the Lake have increased with completion of the private recreational boating access at The Preserve Subdivision and may be expected to increase further if the proposed public access site is opened. For these reasons, placement of slow-no-wake buoys at either side of the channel between the upper and power basins of Hunters Lake should be considered, especially since boating traffic through this channel, which is less than 200 feet in width, would be subject to the slow-no-wake provisions of the Town of Ottawa ordinance. Further, the Town of Ottawa, in consultation with the DNR and Hunters Lake Association, may wish to consider the implications of this on the determination of the number of open water acres within, and the standards for the provision of public boating access to, Hunters Lake as provided for in Section NR 1.91 of the Wisconsin Administrative Code.

As previously noted, there is currently a lake access at Parry Road on Scuppernong Creek just upstream of Hunters Lake which provides for onstreet nontrailed parking sites usable for carry-in boating only, and has no handicapped access facilities. This site does not meet the access standards. Under the first option, a new site is proposed to be constructed on publicly owned land at Manor House Road. This access site, or any other site as may be identified for development as a public recreational boating site in future, should be designed to accommodate not more than six car-trailer parking spaces suitable for a combination of car-top and small-boat car-trailer units, including one suitable for handicapped access, and to encourage use of slow-speed watercraft, including nonmotorized watercraft. Specific consideration should be given to potential ecosystem and recreational use impacts as discussed in Chapter III in the determination of the level and type of access. Under the second option, the public access at Parry Road would be up-graded to accommodate handicapped access by providing a handicapped parking site with hardened surface and a suitably graded ramp leading to the Creek, as set forth in the Wisconsin Department of Natural Resources Publication No. CA-003-88, Handbook for Accessibility ... A Reference Manual to Help Outdoor Recreation Areas to Include People with Disabilities, Spring 1989. This site would continue to provide carry-in access.

Recommended Boating Access

As of May 1997, the Town of Ottawa Board determined that the proposed Manor House Road access site was not needed or required to be constructed as a public recreational boating access pursuant to the open space requirements set forth in Chapter 236 of the Wisconsin Statutes.⁹ Given that position, support for which is set forth in Chapters II and III, it is recommended that the public recreational boating access site currently located at Parry Road be retained and upgraded¹⁰ as the primary public recreational boating access to Hunters Lake. It is recommended that the Parry Road site be up-graded to provide for handicapped-accessible carry-in access to Hunters Lake, with provision for one handicapped access parking space which would conform to the guidance set forth in the aforementioned Wisconsin Department of Natural Resources Publication No. CA-003-88. It is also recommended that the site facilities be designed to encourage the continued use of slow-speed watercraft, including nonmotorized watercraft, on Hunters Lake.

Notwithstanding, should it, in the future, be deemed desirable to proceed with the construction of alternate public recreational boating access facilities on Hunters Lake, other than the Parry Road site set forth above, it is recommended that consideration be given to the potential ecosystem and recreational use impacts associated with increased lake use as discussed in Chapter III. In addition, recognizing the current extent of use of Hunters Lake relative to the guidelines set forth in the Commission's regional park and open space

⁹ "On Hunter's Lake, Ottawa: Ramp Not Needed," The Kettle Moraine Index, Volume 93, No. 46, May 15, 1997.

¹⁰ Placement of appropriate warning signage along Parry Road, especially in the eastbound travel lane, should be included in the upgrading of this access site.

plan, it is recommended that the Parry Road access site be closed at such time as an alternate site is developed.

It is also recommended that provision be made at the access sites on the Lake for the posting of such boating regulations as may be adopted by the Town of Ottawa and other notices as necessary.

SHORELINE EROSION

The shoreline of Hunters Lake presents a largely natural aspect to lake users and residents. As described in Chapter III, the shoreline of Hunters Lake is generally stable. However, problems associated with the maintenance of this natural shoreline may result from the potentially higher level of recreational boating use that is anticipated following provision of improved public recreational boating access to the Lake.

Alternative Protection Measures

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 Lake, and, especially, to preserve the nearshore and wetland aquatic vegetation in and around the Lake. 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.

Four alternative shoreline erosion control techniques are considered potentially viable: vegetative buffer strips, rock revetments, wooden bulkheads, and gabions. These alternatives, as shown in Figure 5, were considered because they can be constructed, at least partially, by local residents; because most of the construction materials involved are readily available; because the technique would, in most cases, enable the continued use of the immediate shoreline; and because the measures are visually "natural" or "semi-natural" and should not significantly affect the aesthetic qualities of the lake shoreline.

Recommended Protection Measures

It is recommended that the Hunters Lake Association provide lakeshore residents with information on the methods of proper construction and maintenance of shoreland protection structures. Adoption of the vegetated buffer strips and riprap or rock revetment methods of shoreline protection is recommended. The proposed amendment of the boating ordinance, set forth above, should provide a further degree of protection to some of the unprotected shoreland areas of the Lake by limiting boat usage in these areas.

GROUNDWATER QUALITY AND QUANTITY

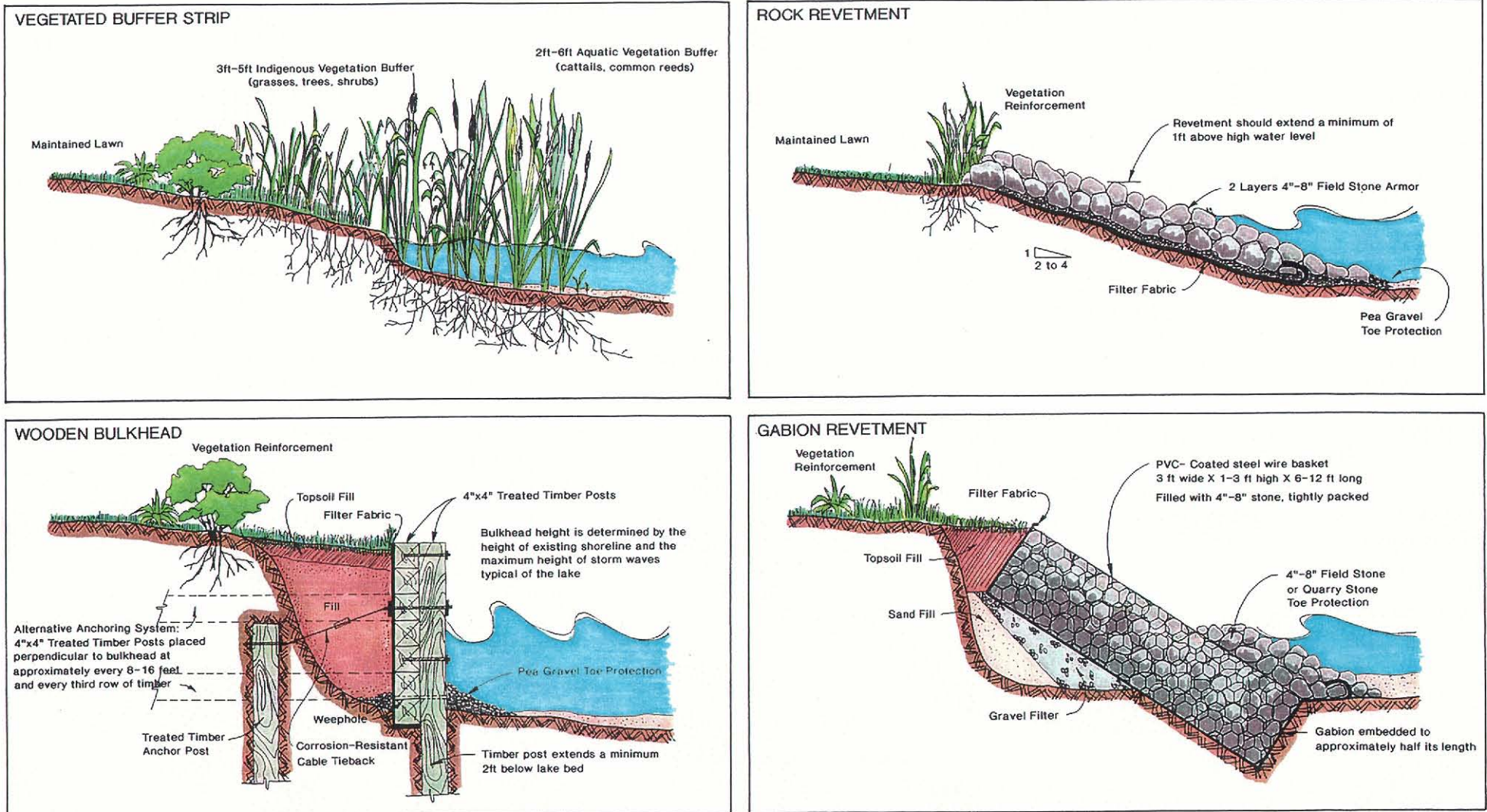
Groundwater is the principal source of potable water to households in the drainage area tributary to Hunters Lake. In addition, groundwater recharge and discharge is an important component to the surface water system of Scuppernong Creek and Hunters Lake. Groundwater resource protection can best be accomplished through the protection of ecologically valuable areas which include groundwater recharge and discharge areas, and by managing onsite sewage disposal systems and nonpoint sources of pollution. Recommendations on these management actions are described earlier. The only other specific recommendation is for the inclusion of information on the responsible storage and use of household chemicals in the overall lake management public informational and educational program. As described in Chapter III, the problems associated with groundwater result from the potential contamination of groundwater sources by onsite sewage disposal systems and land use activities.

