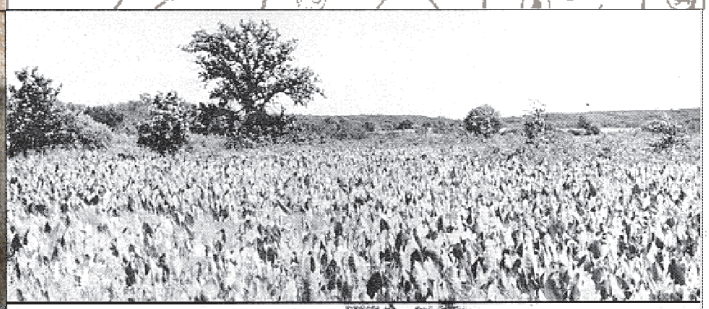
PLANNING REPORT NO. 42

A REGIONAL NATURAL AREAS AND CRITICAL SPECIES HABITAT PROTECTION AND MANAGEMENT PLAN FOR SOUTHEASTERN WISCONSIN



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Cover Photographs: Left—The prairie white-fringed orchid, a federally designated threatened and State-designated endangered plant species, photographed at the Chiwaukee Prairie in Kenosha County. Photo Source: Christopher J. Jors.
Upper Right—The Scuppernong Prairie State Natural Area, located in Waukesha County. Photo Source: Donald M. Reed.
Lower Right—The Camp Wowitan Esker and Fen, located in Washington County. Photo Source: Donald M. Reed.

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A REGIONAL NATURAL AREAS AND CRITICAL SPECIES HABITAT PROTECTION AND MANAGEMENT PLAN FOR SOUTHEASTERN WISCONSIN

Prepared by the

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September 1997

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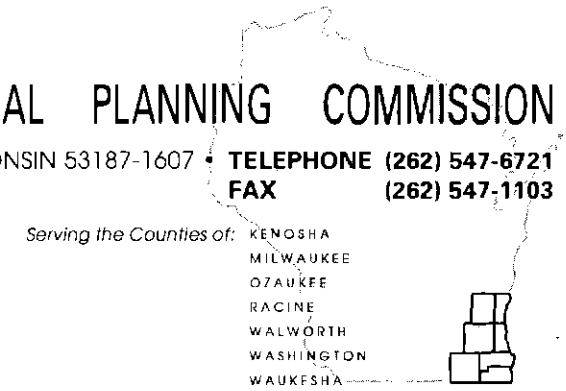

September 2, 1997

STATEMENT OF THE CHAIRMAN

Since its inception, the Regional Planning Commission has placed a high priority on the identification, protection, and wise use of the natural resources of the Region. The Commission was, therefore, particularly pleased to be asked by Milwaukee County in December 1987, and subsequently by its other six constituent counties, to undertake the preparation of a regional natural areas and critical species habitat protection and management plan. That plan, presented in this report, is the product of almost 10 years of intensive planning work conducted under the guidance of a Technical Advisory Committee comprised of individuals particularly knowledgeable about the natural areas and critical species habitats of the Region. That work culminated in a series of public informational meetings and hearings held in May 1997 in which an opportunity was afforded for additional participation in the plan preparation by interested and concerned public officials and other citizens.

Through an extensive inventory effort, the planning project identified all of the high-quality natural areas and critical species habitats remaining in the seven-county Region, and formulated a recommended plan for the protection, wise use, and proper management of those areas and habitats. Adoption and implementation of the recommended plan will do much toward maintaining the native biota, protecting sites of geological and archaeological importance, and preserving the natural beauty and environmental quality of the Region. Importantly, this report also provides much information needed to promote sound rural and urban development within the Region and to avoid unnecessary and costly conflicts between development proposals and the need for resource protection.

Respectfully submitted,

Thomas H. Buestrin
Chairman

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Chapter I

INTRODUCTION

The regional natural areas and critical species habitat protection and management plan presented in this report is an integral part of the comprehensive plan for the development of Southeastern Wisconsin which the Southeastern Wisconsin Regional Planning Commission (SEWRPC) is charged by law with preparing. In the light of this fact, an understanding of the need for, and objectives of, regional planning and the manner in which that need and those objectives are being met in Southeastern Wisconsin is necessary for a proper appreciation of the plan and its findings and recommendations.

THE NEED FOR REGIONAL PLANNING

In recent years, regional planning has become increasingly accepted as a necessary governmental function in most large urban areas of the United States. This tendency reflects a growing awareness that certain pressing problems of physical and economic development, as well as of environmental deterioration, transcend the geographic limits and fiscal capabilities of local units of government and require the cooperation of all units and agencies of government concerned for sound resolution.

The term "regional," as it is used in this context, applies to an area larger than a county but smaller than a state, united by economic interests and geography and by the common problems brought about by rapid urbanization and changing regional settlement patterns. A regional basis is unquestionably necessary to provide a meaningful technical approach to the sound development of such areawide systems of public works as highways and transit, sewerage and water supply, and park and related open space facilities. A regional basis is also necessary to a sound approach to the resolution of such areawide problems as flooding, air and water pollution, rapidly changing land use, and deterioration or destruction of the natural resource base.

Rural and urban; Federal, State, and local; and public and private interests are all vitally affected by such areawide problems and by proposed solutions to these problems. It appears neither desirable nor possible for any one level or agency of government to impose the decisions required to solve these areawide problems. Such decisions can better come through obtaining a consensus of the various levels and agencies of government and private interests concerned, based on a common interest in the welfare of the entire region. Regional planning is imperative for promoting such a consensus and the necessary cooperation between the various interests concerned.

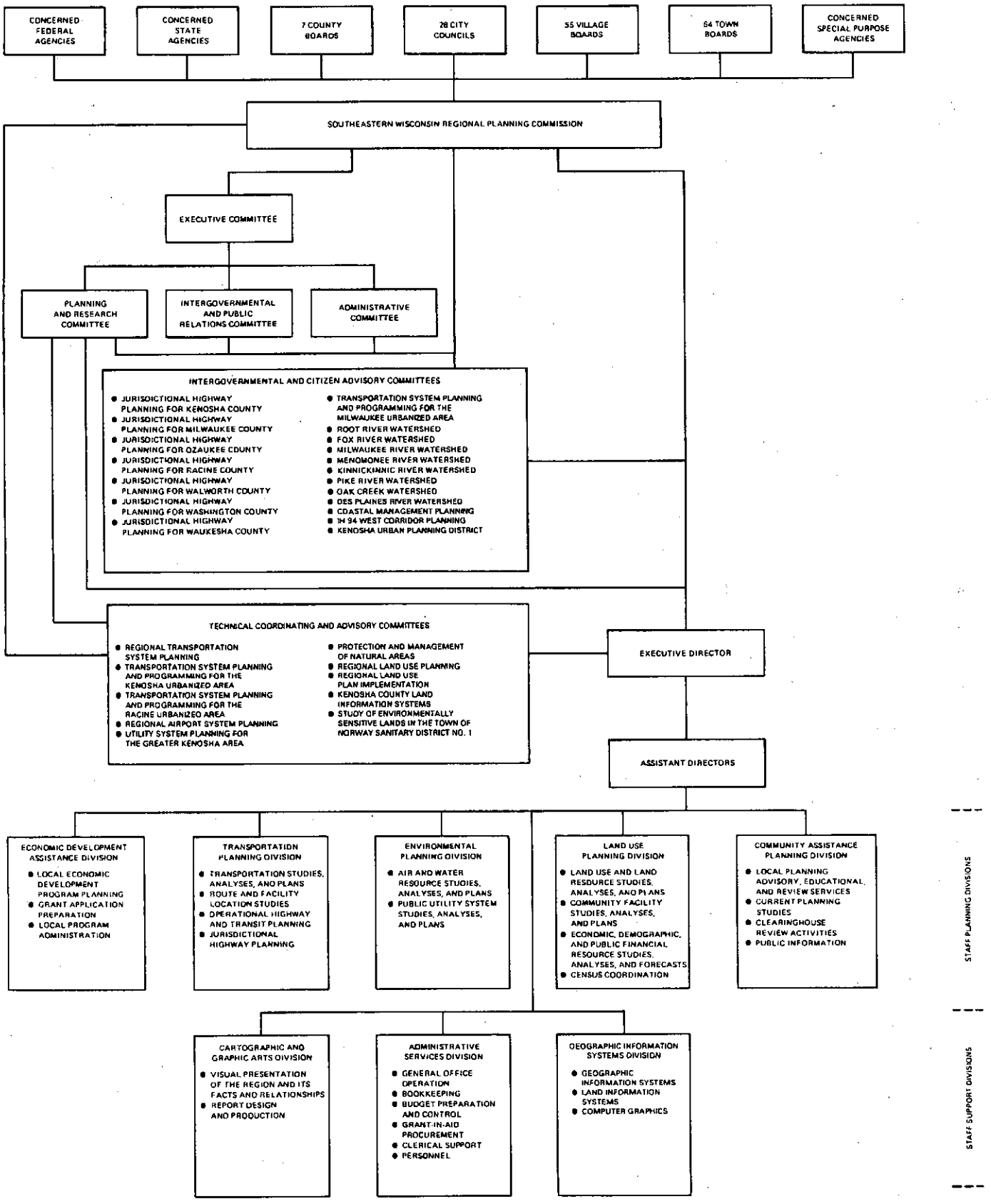
THE SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

The Southeastern Wisconsin Regional Planning Commission represents an attempt to provide the necessary areawide planning services for one of the largest urbanizing regions in the United States. The Commission was created in August 1960, under the provisions of Section 66.945 of the Wisconsin Statutes, to serve and to assist the local, State, and Federal units and agencies of government concerned with planning for the orderly and economical development of the Southeastern Wisconsin Region. The Commission's role is entirely advisory; participation by local units of government in the work of the Commission is on a voluntary, cooperative basis. The Commission itself is composed of 21 members, three from each county within the Region.

The powers, duties, and functions of the Commission are carefully set forth in Wisconsin law. The Commission is authorized to employ experts and a staff, as necessary, for the execution of its responsibilities. Basic funds necessary to support Commission operations are provided by the member counties, with the budget apportioned among the seven counties on the basis of relative equalized valuation. The Commission is authorized to request and accept aid in any form from all levels and agencies of government for the purpose of accomplishing its objectives and is authorized to deal directly with the State and Federal governments for this purpose. The organizational structure of the Commission and its relationships to the constituent units and agencies of government composing, or operating within, the Region are shown in Figure 1.

Figure 1

SEWRPC ORGANIZATIONAL STRUCTURE



Source: SEWRPC.