AUXILIARY PLAN RECOMMENDATIONS

Public information, education, and involvement remains an important component of any lake management program. It is recommended that informational brochures and pamphlets, of interest to homeowners and

Figure 5

ALTERNATIVES FOR SHORELINE EROSION CONTROL



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

supportive of the recommendations contained herein be provided to homeowners through direct distribution or targeted civic center outlets such as the Town Hall.

Further, it is recommended that public meetings convened by the Town of Ottawa and the Hunters Lake Association at regular intervals be continued, and that informational issues identified above be presented as a regular part of such meetings. This plan and its subsequent iterations should be made available for public inspection at the Association's annual meetings.

Continued participation in the DNR Self-Help programs is also recommended as a means of assessing the health of Hunters Lake on a regular basis. These programs can provide an early warning of undesirable changes in lake water quality and aquatic species composition and initiate appropriate responses in a timely manner. Such data can supplement and be coordinated with data gathered by the Wisconsin Department of Natural Resources under the current surface water monitoring strategy developed to conduct monitoring activities and to perform basic assessments for each watershed in the Region on an approximately five- to seven-year rotating cycle.¹¹

It is also recommended that the Wisconsin Department of Natural Resources, in cooperation with the Town of Ottawa and the Hunters Lake Association, conduct a fish survey of Hunters Lake and its tributaries to update information of fish species composition and condition. Such data has not been collected since 1967. It is also recommended that such a survey be conducted on a five- to 10-year frequency in order to assess any significant changes in the fishery resource and to examine the need for additional fishery enhancement measures.

SUMMARY

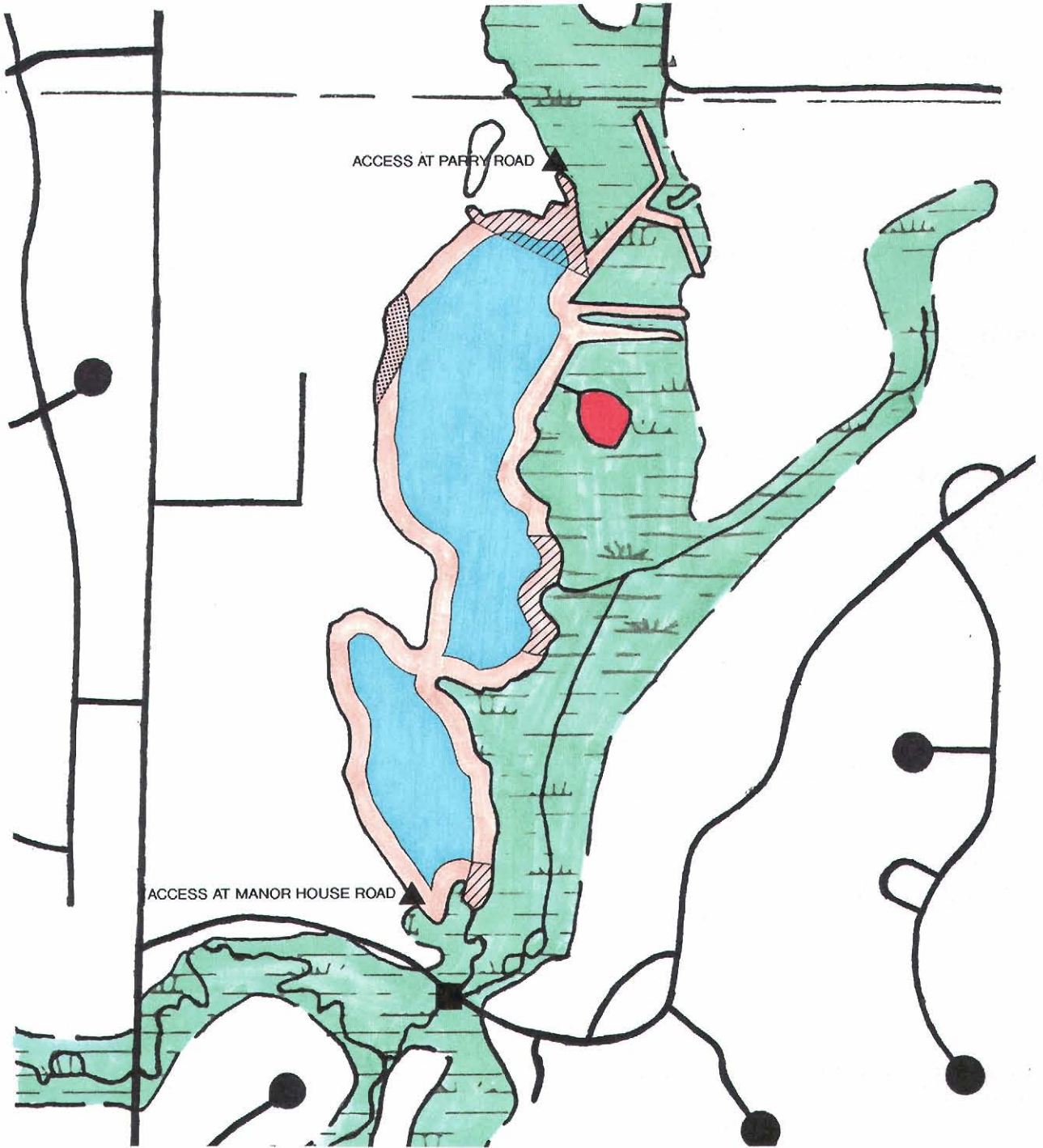
This plan, which documents the findings and recommendations of a study requested by the Town Board of the Town of Ottawa and the Hunters Lake Association, examines existing and anticipated conditions and potential management problems of Hunters Lake and presents a recommended plan for the resolution of these problems.

Hunters Lake was found to be a mesotrophic, largely deep water lake of relatively good quality located in close proximity to the Milwaukee metropolitan area and adjacent to a progressively urbanizing part of Waukesha County in which its tributary drainage area is wholly located. Surveys indicated that the Lake and its tributary drainage area contain significant areas of ecological value, including numerous wetlands and high-quality wildlife habitat surrounding the Lake.

The Hunters Lake protection and recreational use plan, summarized on Map 16 and in Table 5, recommends actions be taken to limit further human impacts on the in-lake macrophyte beds and reduce human impacts on the ecologically valuable areas adjacent to the Lake and in its watershed. The development of a public boat access site to serve the Lake is also recommended. The plan recommends only limited aquatic plant management action, including selected manual removal and surveillance activities at this time, mainly in the cases where purple loosestrife and Eurasian water milfoil are present, with the limited use of chemical treatment only to treat such species, if needed. The plan also recommends that the macrophyte beds that contain Eurasian water milfoil (*Myriophyllum spicatum*) be marked as motor exclusionary zones to attenuate the further proliferation of this plant. An initial, and periodic future, fishery surveys are also recommended. Consideration of public acquisition of, or acquisition of conservation easements over, lands within the primary environmental corridors to ensure the protection and preservation of these ecologically valuable areas is also recommended.