THE REGIONAL PLANNING CONCEPT IN SOUTHEASTERN WISCONSIN

Regional planning, as conceived by the Commission, is not a substitute for, but rather a supplement to, local, State, and Federal planning efforts. Its objective is to aid the various levels and units of government involved in finding solutions to areawide developmental and environmental problems which cannot be properly resolved within the framework of a single municipality or county. As such, regional planning has three principal functions:

1. Inventory: the collection, analysis, and dissemination of basic planning and engineering data on a uniform, areawide basis so that, using such data, the various levels and agencies of government and private interests operating within the Region can better make decisions regarding community development.

2. Plan Design: the preparation of a framework of long-range plans for the physical development of the Region, with such plans limited to those functional elements of areawide significance. To this end, the Commission is charged by law with the function and duty of "making and adopting a master plan for the physical development of the [R]egion." The permissible scope and content of this plan, as outlined in the enabling legislation, extend to all phases of regional development, implicitly emphasizing, however, the preparation of alternative spatial designs for the use of land and for supporting transportation and utility facilities.

3. Plan Implementation: the provision of a center for the coordination of the many planning and plan implementation activities carried on by the various levels and agencies of government operating within the Region. To this end, all Commission work programs are intended to be carried out within the context of a continuing planning program which provides for the periodic reevaluation of the plans produced, as well as for the extension of planning information and advice necessary to convert the plans into action programs at the local, regional, State, and Federal levels.

THE REGION

The Southeastern Wisconsin Region, as shown on Map 1, is composed of Kenosha, Milwaukee, Ozaukee, Racine, Walworth, Washington, and Waukesha Counties. These seven counties have an area of about 2,689 square miles, or about 5 percent of the total area of the State of Wisconsin. Their combined resident population is about 1.82 million persons, or about 37 percent of the total population of the State. The Region provides about 981,400 jobs, or about 39 percent of the total employment in the State, and contains about 41 percent of the tangible wealth of the State, as measured by equalized valuation. Exclusive of school and other special-purpose districts, the Region contains 154 local units of government, all of which participate in the work of the Commission.

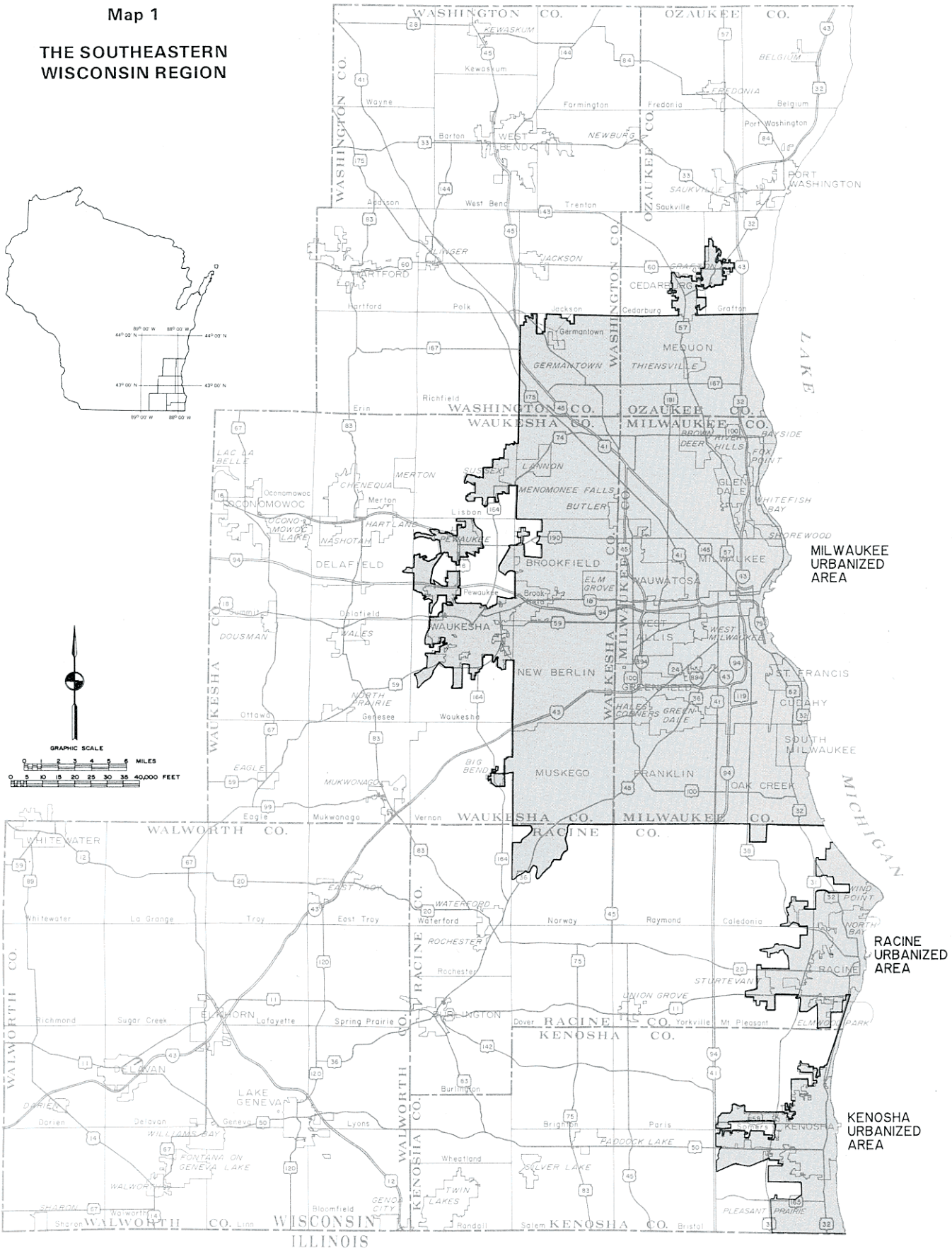
THE NATURAL AREAS AND CRITICAL SPECIES PROTECTION AND MANAGEMENT PLANNING PROGRAM

In December 1987, the Milwaukee County Department of Parks, Recreation and Culture requested that the Southeastern Wisconsin Regional Planning Commission assist the County in the development of criteria which could be used to evaluate county parklands being considered for disposition; to provide recommendations for or against proposed disposition; to identify environmentally sensitive areas in the county park system; and to provide standards for the management of such areas. This request resulted from public controversy surrounding the sale and subsequent development of certain county parklands. Development of these former parklands ultimately caused severe adverse environmental impacts on adjacent parklands and on a threatened plant species growing in the parks. The request by Milwaukee County was intended to help obtain information necessary to prevent recurrence of a similar situation and thereby to provide protection for the remaining unique and outstanding natural resources existing in the Milwaukee County park system.

In addition, several land, highway, and utility development projects proposed by Federal, State, and local units and agencies of government in the Southeastern Wisconsin Region in the recent past have involved environmentally sensitive lands, thereby causing significant conflicts

Map 1

THE SOUTHEASTERN WISCONSIN REGION



The Southeastern Wisconsin Region, consisting of Kenosha, Milwaukee, Ozaukee, Racine, Walworth, Washington, and Waukesha Counties, encompasses an area of about 2,689 square miles, or about 5 percent of the total area of the State. The Region has a resident population of about 1.84 million persons, or about 37 percent of the population of the State, and provides about 997,000 jobs, or about 39 percent of the total employment in the State. There are 154 general-purpose local units of government in the seven-county Region.

Source: SEWRPC.

between competing interests within the Region. If information on such lands could be made available on a uniform, areawide basis in advance of any development proposals, such conflicts can be reduced or avoided.

After the Commission received Milwaukee County's request, consultations between the staffs of the Commission and the Wisconsin Department of Natural Resources, Bureau of Endangered Resources, identified similar concerns relating to sensitive natural areas and rare species habitats located on open space lands not County-owned and on similar lands throughout the Region. As a result, the Commission determined that a prospectus[1] should be prepared for a natural areas and critical species habitat protection and management plan that would address such areas, not only in Milwaukee County, but throughout the entire Southeastern Wisconsin Region.

Accordingly, in May 1989, the Commission acted to create the Technical Advisory Committee for the Protection and Management of Natural Areas in Southeastern Wisconsin. The Committee, under whose guidance the prospectus was prepared, was and is composed of individuals knowledgeable about, and concerned, with the natural areas and critical species habitats of the Region and the problems involved in identifying and preserving them. The membership of the Committee is listed on the inside front cover of this report.

In the prospectus the Committee identified and described three serious problems related to natural areas within the Region requiring areawide study and resolution: 1) the loss of significant natural areas in the Region, 2) the loss of rare, threatened, and endangered species in the Region, and 3) the need to identify and delineate natural areas and critical habitats for rare, threatened, and endangered species in the Region in a manner consonant with the requirements of applicable Federal and State regulatory processes pertaining to development proposals. The Committee also set forth its recommendations for the scope and content of a natural areas protection and management planning program for the Region and proposed appropriate organizational arrangements and budget estimates for such a program.

The prospectus was approved unanimously by the Technical Advisory Committee on August 16, 1989, was published, and, in accordance with the advisory role of the Commission, was recommended on August 25, 1989, to the Wisconsin Department of Natural Resources and the seven County Boards of the Region for their consideration and action. Subsequently, the seven counties and the Department of Natural Resources agreed to fund the recommended planning program.

THE NEED FOR A NATURAL AREAS AND CRITICAL SPECIES HABITAT PROTECTION AND MANAGEMENT PLAN FOR SOUTHEASTERN WISCONSIN

Prospectus Findings and Recommendations

As the study prospectus pointed out, a 1986 analysis by the Wisconsin Department of Natural Resources, Bureau of Endangered Resources, of the major presettlement plant communities of southern Wisconsin, defined as the southern 45 percent of the area of the State, 8,100 square miles of the original forest, 3,280 square miles of the original prairie, 11,400 square miles of the original oak savannah, and 1,550 square miles of the original southern sedge meadow have been significantly degraded or lost as a result of human activity. Thus, of the more than 24,370 square miles of original presettlement vegetation occupying the landscape at the beginning of European settlement in southern Wisconsin, over 99.5 percent has been either significantly degraded or lost.

In addition, the prospectus concluded that while Southeastern Wisconsin has historically supported a wide variety of plant communities and attendant wildlife species, massive urbanization and agriculturalization have had significant and adverse impacts on local biota. Many habitat types have been virtually eliminated and most have been seriously degraded. As habitat is lost, so, typically, are the species dependent on that habitat. The result for many species has been local and regional elimination, and, for some, even extirpation.

Despite Federal and State regulatory processes and measures designed to protect rare, threatened, and endangered species, natural areas and

[1] *See SEWRPC, Natural Area Protection and Management Planning Program Prospectus, August 1989.*

rare species and their habitats continue to suffer adverse development-related impacts. The formulation and implementation of a natural areas protection and management plan for the Southeastern Wisconsin Region constitutes an important step toward ensuring the long-term survival of these invaluable elements of the natural resource base of this rapidly urbanizing Region.

Under a natural areas and critical species habitat protection and management plan, all pertinent existing ecological inventory information could be collated and used as a basis for delineating critical natural areas within Southeastern Wisconsin, as well as for determining if additional data are needed to identify and delineate such areas properly. Combined with any additional inventory information and using agreed-upon criteria, the plan would map the location and extent of natural areas and critical species habitats within Southeastern Wisconsin and would develop and present recommendations for the preservation and management of those natural areas and critical species habitats.

Two factors make the preparation of a natural areas and critical species habitat protection and management plan particularly appropriate at this time. First, rapid urbanization and continued developmental pressures combine to affect existing natural areas in Southeastern Wisconsin; second, a comprehensive inventory of important natural areas and critical species habitats on which to base land use development decisions is not currently available in a readily usable form.

The prospectus concluded that if natural areas and rare, threatened, and endangered species and their critical habitats in Milwaukee County and in the Region, of which the County is an integral part, are to be effectively protected and wisely managed, adequate information concerning such resources should be assembled in a readily usable form as soon as possible. Otherwise, significant native plant and animal communities, rare species and their habitats, and areas of archaeological and geological significance may be expected to continue to be adversely affected, possibly lost entirely, owing to unwise and insensitive urban and rural development. Proper planning for protection and management of the unique and sensitive resources of the Southeastern Wisconsin Region should include a standardized means of identifying and evaluating those resources. Effective identification of those resources and proposals for their long-term management must be implemented to ensure the maintenance of the integrity of natural areas and survival of the species dependent on them. The natural areas and critical species habitat protection and management plan proposed under the prospectus and set forth in this report will help accomplish these objectives, thus contributing to the maintenance and restoration of the natural beauty of the Region and to the quality of life and the maintenance of biotic diversity within the Region.

Such a plan would also facilitate economic development within the Region with respect to legally mandated environmental review processes by clearly identifying environmentally sensitive lands prior to the preparation of development proposals. Sound economic development could then proceed with confidence and, therefore, in a less costly manner with respect to environmental concerns, reducing the possibility of conflict regarding required environmental regulatory and review processes.

Definition of Terms

Several terms and concepts occur throughout this report that require clear definition at the onset. Accordingly, definitions are provided for the following terms.

Archaeological Sites: Archaeological sites are herein defined as those tracts of land, streambeds, or lake bottoms that include objects or other evidence of archaeological interest 100 years or more of age, including, but not limited to pottery, basketry, bottles, weapons, weapon projectiles, tools, structures or portions of structures, pit houses, rock paintings, rock carvings, intaglios, graves, human skeletal materials, or any portion or piece of any of the foregoing items; aboriginal mounds and earthworks; ancient burial grounds; prehistoric and historic ruins; Indian mounds; and other archaeological and historical features.[2,3]

Biotic Community: A biotic community is herein defined as any community that can be delineated

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[2]*National Historic Preservation Act of 1966, as amended, 16 U. S. C., Section. 470bb.*

[3]*Wisconsin Statutes, Section 44.47(1)(b).*

in the environment on the basis of the composition of its animals, plants, and other organisms.

Critical Species: Critical species are herein defined as those animals, plants, and other organisms considered by the Federal or State governments to be rare, threatened, or endangered or to have significantly declining or unstable populations.

Critical Species Habitat: Critical species habitats are herein defined as those tracts of land or water which support Federally or State-listed rare, threatened, and/or endangered plant or animal species as defined by State or Federal agencies. These habitats include the abiotic and biotic factors necessary for the long-term support of the critical species population.

Ecosystem: An ecosystem is herein defined as the sum of all organisms of a locality and their interactions with both the abiotic and biotic elements of the environment.

Extirpated Species: An extirpated species is herein defined as any species that has disappeared from the State as a breeding species, although it may still be present in other states. Animals and plants designated as extirpated have been lost to the breeding population within the State between 1800 and the present.

Federally Designated Endangered Species: A Federally designated endangered species is herein defined as any species or subspecies designated by the U. S. Congress as being in danger of extinction throughout all, or a significant portion, of its range.

Federally Designated Threatened Species: A Federally designated threatened species is herein defined as any species or subspecies designated by the U. S. Congress as being likely within the foreseeable future to become endangered throughout all, or a significant portion, of its range.

Gene Pool: A gene pool is herein defined as the total of all the genetic material of all the organisms within a designated population.

Geological Sites: Geological sites are herein defined as those tracts of land that include such specific glacial features as eskers and kames, fossil beds, and rock outcrop and exposed bedrock sites of scientific and educational value. Such sites may also support specific plant communities, such as dry prairie remnants or oak openings on eskers and kames.

Natural Areas: Natural areas are herein defined as those tracts of land or water so little modified by human activity, or which have sufficiently recovered from the effects of such activity, that they contain intact native plant and animal communities believed to be representative of the pre-European-settlement landscape. Natural area sites may be ranked according to several factors, including diversity of plant and animal species and community types present; the structure and integrity of the native plant or animal community; the extent of disturbance from human activity, such as logging, grazing, water level changes, and pollution; the commonness of the plant and animal communities present; the size of the area; any unique natural features within the area; and the educational and scientific value. These rankings and how they relate to the aforementioned factors are discussed further in Chapter II, "Basic Principles and Concepts."

Plant Community: A plant community is herein defined as a particular association of plants, usually described by referring to the most characteristic species and/or moisture conditions. Examples include "beech-maple forest," "sedge meadow," and "dry-mesic prairie."

Presettlement Vegetation: The presettlement vegetation is herein defined as the characteristic vegetation of Southeastern Wisconsin prior to settlement by Europeans.

Rare Species: Rare species are herein defined as those native animal or plant species which occur infrequently either as individuals or in specific communities on the landscape.

State-Designated Endangered Species: State-designated endangered species are herein defined to include any species native to the State of Wisconsin whose continued existence as a viable component of the State's wild animals or wild plants is determined by the Wisconsin Department of Natural Resources, on the basis of scientific evidence, to be in jeopardy.[4]

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[4] *Wisconsin Statutes, Section 29.415(2)(a).*

State-Designated Threatened Species: State-designated threatened species are herein defined to include any species of wild animals or wild plants native to the State of Wisconsin which appear likely, within the foreseeable future and on the basis of scientific evidence, to become endangered.[5]

Watch Species: A watch species is herein defined as any native species within the State of Wisconsin about which some problem of abundance or distribution is suspected, but not yet proved. This designation is an informational, nonlegal category designed to focus attention on certain species before they become endangered or threatened.

PREVIOUS COMMISSION WORK PROGRAMS RELATED TO THE NATURAL AREAS PROTECTION AND MANAGEMENT PROGRAM

The Commission's natural areas and critical species habitat protection and management planning program was conducted within the context of, and has been fully coordinated with, its ongoing comprehensive planning program for Southeastern Wisconsin. It is therefore appropriate to briefly review selected aspects of the previous work programs of the Commission as these programs relate to the natural areas and critical species habitat protection and management planning program.

The Menomonee River Watershed Study

The Menomonee River watershed study was the fourth comprehensive watershed planning program undertaken by the Commission. The study was initiated in February 1972 and was completed in October 1976. The findings and recommendations of this planning effort are documented in SEWRPC Planning Report No. 26, A Comprehensive Plan for the Menomonee River Watershed, Volume One, Inventory Findings and Forecasts, and Volume Two, Alternative Plans and Recommended Plan, both published in October 1976. The Menomonee River watershed plan set forth recommendations for the abatement of flooding, water pollution, and related land and natural resource conservation problems and for recreation in the watershed. The Menomonee River watershed study was the first such study to be conducted by the Commission for a watershed which is extensively urbanized and which is expected to become almost entirely urbanized in the near future. A total of 22 unprotected natural areas occupying about 4.3 square miles were identified during the study.

The Oak Creek Watershed Study

The Oak Creek watershed study was the seventh comprehensive watershed planning program undertaken by the Commission. The study was initiated in June 1979 and was completed in August 1986. The findings and recommendations of this planning effort are documented in SEWRPC Planning Report No. 36, A Comprehensive Plan for the Oak Creek Watershed, August 1986. The Oak Creek watershed plan set forth recommendations for the abatement of the flooding and water pollution problems of the watershed. In addition, the plan provided recommended land use, open space, and fishery development plans for the watershed. A total of six natural areas occupying about 0.3 square mile were identified in the study.

The Pike River Watershed Study

The Pike River watershed study was the sixth comprehensive watershed planning program undertaken by the Commission. The study was initiated in May 1978 and was completed in June 1983. The findings and recommendations of this planning effort are documented in SEWRPC Planning Report No. 35, A Comprehensive Plan for the Pike River Watershed, June 1983. The Pike River watershed plan set forth recommendations for the abatement of the flooding and water pollution problems of the watershed. In addition, the plan provided recommended land use plans for the watershed. A total of four natural areas occupying about 0.3 square mile were identified in the study.

The Lake Michigan Shoreline Erosion Study for Milwaukee County

The Lake Michigan erosion study for the Milwaukee County shoreline was initiated in May 1987 and was completed in October 1989. The findings and recommendations of this planning effort are documented in SEWRPC Community Assistance Planning Report No. 163, A Lake Michigan Shoreline Erosion Management Plan for Milwaukee County, Wisconsin, October 1989. The Milwaukee County erosion plan set forth

[5] *Wisconsin Statutes, Section 29.415(2)(b).*

recommendations which, when applied on a reach-by-reach basis, would effectively abate the erosion problems of Milwaukee County. Specifically, the plan identified management procedures that stabilize the bluff slopes and protect the immediate shoreline from wave and ice erosion on a long-term basis.

A total of five natural areas occupying about 0.6 square mile were identified in the study. In addition, five sites containing State-designated rare, threatened, or endangered plant species, of which three were located outside of the aforementioned natural area sites, were identified during the study.

The Regional Park and Open Space Study

The regional park and open space study was initiated in October 1972 and was completed in November 1977. The findings and recommendations of this planning effort are documented in SEWRPC Planning Report No. 27, A Regional Park and Open Space Plan for Southeastern Wisconsin: 2000, November 1977. The regional park and open space plan set forth identified regional park and open space needs, including a recommended spatial arrangement of parks and related open spaces to meet both existing and probable future recreation demands. While the plan does not identify specific natural area and critical species habitat sites within the Region, it does identify large tracts of natural lands within the Region. It is within these large tracts of natural lands that the majority of the significant natural areas and critical species habitats remaining in the Region will probably occur.