¹¹ SEWRPC Memorandum Report No. 93, *op. cit.*

RECOMMENDED LAKE PROTECTION PLAN FOR HUNTERS LAKE



LEGEND

RECREATIONAL BOATING USE ZONES

- RECOMMENDED AREA FOR BOATING ACTIVITY
- SLOW-NO-WAKE WITHIN 100 FEET OF SHORE
- RECOMMENDED NO MOTORIZED VESSELS
- PUBLIC ACCESS SITE

HABITAT ZONES

- RECOMMENDED AREA FOR PROTECTION AND PRESERVATION
- EURASIAN WATER MILFOIL MANAGEMENT AREA- LIMIT BOATING ACTIVITY
- VALUABLE AQUATIC HABITAT- LIMIT DISTURBANCE OF LAKE BOTTOM

MONITORING PROGRAM

- CONTINUE WATER QUALITY MONITORING
- CONTINUE AQUATIC PLANT MONITORING
- CONDUCT FISH SURVEY

WATERSHED MANAGEMENT

- ENFORCE CONSTRUCTION SITE EROSION CONTROL ORDINANCE
- PROTECT ENVIRONMENTALLY VALUABLE AREAS
- POTENTIAL WATER LEVEL CONTROL STRUCTURE

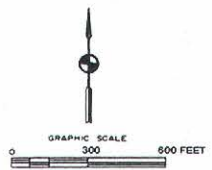


Table 5

RECOMMENDED MANAGEMENT PLAN ELEMENTS FOR HUNTERS LAKE

Plan Element	Subelement	Location	Management Measures	Initial Estimated Cost	Management Responsibility
Land Use Management	Land use implementation planning	Entire watershed	Support implementation set forth in Waukesha County development plan, including protection of environmental corridors	-. ^a	Waukesha County and Town of Ottawa
Watershed Land Management	Construction site erosion control	Entire watershed	Continue to enforce existing ordinances	-. ^b	Waukesha County, all general-purpose units of government in drainage area, and private property owners
	Urban nonpoint source controls	Entire watershed	Implement and maintain recommended urban good housekeeping practices	-. ^c	Waukesha County, Town of Ottawa, and Hunters Lake Association
	Rural nonpoint source controls	Entire watershed	Implement and maintain rural land best management practices	-. ^d	Waukesha County
	Environmentally sensitive lands protection	Town of Ottawa	Protect wetlands, wildlife habitat, and environmental corridors; develop and maintain trail systems as set forth in the Waukesha County park and open space plan component of the county development plan	-. ^e	Waukesha County, Town of Ottawa and Hunters Lake Association
	Onsite sewage disposal system management	Urban development surrounding Lake	Develop informational and educational program to promote sound maintenance practices and periodic inspections	-. ^c	Waukesha County, Hunters Lake Association, and private property owners
Water Quality Management	Water quality monitoring	Entire Lake	Continue to participate in the DNR Self-Help Water Quality Monitoring Program	-. ^c	Hunters Lake Association
Aquatic Plant Management	Aquatic plant monitoring	Entire Lake	Continue to participate in the DNR Self-Help Aquatic Plant Monitoring Program	-. ^c	Hunters Lake Association
	Milfoil management program	Affected in-lake areas	Limit boat traffic in designated areas; encourage and protect native aquatic plant growth; monitor exotic aquatic plant growth	-. ^c	Hunters Lake Association
	Manual harvesting and limited chemical treatment	Affected areas	Control purple loosestrife in wetland areas as necessary	-. ^c	Hunters Lake Association
Fish Management	Fish survey	Entire Lake	Implement citizen-based creel survey with assistance from the DNR	\$ 2,000 ^{e,f}	Hunters Lake Association and DNR

Table 5 (continued)

Plan Element	Subelement	Location	Management Measures	Initial Estimated Cost	Management Responsibility
Recreational Use Management	Recreational use zoning	Entire Lake	Enforce slow-no-wake ordinance within 100 feet of shoreline; restrict boating in ecologically valuable areas; refine ordinance as appropriate	\$ 500	Town of Ottawa
	Public access	Manor House Road and Parry Road sites	Construct and maintain access sites as required	\$85,000 ^e	Town of Ottawa and DNR
	Water level management	Entire Lake	Install outlet structure and maintain established ordinary high water mark within normal hydrological limits	\$ 1,500	Town of Ottawa and Hunters Lake Association
Shoreland Protection	Maintain structures	Entire Lake	Maintain existing structures	- ^c	Hunters Lake Association and private property owners
Information Program	Public information programming	Town of Ottawa in vicinity of Lake	Continue public awareness and information programming	\$ 500	Town of Ottawa and Hunters Lake Association

^aRecommendation set forth in county development plan. No specific cost allocation for Hunters Lake.

^bCost varies with amount of land under development in any given year.

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

^dCosts vary and will depend upon preparation of individual farm plans.

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

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

Source: SEWRPC.

The recommended plan includes continuation of an ongoing program of public information and education providing riparian residents and lake users. For example, additional options regarding household chemical usage, lawn and garden care, shoreland protection and maintenance, and recreational usage of the Lake should be made available to riparian householders, thereby providing riparian residents with alternatives to traditional alternatives and activities.

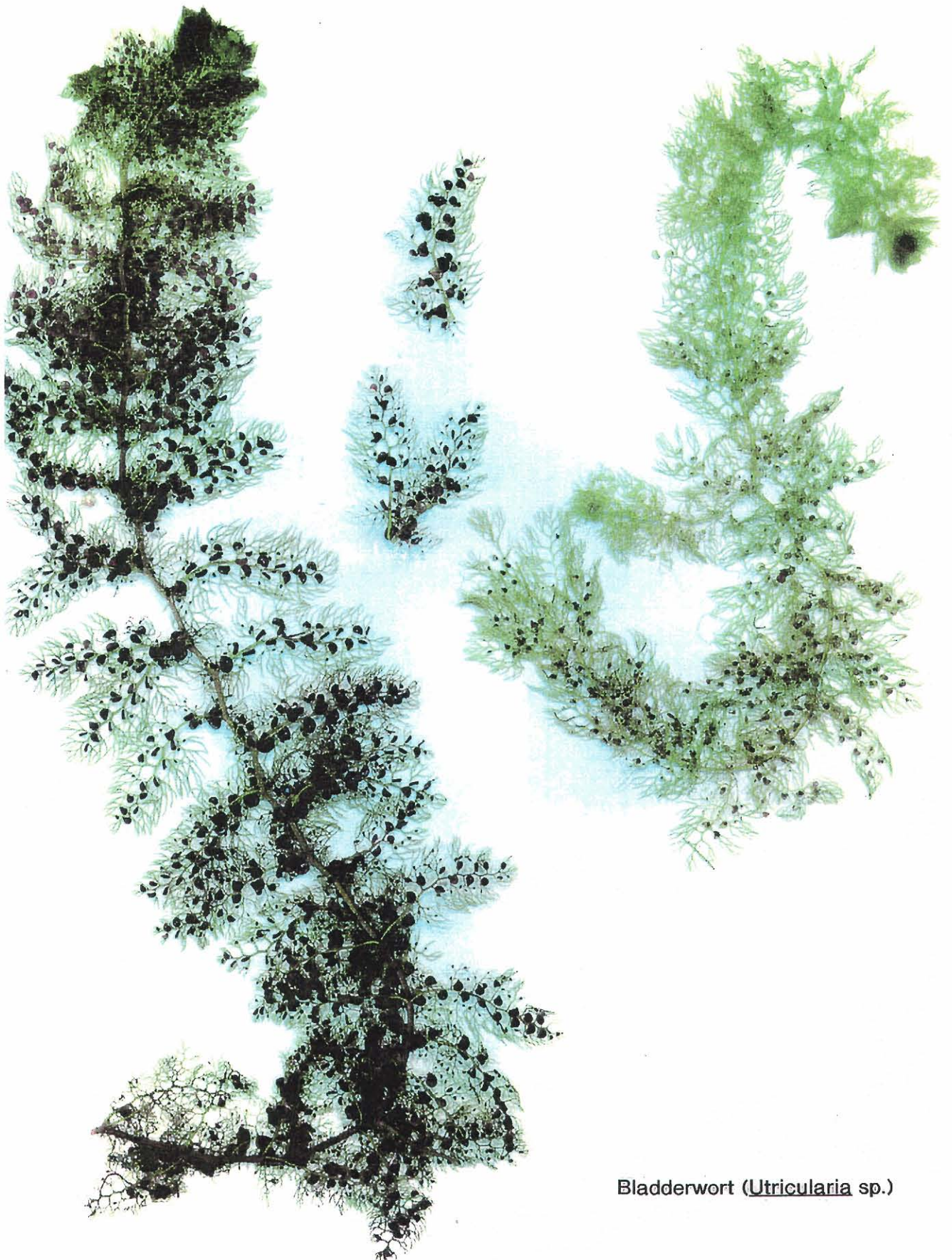
The recommended plan seeks to balance the demand for high-quality residential and recreational opportunities at Hunters Lake with the requirements for environmental protection.

APPENDICES

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Appendix A

ILLUSTRATIONS OF COMMON AQUATIC PLANTS IN HUNTERS LAKE



Bladderwort (*Utricularia* sp.)