The Chiwaukee Prairie-Carol Beach Area Land Use Plan

The Chiwaukee Prairie-Carol Beach area land use planning program was initiated in March 1982 and was completed in February 1985. The findings and recommendations of this planning effort are documented in SEWRPC Community Assistance Planning Report No. 88, A Land Use Management Plan for the Chiwaukee Prairie-Carol Beach Area of the Town of Pleasant Prairie, Kenosha County, Wisconsin, February 1985. The Chiwaukee Prairie-Carol Beach land use management plan identified those open space lands which should be protected and preserved in the public interest and those areas within which urban growth should be accommodated. Specifically, the management plan recommends the preservation and protection of 1.5 square miles of a ridge and swale complex consisting of prairie and wetlands. A total of seven natural areas occupying about 0.8 square mile were identified in the study. In addition, a total of 44 animal and plant species occurring in the Chiwaukee Prairie-Carol Beach area are listed as declining, rare, threatened, or endangered species in Wisconsin.

The Park and Open Space Plan for the City of West Bend

The park and open space planning study for the City of West Bend was initiated in April 1983 and was completed in June 1985. The findings and recommendations of this planning effort are documented in SEWRPC Community Assistance Planning Report No. 104, A Park and Open Space Plan for the City of West Bend, Washington County, Wisconsin, June 1985.

The City of West Bend park and open space plan set forth recommendations to guide the acquisition and development of lands and facilities needed to satisfy the outdoor recreational and open space needs of the existing and probable future population of the City. The plan was further designed to assist in the protection and enhancement of the underlying sustaining natural resource base. As part of the City of West Bend park and open space planning study, a special inventory of natural and scientific areas was conducted in the West Bend study area. A total of 35 natural area sites, encompassing a total area of about 5.2 square miles, were identified in the study.

Other Park and Open Space Planning Studies Prepared by Commission Staff

In addition to the City of West Bend park and open space planning effort, six other local park and open space plans which identify natural and scientific areas have been prepared by Commission staff. The park and open space plan for the City of New Berlin identified three natural area sites which encompass 0.1 square mile; the plan for the Town and Village of Pewaukee identified six sites which encompass 0.5 square mile; the plan for the Town of Caledonia, Racine County, identified eight sites which encompass 0.6 square mile; the plan for the Town of Eagle, Waukesha County, identified 36 sites which encompass 1.3 square miles; the plan for the Town of Vernon, Waukesha County, identified four sites which encompass 0.6 square mile; and the plan for the Kenosha Planning District identified five sites which encompass 0.6 square mile.

Finally, countywide park and open space plans have been prepared for each of the Region's seven counties. Under these efforts, a total of 294 natural and scientific area[6] sites encompassing a total of about 39 square miles, which include the aforementioned sites, were identified. The number of sites and total acreage are tabulated by county in Table 1.

Table 1

KNOWN NATURAL AND SCIENTIFIC AREA[a] SITES IDENTIFIED IN COUNTY PARK AND OPEN SPACE PLANS

County	Number of Sites	Total Area (acres)
Kenosha	28	2,799
Milwaukee	16	694
Ozaukee	22	4,087
Racine	29	2,088
Walworth	38	3,447
Washington	38	3,957
Waukesha	123	8,137
Total	294	25,209

[a]*The term "scientific area" is now included under the term "State natural area."*

Source: SEWRPC.

STAFF, COOPERATING AGENCY, AND COMMITTEE STRUCTURE

The basic organizational structure utilized in the conduct of the planning program and for the preparation of the resulting plan is outlined in Figure 2. This figure identifies the cooperating Federal, State, county, local, and private agencies and the designated responsibilities of these agencies and their staffs in the conduct of major elements of the planning program.

The organizational structure for the planning program includes, importantly, the Technical Advisory Committee for the Protection and Management of Natural Areas in Southeastern Wisconsin. The current purpose of this Committee is to involve governmental bodies, technical agencies, and private interest groups within the Region actively in the natural areas and critical species habitat protection and management planning effort. The Committee is intended to assist the Commission in determining and coordinating public policies involved in the conduct of the study and in the resulting protection and management plan and plan implementation programs. Active involvement of State and Federal, as well as local, public officials in the protection and management planning program through this Committee is particularly important to any ultimate implementation of protection and management plans in view of the advisory role of the Commission in shaping regional development. The Technical Advisory Committee is also intended to perform an important educational function in familiarizing local leadership within the Region with the study and its findings, in generating an understanding of basic natural areas and critical species habitat protection and management objectives and implementation procedures, and in encouraging plan implementation.

The staff work necessary for the conduct of the natural areas and critical species habitat protection and management planning program was a joint effort of the Commission staff and the staff of the Wisconsin Department of Natural Resources, Bureau of Endangered Resources. More specifically, the Commission staff was responsible for preparing the detailed study design, formulating basic principles and concepts, conducting certain inventories, conducting all analyses of the inventory data, synthesizing and evaluating alternative plan elements, and preparing the report. The Bureau of Endangered Resources staff was responsible for the provision of the critical inventory data related to natural areas and to the habitat for rare, threatened, and endangered species occurring within the Region; the preparation of criteria for identifying natural areas and critical species habitat; the provision of assistance in the evaluation of natural areas and critical species habitat; the collation and provision of existing inventory data related to archaeological and geological site occurrences within the Region; and the provision of assistance in the development of alternative and recommended natural area and critical species habitat plans within the Region.

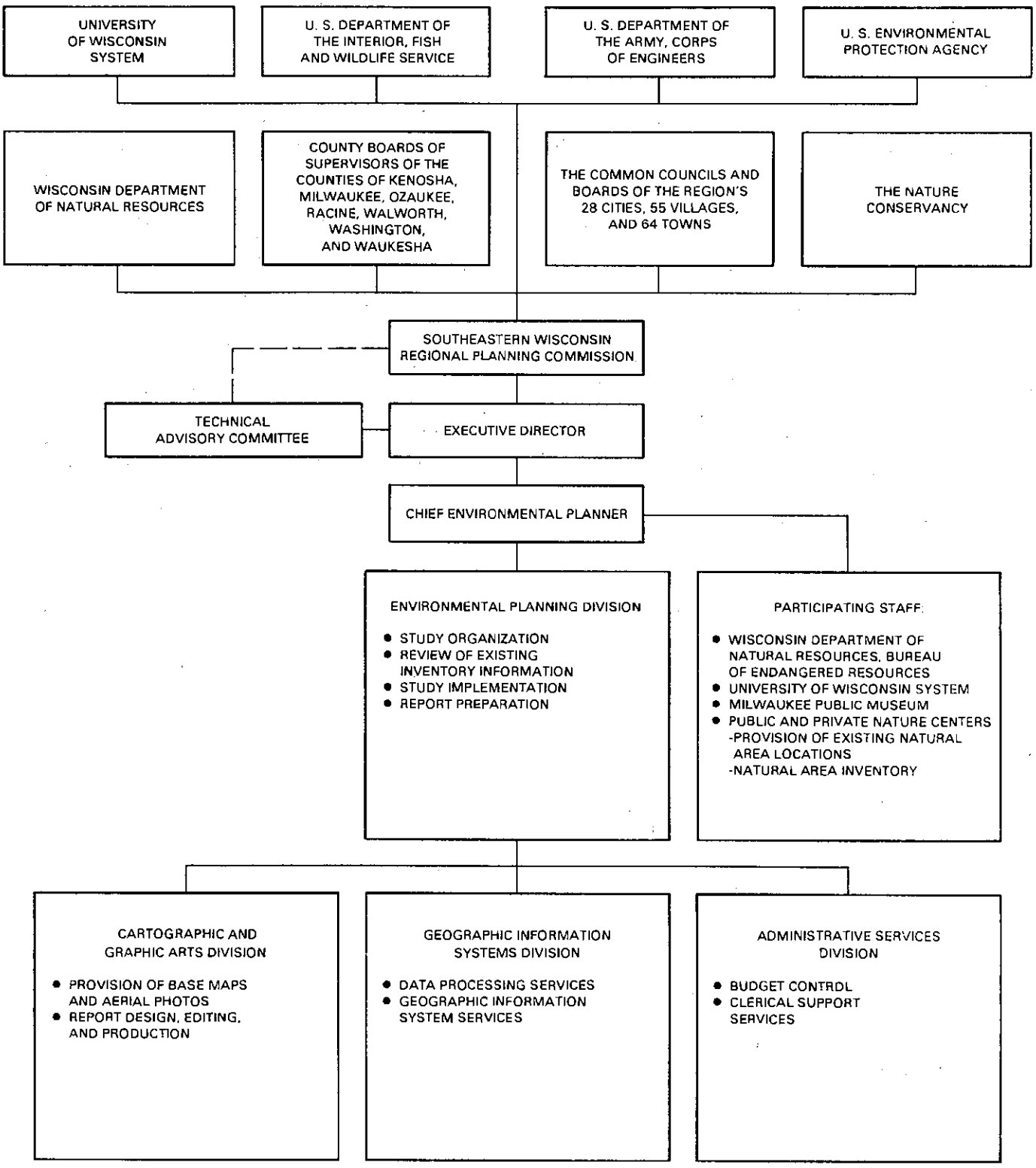
SCHEME OF PRESENTATION

The major findings and recommendations of the natural areas and critical species habitat protec-

[6]*The term "scientific area" is now included under the term "State natural area."*

Figure 2

ORGANIZATIONAL STRUCTURE FOR THE NATURAL AREAS PLANNING PROGRAM



Source: SEWRPC.

tion and management planning program are documented and presented in this report. The report sets forth the basic principles and concepts underlying the study and the factual findings of the extensive inventories conducted under the study. It identifies and, to the extent possible, quantifies the historic loss of natural areas and critical species habitat in the Region and sets forth forecasts of anticipated growth and change in the Region. The report presents an overview of natural area, critical species, and critical species habitat law; develops natural area and critical species habitat objectives, principles, and standards; presents alternative natural area and critical species habitat protection and management plans; and sets forth a recommended natural area and critical species habitat protection and management plan for the Region. In addition, the report presents the findings of pertinent financial and institutional analyses and specific recommendations for plan implementation. The report is intended to allow for careful, critical review of the alternative plan elements by public officials, agency staff personnel, and citizen leaders within the Region and to provide the basis for plan adoption and implementation by the Federal, State, and local agencies of government concerned.

This report can only summarize briefly the large volume of information assembled in the extensive data collection and analysis phases of the natural areas and critical species habitat protection and management planning study. Although the reproduction of all this information in report form is impractical because of the magnitude and complexity of the data collected and analyzed, all the basic data are on file in the Commission offices and are available to member units and agencies of government and to the general public upon specific request. This report, therefore, serves the additional purpose of indicating the types of data which are available from the Commission and which may be of value in assisting Federal, State, and local units of government and private investors in making better decisions about community development within the Region.

Chapter II

BASIC PRINCIPLES AND CONCEPTS

INTRODUCTION

Natural area and critical species habitat protection measures are not new to the Southeastern Wisconsin Region. However, previous efforts have generally proceeded on an ad hoc basis, that is, individual natural areas and critical species habitats have been identified and protected only after threats to their integrity or even their continued existence have become evident. Thus, protection efforts have traditionally been untimely, of limited scope, and without regard to resources concerned within the Region as a whole. Such efforts have employed a narrow range of means to achieve essentially a specific range of goals.

The regional natural areas and critical species habitat protection and management program represents an application of comprehensive planning principles and practices to natural area protection on an areawide basis. An exposition of the basic principles underlying the planning approach used in the regional natural area protection study is therefore in order. This exposition should help improve understanding not only of the approach taken in the regional natural areas and critical species habitat protection program, but also of the specific protection and management problems identified in the program and the recommended solutions to those problems.

THE REGION AS A PLANNING UNIT FOR NATURAL AREA AND CRITICAL SPECIES HABITAT PROTECTION AND MANAGEMENT

The selection of the seven-county Southeastern Wisconsin Region as an area for natural area and critical species habitat protection planning is based upon the existence of that Region as a rational area for land use and supporting public works planning. The Region contains the daily commutersheds of the Milwaukee, Racine, and Kenosha urbanized areas. In addition, the Region serves as an extension of the daily commutershed of the Chicago urbanized area, especially along the IH 94 corridor in Kenosha County and in the Lake Geneva area of Walworth County. Essentially, all the land contained within these commutersheds is subject to intensive land use development pressures emanating outward from these large urbanized areas. The existence of natural areas and critical species habitat is intimately related to certain important elements of the natural resource base, such as surface water, woodlands, wetlands, wildlife habitat, and varied topography. These natural elements, like the urban development pressures, are not confined by jurisdictional boundaries. The increasing diffusion of urban development thus poses a threat of loss of natural areas and critical species habitats within the Region. It does so by bringing urban development into contact with once-remote natural resource amenities located in outlying areas of the Region and through the destructive impacts of unplanned or poorly planned urbanization on those resource amenities and related natural area and critical species habitat sites. Therefore, planning for natural area and critical species habitat protection and management must, to be fully effective in an urbanizing Region, be conducted on an areawide basis as an integral part of comprehensive planning for land use development and supporting public works.

While the Region constitutes a sound geographic unit for natural area and critical species habitat protection and management planning, such a planning effort also must recognize the existence within the Region of county and municipal levels of government. These civil divisions have important planning and plan implementation responsibilities. Such a planning effort must also recognize the planning and plan implementation responsibilities of the State and Federal governments. The land use and public works development activities and the natural area and critical species habitat protection and management activities of these four levels of government must be fully coordinated if land use and public works development activities are to be guided and shaped to protect the best remaining natural area and critical species habitat sites. This coordination can best be achieved through the preparation and implementation of a plan, the geographic area of which coincides with the strong community of interest created by areawide urbanization.

THE REGIONAL NATURAL AREAS AND CRITICAL SPECIES HABITAT PROTECTION AND MANAGEMENT PLANNING PROBLEM

Although the natural resource planning efforts of the Commission are focused on the Region as a rational planning unit, the regional natural areas and critical species habitat protection planning problem is closely linked to the broader problem of protecting and maintaining the quality of the environment in urban and urbanizing areas. In the past, environmental protection, or what was then more commonly called "conservation," was largely concerned with protecting large natural tracts in rural areas and with the possible future shortages of mineral, forest, or other resources resulting from chronic mismanagement. The major problem that environmental protection now faces is occasioned by an ever-increasing areawide diffusion of urban development, together with the relentless pursuit of an ever-higher material standard of living.

Enlightened public officials and citizen leaders are gradually becoming aware of this documented and pressing need for the protection and, in some cases, the enhancement of the physical environment in urbanizing areas. The need to adjust the physical fabric of urban development to the ability of the underlying natural resource base to sustain such development is critical in urbanizing areas such as Southeastern Wisconsin. In such urbanizing areas, in contrast to more sparsely settled rural areas, the overall quality of the environment becomes highly dependent on present and future land use activities and supporting public works facilities. Viable options remaining for environmental protection and enhancement are limited.

The ultimate resolution of the problems created by urban diffusion will require many important public policy determinations. These determinations must be made in recognition of an urbanizing Region which is constantly changing, therefore they should be based upon a comprehensive planning process able to scale objectively the changing resource demands against the ability of the limited natural resource base to meet these demands. Only within such a planning process can the effects of different land and water use proposals be evaluated, the best course of action intelligently selected, and the available funds most effectively invested.

Accordingly, the basic purpose of such a planning process is twofold:

1. To permit broad public evaluation and choice of alternative development and environmental protection and enhancement policies and plans.

2. To provide, through the medium of a long-range plan, for the protection and management of natural areas and critical species habitat and for the full coordination of local, county, State, and Federal environmental protection programs within the Region. Important among the goals to be achieved by this process are the protection of significant natural areas and critical species habitats, recommendations for management guidelines to ensure the continued existence of these areas, and the general promotion of the wise and judicious use of the limited land and water resources of the Region.

BASIC PRINCIPLES OF THE NATURAL AREAS AND CRITICAL SPECIES HABITAT PROTECTION AND MANAGEMENT PLANNING PROCESS

Based upon the foregoing considerations, seven basic principles were formulated which together form the basis for the specific planning process applied in the study. They are:

1. That the ultimate purpose of a natural areas protection and management plan is to guide the identification, protection, and management of high-quality natural areas and critical species habitats in Southeastern Wisconsin.

2. That effective solutions to the problems of natural areas and critical species habitat protection and management in the Region can be achieved only by considering all important aspects of the natural resource base, together with all significant human modifications and uses thereof. This requires that the natural areas and critical species habitat planning effort be carried out within the context of a comprehensive areawide planning effort.

3. That the study will utilize the latest identification, protection, and manage-

ment techniques in developing a protection and management plan for natural areas and critical species habitat in the Region.

4. That the task of establishing a natural areas and critical species habitat protection and management program, the collection and analysis of basic data under such a program, and the formulation of improvement plans and of related plan implementation programs all require close and continuing cooperation among the various levels and agencies of government concerned with, and involved in, natural areas and critical species habitat protection and management.

5. That full use will be made of all previously published and unpublished surveys, reports, and other pertinent data on natural areas of Southeastern Wisconsin, including, but not limited to, technical information assembled by the following agencies and individuals: U. S. Department of the Army, Corps of Engineers; U. S. Department of the Interior, Fish and Wildlife Service and Geological Survey; Wisconsin Department of Natural Resources; Milwaukee Public Museum; University of Wisconsin System; and biologists and naturalists familiar with the natural resource base of the Southeastern Wisconsin Region, as is the Southeastern Wisconsin Regional Planning Commission itself. Additional data collection will be conducted only as necessary to develop essential original data currently unavailable or to supplement, or update, existing data.

6. That the study will deal with natural areas and critical species habitat protection and management concerns, as well as identifying significant known archaeological and geological sites, and will provide a framework within which an integrated natural areas protection and management plan can be readily prepared.

7. That although time is of the essence, the breadth of the study and its intensity must not be sacrificed for the expediency of effecting temporary, short-range solutions to the problems of natural areas protection and management in Southeastern Wisconsin.

It is intended that the study culminate in the adoption of a natural areas and critical species habitat protection and management plan providing for the identification, protection, and management of the Region's high-quality natural areas and critical species habitat in an economically feasible, socially responsive, functionally sound, and environmentally sensitive manner.

THE NATURAL AREAS AND CRITICAL SPECIES HABITAT PLANNING PROCESS

The Regional Planning Commission has developed a seven-step planning process by which the principal functional relationships existing within Southeastern Wisconsin can be accurately described, both graphically and numerically and by which the effect of different courses of development actions can be evaluated. The regional planning process not only provides for the integration of all of the complex studies required to prepare a comprehensive natural areas and critical species habitat management plan, but also provides a means whereby the various private and public interests concerned may actively participate in the plan preparation. The process thus provides a mechanism for resolving actual and potential conflicts between such interests, a forum in which the various interests may better understand the interrelated problems of the area and the alternative solutions available for such problems, and a means whereby all regional interests may become committed to implementation of the best alternatives for the resolution of the problems.

The seven steps involved in this planning process are: 1) study design, 2) formulation of objectives and standards, 3) inventory, 4) analysis and forecast, 5) plan synthesis, 6) plan testing and evaluation, and 7) plan selection and adoption. The details of planning implementation, although necessarily beyond the foregoing planning process, must be considered throughout the process if plans are to be realized.

The principal results of the above process are land use and supporting public works plans scaled to future land use and resource demands and consistent with regional development objectives. In addition, the process represents the beginning of a continuing planning effort that permits modification and adaptation of the plans and the means of implementation to changing conditions. Each step in this planning

process includes many individual operations which must be carefully designed, scheduled, and controlled to fit into the overall process. An understanding of this planning process is essential to an appreciation and understanding of the results. Each step in the process, together with its major component operations, is diagrammed in Figure 3 and described briefly below.

Study Design

Every planning program must embrace a formal structure or study design so that the program can be carried out in a logical and consistent manner. This study design must specify the content of the fact-gathering operations, define the geographic area for which data will be gathered and plans prepared, outline the manner in which the data collected are to be processed and analyzed, specify requirements for forecasts and forecast accuracy, and define the nature of the plans to be prepared and the criteria to be used in their evaluation and adoption.

The need for, and objectives of, the natural areas and critical species habitat study were set forth in the Natural Area Protection and Management Planning Program Prospectus prepared by the Technical Advisory Committee for the Protection and Management of Natural Areas in Southeastern Wisconsin and published in August 1989. This prospectus also identified major work elements to be included in the comprehensive natural area study and thereby set forth a general study design. The staff of the Regional Planning Commission detailed and expanded this initial study design during the course of the study as a result of continuous staff-level communication with those governmental agencies contributing specialized services to the planning program, and, collectively, with the Technical Advisory Committee.

Formulation of Objectives and Standards

In its most basic sense, planning is a rational process to establish and meet objectives. The formulation of natural areas and critical species habitat protection and management objectives is thus an essential task which must be undertaken before a preservation plan can be prepared. In order to be useful, the objectives to be defined must not only be clearly stated and logically sound, but must also be related in a demonstrable way to long-range natural resource planning proposals. Only if the objectives are clearly related to such proposals and subject to objective testing can a plan that best meets the needs of agreed-upon objectives be selected from among alternative plans. Finally, logically conceived and well-expressed objectives must be translated to the extent practicable into quantitative design standards to provide the basis for plan preparation, testing, and evaluation.