Cattail (*Typha angustifolia*)



Clasp Leaf Pondweed (Potamogeton richardsonii)



Coontail (Ceratophyllum demersum)



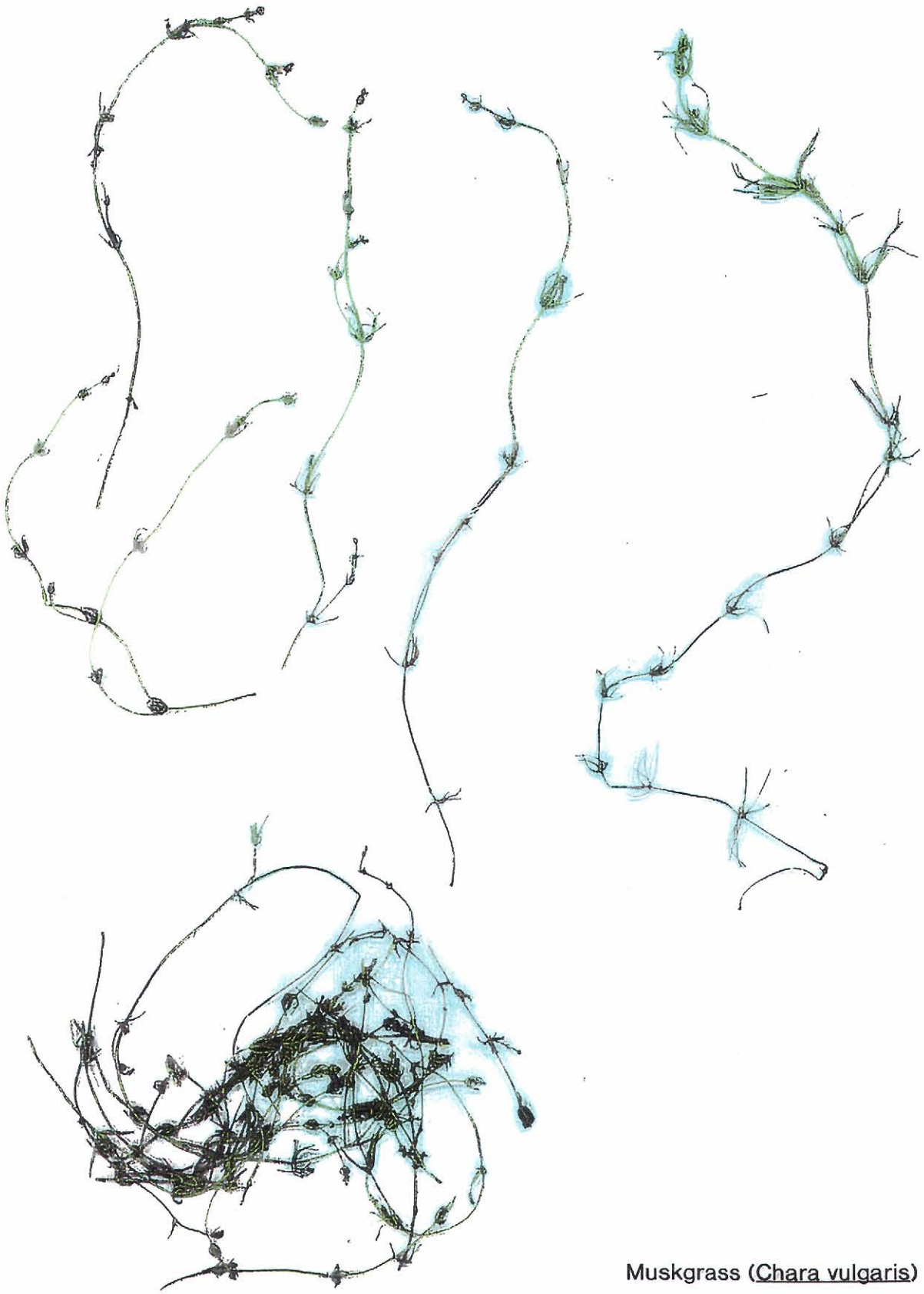
Curly Leaf Pondweed (Potamogeton crispus)



Eel Grass/ Wild Celery (Vallisneria americana)



Eurasian Water Milfoil (Myriophyllum spicatum)



Muskgrass (Chara vulgaris)



Sago Pondweed (Potamogeton pectinatus)



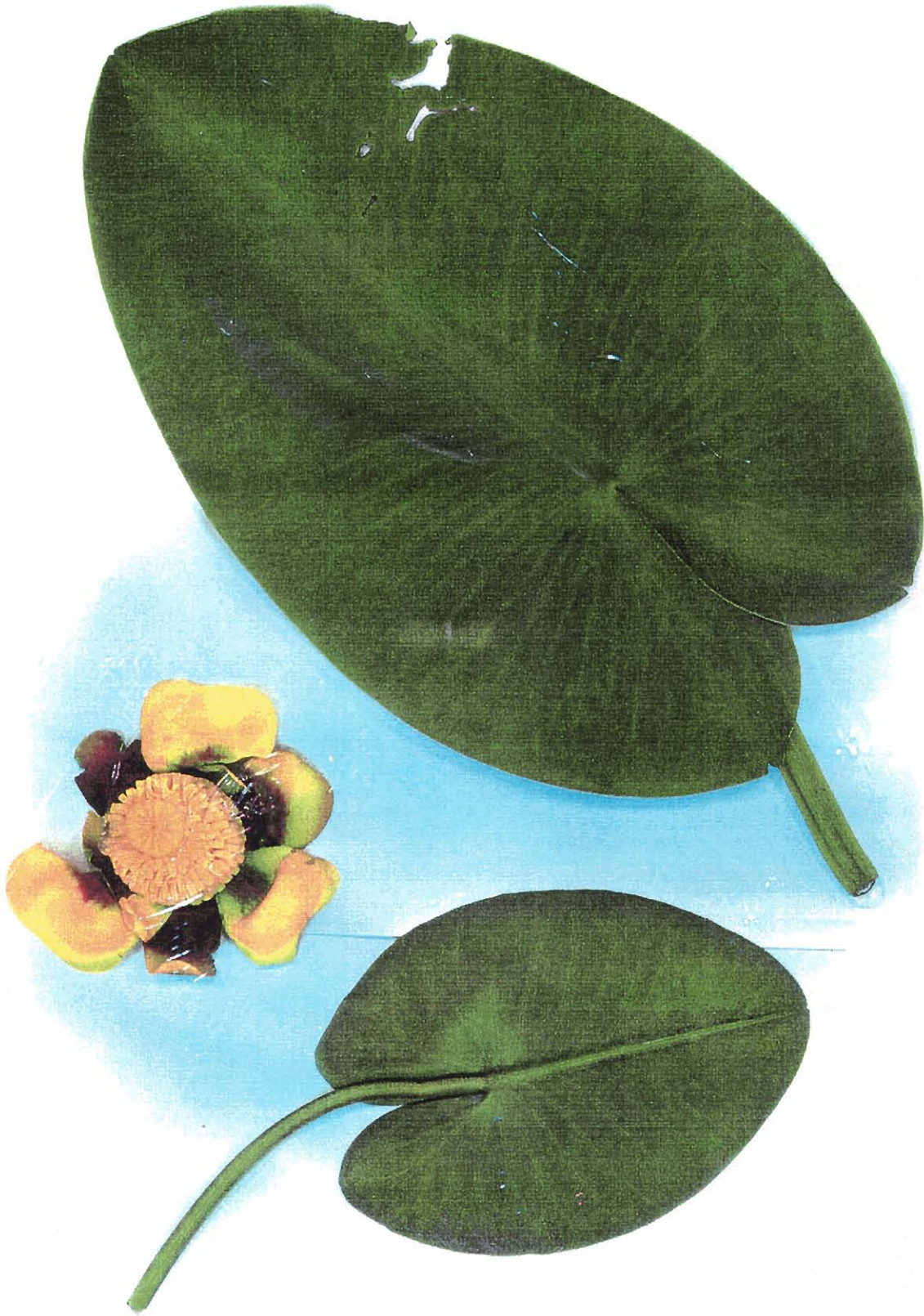
Spiney Naiad (*Najas marina*)



Waterweed (Elodea canadensis)



White Water Lilly (*Nymphaea tuberosa*)



Yellow Water Lilly (Nuphar variegatum)

Appendix B

WETLAND VEGETATION SURVEYS FOR THE HUNTERS LAKE AREA

Appendix B-1

SEWRPC LETTER REPORT—PRELIMINARY VEGETATION SURVEY FOR THE HUNTERS LAKE AREA: 1993-1994

Exhibit A

PRELIMINARY VEGETATION SURVEY
MATT PROPERTY WETLANDS

Date: May 11, December 21, 1993 and January 25, 1994

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

Location: Town of Ottawa in parts of the U.S. Public Land Survey Section 11, Township 6 North, Range 17 East, Waukesha County, Wisconsin.