Criteria and methods for evaluation, prioritization, designation, and management of natural areas and critical species habitat must be agreed upon among the various interests concerned. One of the initial work elements of the proposed planning program thus entailed consideration for use in the planning effort of the criteria and methods set forth in William Tans's natural area evaluation system.[1] The adoption of such criteria and standards by the interests concerned is important, since these criteria and standards will be used as a basis for the determination of the adequacy of existing natural area protection programs, as a basis for plan preparation, and as a basis for determining the relative urgency among various needs. All objectives and standards were reviewed and approved by the Technical Advisory Committee.

Inventory

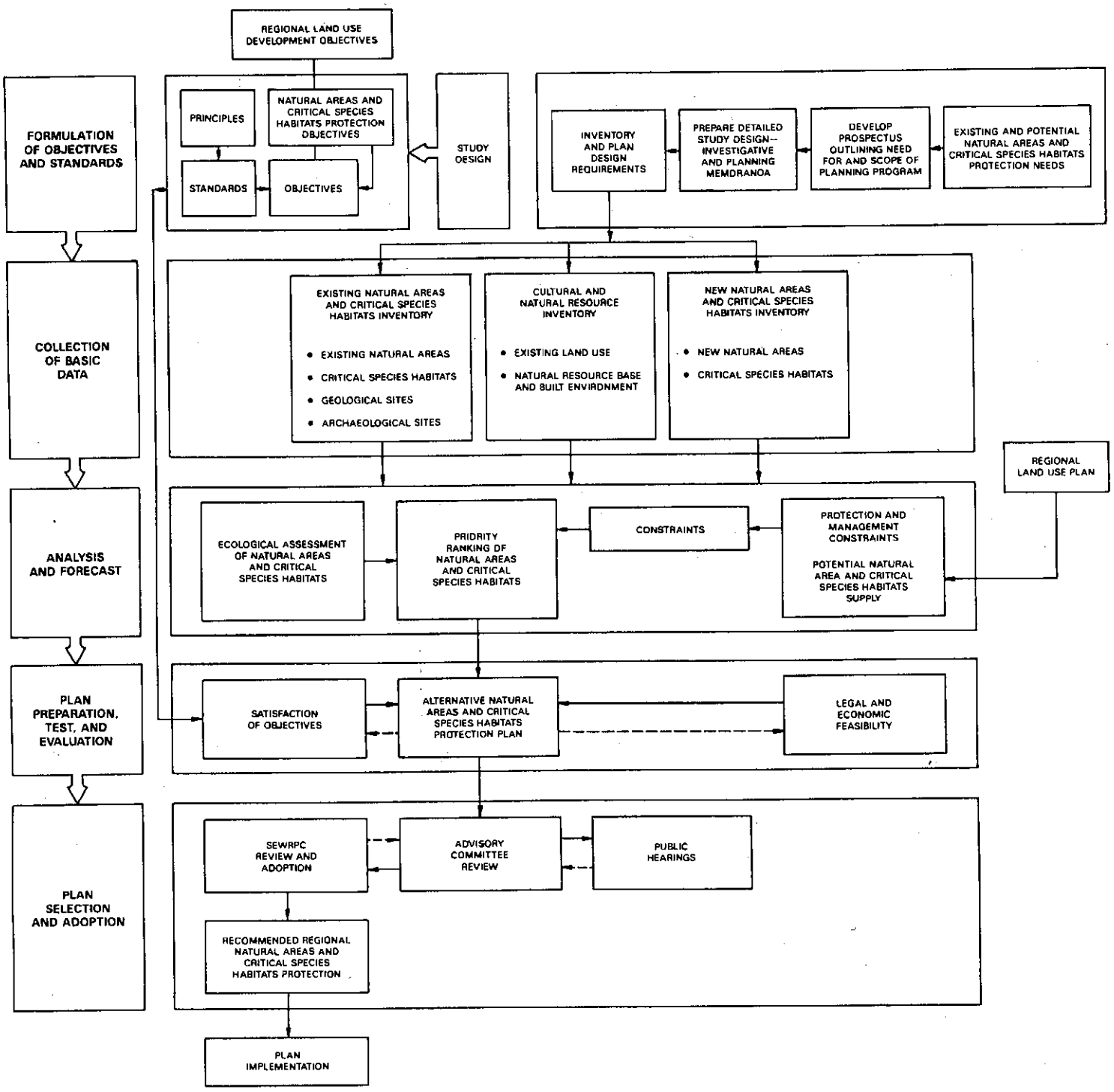
Reliable, pertinent inventory data collected on a uniform, areawide basis are essential to formulation of workable development plans. No intelligent forecasts can be made or alternative courses of action selected without knowledge of the current state of the system being planned. Therefore, inventory becomes the first operational step in any planning process. The following inventory operations were conducted as part of the planning program. They provided the necessary background information for the field investigations of each individual natural area and critical species habitat, the detailed procedure of which is described in Chapter VI of this report.

Mapping: Essential to any natural areas and critical species habitat protection and management effort is a knowledge of the natural resource features of the designated planning area. Such knowledge can best be derived from topographic and resource maps of the required

[1] *William Tans, "Priority Ranking of Biotic Natural Areas," Michigan Botanist, Vol. 13, 1974, pp. 31-39.*

Figure 3

GENERAL STEPS IN A REGIONAL NATURAL AREAS AND CRITICAL SPECIES HABITAT PLANNING PROGRAM



Source: SEWRPC.

scale and accuracy. Information available from such maps includes data on such things as drainage area boundaries; relief; and the locations of streams, ponds, wetlands, floodlands, woodlands, and prairies, as well as specially designated areas, including park lands, environmental corridors, and established natural areas.

General Base Maps: General base maps of the planning area were required to provide a medium for recording and presenting in graphic form the results of the planning studies, as well as the natural and built features of the planning area. Regional base maps prepared by the Commission were used for the study. These maps can be used to portray the Region and subareas thereof and are available at three scales: 1:24,000, 1:48,000, and 1:96,000. These base maps can be expanded or reduced in scale for use in various phases of the study and show, among other information, all streams and watercourse lines; all railways, streets and highways; all U. S. Public Land Survey township, range, and section lines; and all civil division lines. These maps are compiled to National Map Accuracy Standards utilizing the Wisconsin State Plane Coordinate Grid South Zone as the map projection.

Aerial Photographs: Current aerial photography at appropriate scale was used as a basis for mapping the location and extent of natural areas and critical species habitat. Ratioed and rectified aerial photography of the entire Region at a scale of 1 inch equals 400 feet was obtained by the Commission in April 1963, 1967, 1979, 1975, 1980, 1985, and 1990, and was made available for use in the study.

Large-Scale Topographic and Cadastral Maps: Useful in the natural areas and critical species habitat study was detailed knowledge of the topographic and cultural features of the Southeastern Wisconsin Region, including the precise location of highways, railways, and other utility rights-of-way; real property lines, principal buildings, and improvements; and significant geological features, slopes, rock outcrops, floodplains, and shorelines. Large-scale, 1 inch equals 100 feet and 1 inch equals 200 feet, topographic and cadastral maps were available for approximately 1,309 square miles, or about 49 percent of the Southeastern Wisconsin Region. These maps are based upon a horizontal system of survey control which combines the U. S. Public Land Survey and State Plane Coordinate Systems. They permit the accurate correlation of topographic and real property boundary line data and show relief by contours with a vertical interval of two feet and have been compiled to National Map Accuracy Standards utilizing the Wisconsin State Plane Coordinate Grid South Zone as the map projection. These maps were available for use in the study.

Natural Resource Base Maps: Natural resource maps compiled on Commission aerial photographs were available for the entire Region. Such maps provided delineations of woodlands, wetlands, known natural areas, and environmental corridors. Wisconsin Department of Natural Resources wetland inventory maps prepared for the Department by the Commission were also available for each of the seven counties of the Region at a scale of 1:24,000.

Existing Land Use Inventory: Since land use is an important determinant of natural area and critical species habitat protection and management and an essential input to the preparation of a meaningful protection and management plan for natural areas, a detailed land use inventory was required, including data on the existing and proposed amount, types, intensity, and spatial distribution of land use. All the land use data needed for the natural areas protection and management plan have been assembled through inventories conducted by the Commission in 1963, 1967, 1970, 1975, 1980, and 1985 and were made available for the study. Sixty-nine categories of land use were identified and mapped on Commission 1 inch equals 400 feet scale aerial photographs. The data were digitized and available for machine analyses and plotting.

Existing Land Use Plans: Consideration of existing regional and local land use plans was necessary in the conduct of the natural areas protection and management study. Such land use plans were collated by the Commission for the entire Region and reviewed during the course of the study. Any potential conflicts between the plan proposals and natural area and critical species habitat protection and preservation were identified. The natural areas protection and management plan contains specific recommendations concerning the resolution of such conflicts and identifies a course of action, including proposed plan amendments, to be followed in order to reduce or eliminate the identified conflicts.

Existing Natural Resource Base Inventory Information: Some natural areas and critical species habitat inventory information previously existed for each of the seven counties of the Region at the time of the initiation of the planning effort. However, none of the previously conducted inventories was comprehensive. Much of the information was old and needed to be updated; many of the individual inventories concerned were conducted using different evaluation criteria, and therefore were not standardized. Initial data collection efforts entailed collating and recompiling available information from such appropriate sources as the Wisconsin Department of Natural Resources, The Nature Conservancy, the University of Wisconsin, the Milwaukee Public Museum, Milwaukee County, Racine County, Waukesha County, and private naturalists, as well as from the Regional Planning Commission staff, and reviewing the information and determining its utility for natural areas and critical species habitat protection and management planning.

New Field Inventory: An essential element of the inventory of natural areas and critical species habitats in Southeastern Wisconsin involves the identification, survey, and evaluation of those potential sites for which no existing data are currently available. Candidate sites will be provided by the Wisconsin Department of Natural Resources, The Nature Conservancy, county naturalists, and other persons knowledgeable about the natural resources of the Region, as well as by the Commission staff. Further, the Commission staff will utilize such resources as large-scale aerial photography, topographic maps, and soil surveys to locate areas which potentially contain natural areas and/or critical species habitats. These candidate potential sites will then be field-inspected, evaluated, and ranked.

Additional Data: Certain existing natural resource base-related sites, if held in public or related nonpublic conservancy ownership, may contribute to the protection of the significant natural areas and critical species habitats in the Region. In addition, such natural resource base-related sites, if held in nonpublic ownership, may warrant protection in association with the protection of significant natural area and critical species habitat sites. Inventory information on such sites, including archaeological sites, geological sites, and park and open space sites, was therefore collected under the natural areas protection and management planning program.

Archaeological Sites: Archaeological sites include campsites, village sites, garden beds, petroglyphs, work sites, burial sites and mounds, caches, quarries, caves and rock shelters, and other sites. Such sites often occur in association with certain wetland plant communities, particularly lowland hardwoods and conifer swamps, which contain a wide range of the floral and faunal resources exploited by the early inhabitants of the Region. Comprehensive, uniform data on archaeological sites have been collected by the State Historical Society of Wisconsin. Such data for the southeastern Wisconsin area, including the seven-county Region, have been collated and mapped by the University of Wisconsin-Milwaukee, Archaeological Research Laboratory. These data were available for use in the study.

Geological Sites: Geological sites include specific glacial features, such as eskers and kames, certain mineral extraction and sand and gravel pit sites, certain rock outcrop and exposed bedrock sites, and certain unique or special glacial landform areas. Such sites may support specific plant communities, such as dry prairie remnants or oak openings at eskers and kames. Some geological sites inventory information does exist for the Region. However, none of the previously conducted inventories was uniform and comprehensive, and data collection efforts involved the development of a standardized classification system and the collation and compilation of available data from appropriate sources, such as the Regional Planning Commission, the Wisconsin Department of Natural Resources, the Milwaukee Public Museum, and the University of Wisconsin and other colleges and universities.

Park and Open Space Sites: Park and open space sites include State, county, and municipal parks; school forests; State-owned conservancy and natural resource preservation areas, such as State forest and wildlife areas; county and municipal parkways and other conservancy and natural resource preservation areas; nature centers and private conservancy areas; and other public and private outdoor recreation and open space sites. Such park and open space sites, both existing and planned, may encompass important natural areas, critical species habitats, and important grassland bird nesting sites.

Comprehensive, uniform data on existing park and open space sites have been collected by the Regional Planning Commission. In addition, the Commission's adopted regional park and open space plan and supporting county plans contain recommendations for proposed park and open space sites, including proposed new parks, parkways, and natural resource preservation sites, and additions to such existing sites. These data on existing and planned park and open space sites were used in the study.

Analysis and Forecasts

Inventories provide factual information about historical and present conditions within natural areas and critical species habitats. Analyses of the inventory data are necessary, however, to establish needs and requirements for maintaining and managing natural areas and critical species habitats. Examples of natural resource data to be analyzed include species composition; minimum viable species populations; habitat conditions and minimum habitat area sizes; the status of exotic plant and animal invasions; trends in the management of grasslands to provide suitable nesting habitat; the presence or absence of Federal-designated or State-designated rare, threatened, and endangered species; and surrounding land uses and related buffer area sizes.

Land use and demographic information taken from Commission work programs completed to date, such as the regional land use plan and the regional park and open space plan, enable identification of the pattern of future growth which may be anticipated within the Region, which, in turn, can be translated into existing needs for the maintenance and management of natural areas and critical species habitat. For example, with a continued loss of good-quality upland hardwood forest to such urban uses as residential development, in order to maintain the ecological health and diversity of the Region and to preserve its natural beauty it may be necessary to identify and set aside large tracts of lower-quality upland hardwood forest and to undertake intensive mitigation efforts to reestablish the species composition and diversity lost. Also, it was necessary to identify which animal and plant communities require special management considerations, such as burning, to develop a framework within which the proper management efforts could be identified and promoted, such as the acquisition of an appropriate buffer area within which firebreaks can be established. In this regard, the natural areas and critical species habitat protection and management plan for Southeastern Wisconsin incorporates the preparation of an idealized model natural areas management plan for aquatic habitats, prairies, wetlands, and woodlands.

The analysis of natural area and critical species habitat data must include a determination of the original animal and plant communities present in Southeastern Wisconsin, a determination of the rate of loss of such communities, a quantification of the area of such communities remaining, and an identification of which community types need to be emphasized in a natural areas and critical species habitat protection and management plan.

Plan Synthesis, Testing, and Evaluation

The ultimate purpose of the proposed natural areas planning program is the preparation and evaluation of several feasible alternative natural area and critical species habitat plans and the selection, from among those alternatives, of a final plan to be recommended for adoption and implementation. Alternative plan elements may include proposals for natural area and critical species habitat acquisition, habitat management, acquisition of adequate buffer zones to protect a resource from encroaching development, habitat restoration, and land use controls. Each alternative plan must be evaluated in terms of the ability of local, State, and Federal units and agencies of government and private conservation organizations concerned to carry out that particular alternative plan.

Plan Selection and Adoption

The general approach used for selecting the final natural areas and critical species habitat protection and management plan from the alternatives advanced was to proceed, through presentation of the alternatives and the analyses of the technical, economic, financial, and legal feasibility of the plan and its alternatives to the Technical Advisory Committee; then to the public at large at a series of public informational meetings and public hearings; and then to a final decision and adoption by the Commission in accordance with the provisions of the State regional planning legislation. The role of the Commission in this respect is solely to recommend to Federal, State, county, and local units of government and private investors the best natural areas and critical species habitat protec-

tion and management plan for consideration and action.

The plan should recommend practical organizational and financial arrangements for implementation. The planning effort must therefore analyze the capabilities of the Federal, State, county, and local units of government involved to implement the various plan recommendations, identifying any Federal, State, and private financial and technical assistance available for such implementation. Appropriate agencies for implementation of each element of the overall natural areas plan should be identified.

With respect to natural areas and critical species habitats, the plan should address the application of land use controls as well as land management techniques. Land use control techniques may include the containment of urban sprawl, the use of buffer zones, and agricultural land preservation and resource conservancy zoning. Management techniques may include warning signs, fencing, brush removal, burning, and proper pesticide use. Such techniques may also include soil erosion control, water management, application of minimal habitat area requirements, and preservation of minimum viable species populations.

IMPORTANCE OF NATURAL AREAS

Natural areas and critical species habitats in Southeastern Wisconsin have been, and are continuing to be, reduced in size, degraded, and lost to development. These reasons alone, however, are not sufficient to substantiate the cost and effort required to preserve the remaining natural areas. The value of these areas should be clearly shown.

In a general sense, natural areas contain ecosystems consisting of intricately interactive groups of living species existing in conjunction with their environments. Natural area values may be categorized as economic, functional, and cultural, and their benefits may be seen as directly or indirectly affecting humankind. These areas serve as living museums of the tremendous variety of habitats in which plants and animals have adapted to exist in the physical world.

Natural areas and critical species habitats are important to humanity in several fundamental ways, including economically, as in agriculture and medicine; functionally, as in protecting the quality of water supplies; educationally; recreationally; aesthetically; ethically; in basic scientific research; and in maintaining biological and genetic diversity. In a less tangible but equally important sense, natural areas contribute to mental well-being and to the overall quality of human life.

Economic Importance of Natural Areas

In a very real sense, natural areas, and their component species, contribute to the economy of any region. Natural areas may support such economic activities as hunting, fishing, trapping, gathering of plants and plant products, and forestry. Tourists who seek the natural world contribute directly to the local economy. It has been recognized that property values increase when land is located adjacent to natural areas. As explained in more detail in the next section, natural areas help maintain air and water quality, functions which, if not aided by the natural environment, would have to be wholly assumed by society at great economic cost. For example, wetlands lower the cost of providing a clean, safe water supply for human consumption by removing pollutants in the natural environment.

Species contain diverse chemical compounds and genetic codes that have evolved to meet specific conditions. How this biochemical and genetic information may be valuable to humanity in the future cannot be predicted, but past experience shows that great benefits are attendant to the presence of a diverse biochemical and genetic pool. Through the ages, humankind has benefitted from the understanding and utilization of the adaptive characteristics of animal and plant species. These benefits include the development of new sources of food; the improvement of cultivated crops; and the creation of new medicines. For example, foxglove is the source of digitalis, a heart medication; western yew and mayapple have been used to develop drugs for the treatment of cancer; the daisy fleabane has been used to develop a biodegradable pesticide; and the armadillo has proved valuable in leprosy research. However, most species have yet to be studied for potential medicinal value. The extinction of any species would mean that that potential would never be fully realized.

The extinction of edible plant species portends more than the loss of potential food sources. Crop plants have been bred to produce higher yields. But because agricultural crops are commonly grown as monocultures, such crops are highly susceptible to transmission of pathogens. New varieties of crop plants, involving new genetic combinations, must constantly be developed. A principal source of new strains is the storehouse of genetic information in the wild relatives of crop species.[2] So, for example, native grasses are used to produce new wheat hybrids.

Yet, at the same time that a diverse gene pool is perceived as being of vital importance, native species have been exterminated by development, narrowing the genetic base. Natural areas, then, with their complement of natively adapted species, provide a resource bank of inestimable value.

Functional Importance of Natural Areas

An important role of natural areas is in their function as environmental regulators. Woodlands protect the quality and quantity of surface waters and groundwaters. Tree, shrub, and herb cover and the associated root structures protect soil from erosion. Natural areas, however, function fully in element cycling only when they retain the diversity of species needed to provide paths for material exchanges and energy flow. Of particular significance are natural wetlands, areas of immense biological productivity that in addition to providing vital habitat for waterfowl, certain mammals, and aquatic animals, are of enormous environmental benefit. Wetlands help to regulate streamflows and lake levels by serving as natural reservoirs, abating both floods and droughts. Wetlands protect surface water quality by trapping silt and sediment contributed by both point and nonpoint sources of pollution. Wetlands may also protect stream and lake shoreline areas from erosion, and it is through certain wetlands that groundwater may be recharged. Wetlands also cycle various chemical elements, such as nitrogen, sulfur, oxygen, and carbon.

Cultural Importance of Natural Areas

Certain aspects of natural areas involve nonconsuming benefits. For example, natural areas have value in recreational, as opposed to commercial, hunting and fishing, teaching environmental science, nature observation and interpretation, bird watching, hiking, nature photography, and other passive recreational pursuits. Natural areas provide the opportunity for environmental science to be taught on a firsthand basis; for example, native plant and animal species may be observed and identified and their interactions with the natural environment studied.

A landscape without natural areas may be monotonous, an unvarying collection of weedy roadsides, old fields, and monotypic crop stands, or totally dominated by human dwellings and by commercial and industrial buildings. Open space has high value because it increases the diversity of the landscape. Development may destroy the very natural area values that attracted the development to begin with.