Plant Community Area No. 1

EQUISETACEAE

Equisetum arvense--Common horsetail

POLYPODIACEAE

Onoclea sensibilis--Sensitive fern

TYPHACEAE

Typha latifolia--Broad-leaved cat-tail

IRIDACEAE

Iris versicolor--Blue flag iris

SALICACEAE

Populus tremuloides--Quaking aspen

FAGACEAE

Quercus macrocarpa--Bur oak
Quercus rubra¹--Northern red oak

SAXIFRAGACEAE

Saxifraga pennsylvanica--Swamp saxifrage
Ribes americanum--Wild black currant

ROSACEAE

Geum canadense--White avens
Rubus strigosus--Red raspberry

BALSAMINACEAE

Impatiens biflora--Jewelweed

Exhibit A (continued)

RHAMNACEAE

Rhamnus cathartica²--Common buckthorn
Rhamnus frangula²--Glossy buckthorn

VITACEAE

Parthenocissus quinquefolia--Virginia creeper

VIOLACEAE

Viola cucullata--Blue marsh violet

CORNACEAE

Cornus stolonifera--Red osier dogwood

CONVOLVULACEAE

Cuscuta gronovii--Dodder

LABIATAE

Lycopus americanus--Cutleaf bugleweed

RUBIACEAE

Galium aparine--Annual bedstraw

CAPRIFOLIACEAE

Viburnum lentago--Nannyberry

COMPOSITAE

Aster puniceus--Red-stemmed aster
Cirsium muticum--Swamp thistle

Total number of plant species: 23

Number of alien, or non-native, plant species: 2 (9 percent)

This approximately 0.8-acre wetland plant community area is part of the Scuppernong Creek wetland complex and consists of shrub-carr and second growth, Southern wet-mesic lowland hardwoods. Disturbances to the plant community area include past wetland fill for a road crossing, some selective tree cutting, and run-off from adjacent lands. No federal- or state-designated rare, threatened, or endangered species were observed during the field inspection.

¹Growing along the wetland edge.

²Alien, or non-native, plant species.

Plant Community Area No. 2

EQUISETACEAE

Equisetum arvense--Common horsetail

POLYPODIACEAE

Onclea sensibilis--Sensitive fern
Thelypteris palustris--Marsh fern

Exhibit A (continued)

PINACEAE

Larix laricina--Tamarack

CUPRESSACEAE

Juniperus virginiana¹--Red-cedar

TYPHACEAE

Typha latifolia--Broad-leaved cat-tail

GRAMINEAE

Bromus inermis^{1,2}--Smooth brome grass

Hystrix patula--Bottle brush grass

Calamagrostis canadensis--Canada bluejoint

Spartina pectinata--Prairie cord grass

Phalaris arundinacea²--Reed canary grass

CYPERACEAE

Scirpus cyperinus--Wool grass

Scirpus atrovirens--Green bulrush

Carex blanda--Wood sedge

Carex stricta--Tussock sedge

Carex aquatilis--Aquatic sedge

Carex comosa--Bristly sedge

Carex lacustris--Lake sedge

Carex trichocarpa--Sedge

Carex sp. --Sedge

LEMNACEAE

Lemna minor--Lesser duckweed

IRIDACEAE

Iris versicolor--Blue flag iris

SALICACEAE

Populus tremuloides¹--Quaking aspen

Salix nigra--Black willow

Salix bebbiana--Beaked willow

Salix sp. --Willow

JUGLANDACEAE

Carya ovata¹--Shagbark hickory

FAGACEAE

Quercus alba¹--White oak

Quercus macrocarpa¹--Bur oak

Quercus rubra¹--Northern red oak

URTICACEAE

Urtica dioica--Stinging nettle

POLYGONACEAE

Rumex orbiculatus--Great water dock

Polygonum sp. --Smartweed

Exhibit A (continued)

SAXIFRAGACEAE

Ribes cynosbati--Pasture gooseberry
Ribes americanum--Wild black currant

ROSACEAE

Geum canadense¹--White avens
Rubus occidentalis¹--Black raspberry
Rubus strigosus¹--Red raspberry
Rosa multiflora^{1,2}--Multiflora rose
Rosa sp. --Wild rose
Prunus serotina¹--Black cherry
Spiraea alba--Meadow sweet

RUTACEAE

Zanthoxylum americanum¹--Prickly-ash

ACERACEAE

Acer negundo¹--Boxelder

BALSAMINACEAE

Impatiens biflora--Jewelweed

RHAMNACEAE

Rhamnus cathartica²--Common buckthorn
Rhamnus frangula²--Glossy buckthorn

VITACEAE

Vitis riparia--River-bank grape
Parthenocissus quinquefolia¹--Virginia creeper

VIOLACEAE

Viola cucullata--Blue marsh violet

ONAGRACEAE

Epilobium coloratum--Willow herb

CORNACEAE

Cornus amomum--Silky dogwood
Cornus stolonifera¹--Red osier dogwood
Cornus racemosa--Grey dogwood

OLEACEAE

Fraxinus pennsylvanica--Green ash

BORAGINACEAE

Hackelia virginiana--Stickseed

VERBENACEAE

Verbena urticifolia--White vervain
Verbena hastata--Blue vervain

SCROPHULARIACEAE

Verbascum thapsus^{1,2}--Mullein

Exhibit A (continued)

RUBIACEAE

Galium aparine¹--Annual bedstraw

CAPRIFOLIACEAE

Viburnum lentago--Nannyberry

Viburnum rafinesquianum--Downy arrow-wood

Sambucus canadensis--Elderberry

Lonicera X bella²--Hybrid honeysuckle

COMPOSITAE

Bidens sp. --Beggar's-ticks

Ambrosia trifida--Giant ragweed

Solidago gigantea--Giant goldenrod

Solidago altissima¹--Tall goldenrod

Solidago graminifolia--Grassleaf goldenrod

Aster lucidulus--Swamp aster

Eupatorium maculatum--Joe-pye weed

Arctium minus^{1,2}--Common burdock

Cirsium vulgare^{1,2}--Bull thistle

Total number of plant species: 73

Number of alien, or non-native, plant species: 9 (12 percent)

This approximately 33-acre wetland plant community area is part of the Scuppernong Creek wetland complex and consists of shallow marsh, Southern sedge meadow, fresh (wet) meadow, shrub-carr, and scattered stands of second growth, Southern wet to wet-mesic lowland hardwoods. Disturbances to the plant community area include water level changes due to past ditching and dredging, placement of dredge spoil materials into the wetland, past wetland filling for a road crossing, and siltation and sedimentation from adjacent agricultural lands. No federal- or state-designated rare, threatened, or endangered species were observed during the field inspection.

¹Growing along the wetland edge.

²Alien, or non-native, plant species.

Plant Community Area No. 3

FAGACEAE

Quercus macrocarpa¹--Bur oak

URTICACEAE

Urtica dioica--Stinging nettle

RANUNCULACEAE

Ranunculus abortivus--Small-flowered buttercup

CRUCIFERAE

Alliaria officinalis²--Garlic-mustard

Exhibit A (continued)

ACERACEAE

Acer negundo³--Boxelder

BALSAMINACEAE

Impatiens biflora--Jewelweed

VITACEAE

Parthenocissus quinquefolia¹--Virginia creeper

UMBELLIFERAE

Osmorhiza claytoni--Sweet cicely

LABIATAE

Leonurus cardiaca²--Motherwort

RUBIACEAE

Galium aparine--Annual bedstraw

CAPRIFOLIACEAE

Viburnum opulus²--High-bush cranberry

CUCURBITACEAE

Echinocystis lobata--Wild cucumber

COMPOSITAE

Arctium minus^{1,2}--Common burdock

Total number of plant species: 13

Number of alien, or non-native, plant species: 4 (31 percent)

This approximately 0.1-acre wetland plant community area is part of an un-named tributary to the Scuppernong Creek and consists of second growth, Southern wet-mesic lowland hardwoods. Disturbances to the plant community area include a stream crossing and bank stabilization, and past agricultural land management activities. No federal- or state-designated rare, threatened, or endangered species.

¹Growing along the wetland edge.

²Alien, or non-native, plant species.

³Dominant tree species.

Plant Community Area No. 4

CUPRESSACEAE

Juniperus virginiana^{1,2}--Red-cedar

GRAMINEAE

Hystrix patula¹--Bottle brush grass

Calamagrostis canadensis--Canada bluejoint

Muhlenbergia cuspidata--Muhly grass

Phalaris arundinacea³--Reed canary grass

Exhibit A (continued)

CYPERACEAE

Scirpus atrovirens--Green bulrush
Carex pensylvanica--Pennsylvania sedge
Carex blanda--Wood sedge
Carex stricta--Tussock sedge
Carex spp. --Sedges

ARACEAE

Arisaema triphyllum--Jack-in-the-pulpit

LILIACEAE

Smilacina racemosa--Solomon's plume

SALICACEAE

Populus tremuloides--Quaking aspen
Salix bebbiana--Beaked willow
Salix sp. --Willow

FAGACEAE

Quercus alba²--White oak
Quercus rubra²--Northern red oak

ULMACEAE

Ulmus americana--American elm

POLYGONACEAE

Rumex verticillatus--Water dock

RANUNCULACEAE

Caltha palustris--Marsh marigold
Ranunculus abortivus--Small-flowered buttercup
Ranunculus flabellaris--Yellow water-crowfoot
Ranunculus septentrionalis--Swamp buttercup

BERBERIDACEAE

Podophyllum peltatum--Mayapple

CRUCIFERAE

Alliaria officinalis³--Garlic-mustard

ROSACEAE

Geum canadense--White avens
Rubus occidentalis--Black raspberry
Rubus strigosus--Red raspberry
Prunus serotina--Black cherry

GERANIACEAE

Geranium maculatum--Wild geranium

RUTACEAE

Zanthoxylum americanum--Prickly-ash

BALSAMINACEAE

Impatiens biflora--Jewelweed

Exhibit A (continued)

RHAMNACEAE

Rhamnus cathartica³--Common buckthorn

VITACEAE

Vitis riparia²--River-bank grape

Parthenocissus quinquefolia--Virginia creeper

VIOLACEAE

Viola (cucullata?)--Blue marsh violet

ONAGRACEAE

Epilobium coloratum--Willow herb

Circaea quadrisulcata--Enchanter's nightshade

UMBELLIFERAE

Cicuta maculata--Spotted water-hemlock

CORNACEAE

Cornus amomum--Silky dogwood

PRIMULACEAE

Lysimachia nummularia³--Moneywort

OLEACEAE

Fraxinus pennsylvanica--Green ash

HYDROPHYLLACEAE

Hydrophyllum virginianum--Virginia waterleaf

VERBENACEAE

Verbena urticifolia--White vervain

LABIATAE

Scutellaria lateriflora--Sideflower skullcap

Prunella vulgaris^{2,3}--Selfheal

Pycnanthemum virginianum--Mountainmint

Lycopus americanus--Cutleaf bugleweed

SCROPHULARIACEAE

Pedicularis lanceolata--Swamp lousewort

RUBIACEAE

Galium (aparine?)--Annual bedstraw

CAPRIFOLIACEAE

Viburnum lentago--Nannyberry

Sambucus canadensis--Elderberry

Lonicera X bella^{1,3}--Hybrid honeysuckle

COMPOSITAE

Bidens sp. --Beggar's-ticks

Solidago gigantea--Giant goldenrod

Aster lucidulus--Swamp aster

Aster lateriflorus--Calico aster

Aster simplex--Marsh aster

Exhibit A (continued)

COMPOSITAE (continued)

Eupatorium maculatum--Joe-pye weed
Eupatorium perfoliatum--Boneset
Eupatorium rugosum--White snakeroot
Arctium minus³--Common burdock
Taraxacum officinale³--Common dandelion

Total number of plant species: 63+

Number of alien, or non-native, plant species: 8 (13 percent)

This approximately 3.0-acre plant community area is part of an un-named tributary to the Scuppernong Creek and consists of fresh (wet) meadow and second growth, Southern wet to wet-mesic lowland hardwoods. Disturbances to the plant community area include water level changes due to past ditching and dredging, side casting of dredge spoil materials into the wetland, past filling for a road crossing, siltation and sedimentation due to runoff from adjacent agricultural lands, and some selective tree cutting. No federal- or state-designated rare, threatened, or endangered species were observed during the field inspection.

¹Growing on berm.

²Growing along the wetland edge.

³Alien, or non-native, plant species.

Plant Community Area No. 5

CUPRESSACEAE

Juniperus virginiana¹--Red-cedar

GRAMINEAE

Bromus inermis^{1,2}--Smooth brome grass
Dactylis glomerata^{1,2}--Orchard grass
Agrostis alba²--Redtop
Phleum pratense^{1,2}--Timothy
Phalaris arundinacea²--Reed canary grass

CYPERACEAE

Scirpus atrovirens--Green bulrush

SALICACEAE

Salix nigra--Black willow
Salix bebbiana--Beaked willow

ULMACEAE

Ulmus americana--American elm

CARYOPHYLLACEAE

Saponaria officinalis^{1,2}--Bouncing bet

ROSACEAE

Geum canadense--White avens

Exhibit A (continued)

FABACEAE

Robinia pseudoacacia^{1,2}--Black locust

ACERACEAE

Acer negundo--Boxelder

RHAMNACEAE

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

VITACEAE

Vitis riparia--River-bank grape

HYPERICACEAE

Hypericum perforatum^{1,2}--Common St. John's wort

ONAGRACEAE

Epilobium coloratum--Willow herb

Circaea quadrisulcata--Enchanter's nightshade

CORNACEAE

Cornus stolonifera--Red osier dogwood

VERBENACEAE

Verbena urticifolia¹--White vervain

LABIATAE

Leonurus cardiaca^{1,2}--Motherwort

SOLANACEAE

Solanum dulcamara²--Deadly nightshade

SCROPHULARIACEAE

Verbascum thapsus^{1,2}--Mullein

Scrophularia lanceolata¹--Early figwort

CAPRIFOLIACEAE

Lonicera X bella^{1,2}--Hybrid honeysuckle

COMPOSITAE

Solidago gigantea--Giant goldenrod

Solidago altissima X gigantea¹--Hybrid goldenrod

Solidago graminifolia--Grassleaf goldenrod

Aster lateriflorus--Calico aster

Aster simplex--Marsh aster

Cirsium arvense^{1,2}--Canada thistle

Cichorium intybus^{1,2}--Chicory

Total number of plant species: 33

Number of alien, or non-native, plant species: 15 (45 percent)

This approximately 1.5-acre wetland plant community area consists of fresh (wet) meadow, fen, and shrub-carr with second growth Southern wet to wet-mesic lowland hardwoods. Disturbances to the plant community area include past agricultural land management activities. No federal- or state-designated rare, threatened, or endangered species were observed during the field inspection.

¹Growing along the wetland edge.

²Alien, or non-native, plant species.

Appendix B-2

WETLAND VEGETATION SURVEY CONDUCTED BY THE
RETZER NATURE CENTER FOR THE HUNTERS LAKE AREA: JULY 1973

17 July 73

A. Stephenson Shrubby Fen

- #1 Andropogon gerardi
Asclepias incarnata
Betula pumila
Cirsium muticum
Cornus ammomum
Cornus stolonifera
(R) Cypripedium candidum
Equisetum *hymale
Eupatorium maculatum
Eupatorium perfoliatum
(U) *Eupatorium rugosum
Fragaria virginiana
Geum aleppicum

- Illex verticillata
(U) Lactuca sp.
Larix laricina
Lycopus sp.
Lysimachia quadriflora
Monarda fistulosa

- (R) Parnassia glauca

- Potentilla fruticosa
Potentilla norvegica
(U) Potentilla recta

Rhus vernix

Salix
Solidago ohioensis
Thalictrum dasycarpum
Thelypteris

- (U) Verbena urticifolia
Viola *cucullata
#31 Vitis *labrusca

1. 1 Dragonfly with copper-colored wings

B. Tamarack Pond Communities

1. Open Water (Sponge-like *Algae)
2. Floating Aquatic (White Nelumbo)
3. Emergent Aquatic (Round-stem Bullrush)
4. Sedge Meadow (Bluejoint common)
5. Shrub Carr (mostly understory of Tamaracks)
6. Tamarack Swamp (dying rather slowing now and progressive die-off for last 10 years or so).

This wetland system presents an excellent example of the classical concentric zones of wetland successional communities and could be used to illustrate the basic story of bogs even though their acidic ericads weren't noticed in the sedge meadow. Since the School Section dam is only downstream a little way, tamarack die-off of the Hunters Lake area may be related.

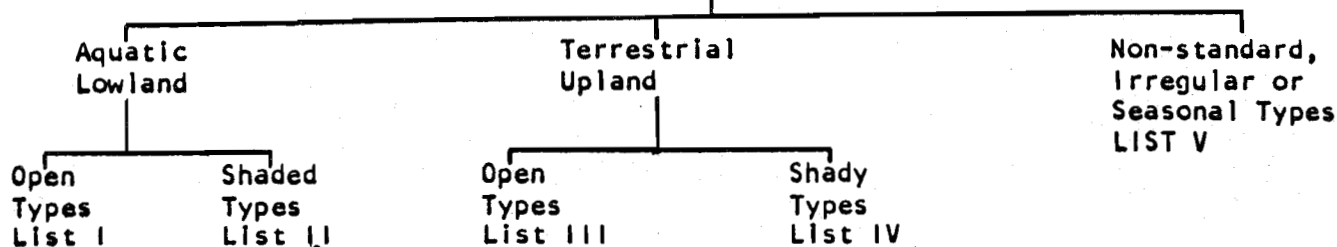
- * - Identification uncertain
- R - Reported by others at a different date
- U - Upland

Retzer Nature Center
2 Aug. 73; typed June 1993
JAS:eas

PLANT COVER TYPES--WAUKESHA COUNTY PARKS
 ECOLOGICAL INVENTORY--1990 VERSION.

Flow Chart Guide to Broad Categories

A Region's Landscape



LIST I Wet Areas and Lowlands

(Conservancy-status wetlands are types #1-22, #31-32, #59-60 and #69)

A. Aquatic Types -VW

1. Algal/Submergent-P&P
2. Vascular Submergent-VW

B. Deep Marshes-TXB

3. Floating-leaved-TXB
4. Deep Marsh (Pond)-FWS

C. Shallow Marshes-TXB

5. Shallow Marsh-FWS
6. Weed Marsh (especially Purple Loosestrife)-P&P

D. Wet Meadows-TXB

7. Sedge Meadow-VW
8. Grass Meadow (see also #31-32) P&P
9. Fresh Meadow-SEW
10. Fen-VW

LIST II Shaded Lowland and Wetlands

E. Shrub Swamps-FWS

11. Bog-VW
12. Shrub Carr-VW
13. Shrub-Fen (Bog Birch & Cinquefoil) P&P-SEW
14. Spirea Thicket-P&P
15. Alder Thicket-VW

F. Lowland Openings-P&P

16. Lowland Forest Edge-P&P
17. Lowland Savannah-TXB

G. Low Hardwood Forests-TXB

18. Lowland Thicket-P&P
19. Lowland Hardwoods-SEW (Wet-mesic-VW)
20. Wet Forest-VW

H. Low Conifer Forest-TXB

21. North Wet-mesic (Cedar) VW
22. North Wet (Tamarck)-VW

LIST III Open Uplands (#31-32 have wet soil)

I. Agricultural -AG

23. Annual crop-AG
24. Cropped Forage-AG
25. Pastured Forage-AG
26. Vegetable/berry Crop-AG

J. Field-TXB

27. Weedy Field-AG/TXB
28. Old-field (incl. 'Soil Bank' classification of USDA)-TXB
29. Old-field, Brushy-TXB
30. Old-field, Prairie-P&P

K. Prairies-TXB

31. Wet Prairie-VW
32. Wet-mesic Prairie-VW
33. Mesic Prairie-VW
34. Dry-mesic Prairie-VW
35. Dry Prairie-VW
36. Sand Barrens-VW

LIST IV Shady Uplands

L. Thickets-TXB

37. Upland Thicket-DNR

M. Wooded Openings-TXB

38. Forest Edge-TXB
 39. Cedar Glade (incl. brushy Sub-type)-VW
 40. Oak Barrens (incl. brushy Sub-type)-VW
 41. Oak Openings (1-20 trees/ac; incl. brushy Sub-type)-VW
 42. Grove (A Wild Grove is 20-80 trees/ac)¹
 -P&P

N. Forests(3) or more trees/ac)-TXB

43. Dry Forest-VW
 44. Dry-mesic Forest-VW
 45. Mesic Forest-VW
 46. Cedar Forest²-TXB

O. Plantations (trees)-DNR

47. Conifer Plantation-DNR
 48. Orchard-BOR
 49. Hardwood Plantation-P&P

P. Parklands-TXB

50. Natural Parklands-P&P
 51. Maintained Parklands-P&P
 52. Groomed Parklands-P&P

LIST V Non-Standard Types ("Azonal", "intra-zonal", seasonally wet, etc.)³

Q. Irregular Uplands-TXB

53. Sunny Cliff-VW
 54. Shaded Cliff (\geq 50% shade)-VW
 55. Open Dune⁴-TXB
 56. Sand Blowout-TXB

R. Irregular Lowlands/Shorelands-P&P

57. Flats-FWS
 58. Bars-BOR
 59. Shores (incl Banks)-TXB
 60. Beaches-VW
 61. Pot Holes-DNR
 62. Seasonally-flooded Basins-FWS

S. Special Disclimaxes-TXB

63. Lawn (Turf)-TXB
 64. Shaded Turf-($>$ 25% shade in sma yards, etc.)-TXB
 65. Horticultural Stands (Non orchard)
 66. Bare Rights-of-way-P&P
 67. "Made" Land⁵-SCS
 68. Open Dumps-DNR
 69. Quarries (incl. Borrow pits)-BOR
 70. Weed Meadow-P&P
 71. Wooded Borders (often have several types/mixed together)-P&P

Key to Source of Inventory Terminology:

- "AG" - Agricultural Terminology
 "BOR" - Bordner's 1930 "Wis. Land Economic Inventory"
 "DNR" - Wis. D.R.R., Game Research Section
 "FWS" - Fish & Wildlife Service, especially from the classic, Circular #39
 "P&P" - Park & Planning (Wauk. Co. Park's Nature Program)
 "SCS" - Soil Conservation Service of USDA
 "SEW" - SEWRPC Wetland Classification Scheme, 1980
 "TXB" - Textbooks commonly used in ecology as Smith. Ecol. & Field Biology
 "VW" - Vegetation of Wis.(1959) by Curtis

Foot Notes

1. Opening is not apparently maintained by management (a synonym for open woodland)
 2. Not a regular community per se, but a localized condition of habitat.
 3. Irregular means 'azonal' or 'intraazonal' in the context of vegetative cover types as they have formed irregularly-local types of soils.
 4. Open Dunes have pre-forest edge cover.
 5. "Made" land in the SCS definition of landfill etc. Can also be extended to include actual buildings, pavement, etc., if desired.

Appendix C

BOATING ORDINANCES APPLICABLE TO HUNTERS LAKE

CHAPTER 20

LAKES AND BEACHES

- 20.01 Boat Traffic
- 20.02 Public Access Points
- 20.03 Henrietta Lake and Utica Lake
- 20.04 School Section Lake
- 20.05 Penalty

20.01 BOAT TRAFFIC. (1) Sections 30.50 through 30.71 inclusive, and §30.80 (1) and (2), Wis. Stats., are hereby adopted by reference except where the provisions of this chapter are more restrictive and in that event the provisions of this chapter shall control.

(2) No person shall swim more than 150' from shore unless accompanied by an escort boat.

(3) All power boats must travel in counter-clockwise direction at all times.

(4) No motor boat shall operate at a speed in excess of slow-no-wake under the following conditions:

(a) Before 11 a.m. and after 6 p.m.

(b) When closer than 100' to any bathing beach or anchored boat.

(5) No person shall water ski between rafts and shorelines.

(6) No person shall operate any boat unless such boat shall be equipped with U.S. Coast Guard approved personal flotation devices as required under §NR 5.13, Wis. Adm. Code.

(7) All waterskiers shall wear U.S. Coast Guard approved life jackets, Type I, II or III, (PFD).

20.02 PUBLIC ACCESS POINTS. (1) PARKING. (a) Parking shall be prohibited on both sides of Pretty Lake Road at all times.

(b) Parking shall be permitted for 4 vehicles only at designated public access points leading to Pretty Lake between 6 a.m. and 10 p.m. Parking at points which are not designated and at all other times not specified herein is prohibited.

(2) RESTRICTIONS. No person shall do any of the following on public access points and areas leading to public access points within the Town:

(a) Consume beverages or food.

(b) Camp or picnic.

(c) Have pets or livestock including horses.

(d) Litter.

20.03 HENRIETTA LAKE AND UTICA LAKE. (1) APPLICATION. The provisions of this ordinance shall apply to the waters of Henrietta Lake and Utica Lake, within the jurisdiction of the Town of Summit and the Town of Ottawa. The provisions of this ordinance shall be enforced by the officers of the Water Safety Patrol Unit and police of the jurisdiction of the Town of Summit.

(2) STATE BOATING AND WATER SAFETY LAWS ADOPTED.

(a) Except as otherwise specifically provided in this ordinance, the current and future statutory provisions describing and defining regulations with respect to water traffic, boats, boating, and relating water activities in §§30.50 up to and including 30.71, 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. Any act required to be performed or prohibited by any current or future statute incorporated herein by reference is required or prohibited by this ordinance. Any further additions, amendments, revisions or modifications of the statute incorporated herein are intended to be made part of this ordinance in order to secure uniform state-wide regulation of the waterways of the State.

(b) All rules and orders created by the Wisconsin Department of Natural Resources, modifying or supplementing the foregoing provisions of State Law or which may be adopted or made in the future, are hereby incorporated in and made a part of this ordinance by deferring to the same as if they are or were to be set out herein verbatim.

(3) OPERATION OF MOTOR BOATS. No motor boat shall be operated on Henrietta Lake and Utica Lake at any time at a speed in excess of slow no wake.

(4) SWIMMING REGULATIONS. No person, unless said person is engaging in activities and subject to the provisions of §30.70, Wisconsin Statutes, entitled Skin Diving, shall:

(a) Swim from any unmanned boat, unless such boat is anchored, or

(b) Swim more than 150 feet from the shoreline unless is a designated swimming zone or unless accompanied by a competent person in a boat, or

TOWN OF OTTAWA 10/26/93

(c) Swim more than 150 feet from the shoreline between sunset and sunrise.

(5) PENALTY.

(a) STATE BOATING AND WATER SAFETY LAWS AND ALL OTHER VIOLATIONS AS SET FORTH IN §2 OF THIS ORDINANCE.

Any forfeiture for violation of the State statute, rule or order adopted by reference in §2 of this ordinance shall conform to the forfeiture permitted to be imposed for violation of such statutes as set forth in the Uniform Wisconsin Deposit and Bail Schedule for Conservation, Boating, Snowmobile, and ATV Violations, including any variations or increases for subsequent offenses, which schedule is adopted by reference.

(b) LOCAL BOATING LAWS AS SET FORTH IN §§3, 4 and 5 OF THIS ORDINANCE.

Any person 16 years or older violating the provisions of this ordinance shall be subject to a forfeiture of not more than \$500 plus court costs and penalty assessment. Failure to pay any forfeiture hereunder shall subject the violator to imprisonment in the County Jail or loss of license.

Any person 14 or 15 years of age shall be subject to a forfeiture of not less than \$10 nor more than \$25 plus court costs and penalty assessment per each offense or referred to the proper authorities as provided in Chapter 48, Wisconsin Statutes. Failure to pay any forfeiture hereunder shall subject the violator to the provisions of §48.17(2), Wisconsin Statutes.

Any person under the age of 14 shall be referred to the proper authorities as provided in Chapter 48, Wisconsin Statutes.

(6) ENFORCEMENT.

(a) Enforcement Procedure. The statutory provisions of §§66.115, 66.119, 66.12, 30.29, 30.50 to 30.71, and Chapter 799, Wisconsin Statutes, are adopted and by reference made a part of this ordinance as if fully set herein. Any act required to be performed or prohibited by any statute incorporated herein by reference is required or prohibited by this ordinance. Any future additions, amendments, revisions or modifications of the statutes incorporated herein are intended to be made part of this ordinance in order to secure uniform state-wide regulation and enforcement of boating ordinance violations. Further, the Town of Summit and the Town of Ottawa specifically elect to use the citation method of enforcement.

(b) Deposits.

1. Schedule of Deposits. The schedule of cash deposits shall be as follows:

§2: Applicable sections of Uniform Wisconsin Deposit and Bail Schedule for Conservation, Boating, Snowmobile and ATV Violations plus current assessment fees and current court costs if applicable.

§§3, 4 and 5: \$50 plus court costs and assessments plus current assessment fees and current court costs if applicable.

2. Deposit for Repeat Offenses. Any person found guilty of violating this ordinance or any part thereof who was previously convicted of the same section within the last year shall forfeit twice the deposit delineated above plus court costs and penalty assessment.

3. Non-Scheduled Deposit. If a deposit schedule has not been established for a specific violation, the arresting officer shall require the alleged offender to deposit not less than the maximum forfeiture permitted hereunder.

4. Depository. Deposits should be made in cash, money order, or certified check to the Clerk of Municipal Court, who shall issue a receipt therefore as required by Wisconsin Statute. If the deposit is mailed, the signed statement required by Wisconsin Statute shall be mailed with the deposit.

(c) Nonexclusivity.

1. Other Ordinances. Adoption of this ordinance does not preclude the Town Boards from adopting any other ordinance or providing for the enforcement of any other law or ordinance relating to the same or other matter.

2. Other Remedies. The issuance of a citation hereunder shall not preclude the Town Boards or any authorized office from proceedings under any other ordinance of law or by any other enforcement method to enforce any ordinance, regulation or order.

20.04 SCHOOL SECTION LAKE. (1) APPLICATION. The provisions of this ordinance shall apply to the waters of School Section Lake.

(2) OPERATION OF MOTOR BOATS.

(a) No boats shall be operated at a speed greater than slow, no wake, between the hours of sunrise and sunset.

(b) No motor boats whatsoever shall be allowed to operate between the hours of sunset and sunrise.

(3) ADDITIONAL RESTRICTIONS. The restrictions contained in this subsection are in addition to all other boating regulations contained within the Town of Ottawa Town Code. In the event there is a conflict between the restrictions contained in this subsection and restrictions contained elsewhere in the Town of Ottawa Town Code, the restrictions of this particular subsection shall apply.

20.05 PENALTY. Except as otherwise provided, any person who shall violate any provision of this chapter, or any regulation, rule or order made hereunder, shall be subject to a penalty as provided in §25.04 of this General Code.

SEWRPC Memorandum Report No. 120

A LAKE PROTECTION AND RECREATIONAL USE PLAN FOR HUNTERS LAKE
WAUKESHA COUNTY, WISCONSIN

Appendix D

**HYDROLOGIC AND HYDRAULIC ANALYSIS OF
PROPOSED OUTLET STRUCTURE FOR HUNTERS LAKE**

INTRODUCTION

This appendix documents the hydrologic and hydraulic analyses performed to evaluate the impacts of the proposed outlet structure on the 100-year recurrence interval flood elevation for Hunters Lake. The structure configuration is shown in Figure 3 of SEWRPC Memorandum Report No. 120.

HYDROLOGIC ANALYSIS

The 100-year inflow and outflow flood discharges for Hunters Lake were previously computed under a hydrologic analysis which was performed for Scuppernong Creek in March 1989 by Commission staff. Flood discharges were developed for then existing year 1985 land use conditions, using the U.S. Army Corps of Engineers HEC-1 Flood Hydrograph Package computer program. Under the analysis presented here, the HEC-1 model was revised to reflect planned buildout land use conditions for the drainage area tributary to Hunters Lake as shown on Map 5 of this report.

HYDRAULIC ANALYSIS

Flood stages for Hunters Lake were determined under this analysis using the U.S. Army Corps of Engineers HEC-RAS River System Analysis computer program. Input to that model was based on the following sources: four field-surveyed valley cross-sections which were obtained from R.A. Smith and Associates, Inc.; field-surveyed structure data obtained by Commission staff; U.S. Geological Survey one inch equals 2,000 foot scale 7.5 minute series quadrangle maps; one inch equals 400 foot scale orthophotographs dated April 1995; and field inspection.

The existing outlet structure for Hunters Lake consists of a roadway bridge with two seven-foot-wide by three-foot-high concrete box culverts located under Manor House Road. A low head dam constructed of small rocks and having a crest elevation of 866.4 feet National Geodetic Vertical Datum, 1929 adjustment (NGVD) is located at the downstream side of the culverts. The proposed outlet condition would include the existing roadway bridge concrete box culverts under Manor House Road and a low head weir constructed of interlocking blocks. The proposed weir would be about 20 feet long and would have a maximum crest elevation of 866.1 feet NGVD. The weir was assumed to have a single, 16-inch-wide

rectangular notch, or two smaller rectangular notches with a total width of about 16 inches, with a crest elevation of 865.85 feet NGVD.

The hydraulic analysis considered the following configurations:

1. The existing box culverts with the abovenoted rock dam.
2. The existing box culverts without the rock dam.
3. The existing box culverts with the proposed weir.

As shown on Table D-1, a comparison of the 100-year flood elevation of Hunters Lake for the existing outlet condition which included the rock dam and proposed outlet conditions indicate that the proposed weir structure would not be expected to result in an increase of 0.01 foot or more and would meet the allowable flood stage increase requirements of Chapter NR 116 of the Wisconsin Administrative Code. A comparison of the 100-year flood elevation of Hunters Lake for the existing outlet condition without the rock dam and the proposed outlet condition indicate that the proposed weir structure would be expected to result in a 0.07-foot increase in the flood stage.

Table D-1

**COMPARISON OF 100-YEAR RECURRENCE INTERVAL
FLOOD ELEVATION AND DISCHARGE—HUNTERS LAKE**

Existing Structure with Rock Dam		Existing Structure without Rock Dam		Existing Structure with Proposed Weir	
Flood Elevation (feet NGVD29)	Outflow (cubic feet per second)	Flood Elevation (feet NGVD29)	Outflow (cubic feet per second)	Flood Elevation (feet NGVD29)	Outflow (cubic feet per second)
869.19	291	869.02	281	869.09	273

Source: SEWRPC.