Basic Scientific Research

An important function of relatively undisturbed natural areas is as environmental benchmarks, controls, or reference sites, with which scientists may assess the human impact upon human-dominated ecosystems. For example, monitoring the quality of such areas over time provides a baseline against which to compare more profound changes in the structure and composition of disturbed systems. Studying undisturbed ecosystems may illuminate means of preventing and repairing ecological damage done to disturbed systems. In this respect, natural areas may act as early warning systems indicating that more far-reaching environmental degradation may be occurring.

In natural areas, scientists have the opportunity to study relatively undisturbed ecosystems, both as a whole and with respect to their component species. These species perform functions; these functions drive natural processes. When humans intervene with these species and natural processes, there is a real risk that these processes may be interrupted to social and economic disadvantage. Undisturbed natural areas serve as laboratories where the natural processes on which life depends may be observed and analyzed and where ecosystem functions may be studied. Extrinsic, human-generated factors are largely absent, so that species and processes

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[2] *Donald A. Falk, "Joining Biological and Economic Models for Conserving Plant Genetic Diversity," in Donald A. Falk and Kent E. Holsinger (eds.), Genetics and Conservation of Rare Plants, Oxford University Press, New York, 1991.*

may be studied in the environment of which they are normal components and to which they are adapted. Food habits, distributions, adaptation, migration, and limiting resources are common objects of the study of native species. Natural areas may also include undisturbed soils and geological features; archaeologists may here find clues to human history. On a much broader scale, natural areas may prove to be indicators of the potentially profound effects of climatic and other global changes.

Finally, the ethical implications of natural area preservation should be considered. The value of natural area preservation may, in some respects and cases, be difficult to demonstrate, especially if neither threatened nor endangered species are present. Most native species do not have clearly identifiable economic value. The conservation of these species and ecosystems, then, must be based, at least in part, on their natural uniqueness rather than on purely utilitarian considerations.

Humanity must assume the responsibility for stewardship of the land and its resources, using a balanced approach of development and preservation. In the view of Aldo Leopold: "The responsibility to maintain, rather than exploit, should be the future basis for land ownership and management."[3] This "land ethic" is a manifestation of an ecological conscience, a way of viewing the world in which the individual, and humanity as a whole, shares responsibility for the health of the land. It affirms the right of species, and their habitats, to continued existence for their own sake, and it assumes that the uneconomic parts of natural ecosystems are just as important as the economic ones. A natural area, something outside of everyday human living space, should be valued precisely because it is not routinely part of human life.

MAINTENANCE OF REGIONAL BIOLOGICAL DIVERSITY

An underlying theme behind recent natural areas protection efforts has been the need to preserve biological diversity. This term refers to the relative abundances of the various types of ecosystems, organisms, and the genetic compositions that exist within species in any particular region.

For a number of reasons, a higher biological diversity is preferable to a lower one. All species evolved in an ecological context, that is, evolved in response to changes in their environment. The raw material for evolution is genetic variability, which enables species to adapt and change. Through time, a large amount of genetic diversity has accumulated in the species of any given region, so that differences exist between individuals and populations of the same species. The greater the genetic diversity, the more likely that at least some individuals can cope with environmental stress. This is essential for the long-term viability of species, particularly in urbanizing environments such as Southeastern Wisconsin. Genetic variation is the basis for potential evolutionary change in a species; it allows for efficient occupation of differing habitats by members of a population; it enables a species to survive random threats, such as disturbance or pathogens; it enables species to adjust to changing environmental conditions; and it may enable species to maintain high levels of reproductive success.[4] The problem of maintaining regional biotic diversity becomes acute when considering species with small populations that are isolated in a fragmented landscape. These populations tend to lose variation more readily and are therefore more apt to become locally extinct.[5] Such conditions may result in inbreeding, leading to a loss of reproductive fitness or to inbreeding depression. Maintenance of high regional biological diversity thus helps to provide for high genetic variability. Not only must

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[3]*Aldo Leopold, A Sand County Almanac, Oxford University Press, New York, 1949.*

[4]*Laura Foster Huenneke, "Ecological Implications of Genetic Variation in Plant Populations," in Donald A. Falk and Kent E. Holsinger (eds.), Genetics and Conservation of Rare Plants, Oxford University Press, New York, 1991.*

[5]*Spencer C. H. Barrett and Joshua R. Kohn, "Genetic and Evolutionary Consequences of Small Population Size in Plants: Implications for Conservation," in Donald A. Falk and Kent E. Holsinger (eds.), Genetics and Conservation of Rare Plants, Oxford University Press, New York, 1991.*

the genetic variation within a species be preserved, but the range of environmental conditions under which species survival can be maintained must also be assured. This entails protecting as many of the natural areas as possible in which a species occurs, since each remnant may contain genetic variation not found in other populations. In this way, natural areas serve as genetic reserves of the diverse varieties of plant and animal species.

Because each species contains a unique arrangement of genetic material and is a component of functioning ecosystems, elimination of a species means that this information is lost forever. Biological complexity is correspondingly reduced as a functioning part of the ecosystem is removed. This ecological simplification may lead to irreparable harm to the system as a whole.

It should be remembered that extinction is a natural process. By far the majority of species that have ever inhabited the earth no longer exist. The problem today, however, lies in the greatly accelerated rate of species extinction, directly attributable to the pervasive influence of human activity. The goal, then, in preserving biological diversity is not to halt extinction, but to prevent the increased rate of species loss resulting from human impact.

It is also ineffective to attempt to preserve species only when near extinction, because by then they will have already lost a significant portion of genetic variation. Sufficiently large populations need to be maintained for exchange of genetic material. Furthermore, preserving habitat is just as important as preserving the organism itself, for unless the habitat is maintained, the species will become extinct. In short, the best way to preserve the gene pool is to protect the natural ecosystems.[6]

Proliferation of Exotic "Weedy" Species into Disturbed Habitats

Experience demonstrates that some exotic species are very successful at becoming established in the regional landscape. Certainly, introduced species include the most pernicious weeds. The dandelion and Queen Anne's lace are ubiquitous. Reed canary grass and purple loosestrife have invaded wetlands within the Region to the detriment of native species. A recent addition to the Wisconsin weed flora, garlic mustard, has increased rapidly in disturbed woodlots. The European buckthorn[7] and the Eurasian honeysuckle[8] are both shrubs which have become weedy pests throughout the open oak woods of southern Wisconsin. Among birds, the English sparrow and starling are common components of the human-dominated landscape.

However, despite the apparent ubiquitous nature of alien weeds and animals, it is important to realize that, of the enormous number of species that have been introduced, only a relatively small percentage has become established in native communities. Only a few exotics, such as glossy buckthorn, become naturalized and are able to compete successfully in undisturbed habitats. The reason for the failure of most exotic plant species to become established outside cultivated areas is that native, undisturbed plant assemblages present closed communities. Prevention of establishment through unsuitable habitat and intensive competition provided by native flora is the usual way that a plant community will resist invasion. Ecologically, "niche" is an inclusive term referring to the total structural and functional role of a species in an ecosystem. It includes not only habitat, but also the ways in which a species responds to and modifies its environment. It is axiomatic that two species cannot occupy the same niche; one will eventually be found to be a better competitor, eliminating the other.

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[6] *Alan R. Templeton, "Off-site Breeding of Animals and Implications for Plant Conservation Strategies," in Donald A. Falk and Kent E. Holsinger (eds.), Genetics and Conservation of Rare Plants, Oxford University Press, New York, 1991.*

[7] *Lawrence A. Leitner, "An Alien Shrub in a Changing Landscape: The European Buckthorn (Rhamnus cathartica L.) in Southeastern Wisconsin," Ph.D. dissertation, University of Wisconsin-Milwaukee, Milwaukee, Wisconsin, 1985.*

[8] *William J. Barnes and Grant Cottam, "Some Autecological Studies of the Lonicera X bella Complex," Ecology, Vol. 55, 1974, pp. 40-50.*

Complex ecosystems have more niches than simple ones, and are thus able to support more species. In mature, undisturbed communities, most ecological niches are filled; few, if any, random invaders would be expected to be better competitors than the native species of such stable communities.[9] When native communities are disturbed by human activity, however, the course of natural succession is set back, and "open" spaces, that is, niches, are created that may be filled by species otherwise unable to invade the closed community. In these relatively open communities, invaders can more successfully compete; the degree of replacement is largely proportional to the amount of disturbance.[10] If disturbance ceases and the community is allowed to recover, the advantage to most aliens will decline, as they are only precariously established.[11]

Most of Southeastern Wisconsin has been, and continues to be, disturbed through the combined effects of agricultural, industrial, and urbanizing processes, thus presenting a multitude of opportunities for invasion by exotic species. The value of the remaining natural areas is magnified; as relatively undisturbed communities, they in large part exclude exotics, while at the same time they provide safe habitats for more sensitive native species.

IMPORTANCE OF BEDROCK GEOLOGIC SITES

Southeastern Wisconsin has a significant geologic heritage that has played an important role in both scientific research and in the industrial and architectural development of the area. The geologic sites on which this heritage is founded are few in number and disappearing rapidly. Nearly all remaining sites, even those on public land, are threatened, in large part because their basic value and importance are unrecognized. These sites must be protected if they are to survive the rapid development of the Region. The goal of the geologic section of the plan set forth in this report is to provide information about bedrock geologic sites in the Region which can then be used by public officials and concerned citizens to protect the sites for scientific, recreational, and educational use.

Preservation of Geologic Sites

The preservation of geologic features is a relatively new concept in the United States. Although spectacular geologic features, such as the Grand Canyon, have long been recognized and protected primarily for their aesthetic value, many less striking features have been overlooked. Conservation efforts in this country have focused primarily on plants and animals and their habitats. The protection afforded biological sites over the last 30 years is not extended to geologic sites, which are also finite, nonrenewable natural resources vulnerable to destruction.

Geologic site preservation is not a routine consideration in public planning and development decisions. Few public officials are aware of the intrinsic value of these sites and of the spectrum of benefits which these sites can provide the general public, as well as the scientific community. Surficial geology is indeed and has long been considered in comprehensive planning, but specific geological features such as bedrock exposures have been largely ignored. At a local level, some sites, such as old quarries, have been acquired principally because they represent large tracts of land that can be used for parks or landfills. Occasionally, water-filled quarries are used as public recreational facilities for swimming and fishing. Lime kilns have been preserved in some places as historical oddities, but they are seldom used to educate the public about the relationship of geology to industrial history. Few geologic sites have been preserved solely for their scientific, historical, or educational value.

This lack of appreciation for geological sites in the United States contrasts sharply with the prevailing attitude in many European countries. For example, the Nature Conservancy Council, the governmental body promoting nature conser-

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[9] *Evelyn G. Hutchinson, An Introduction to Population Ecology, Yale University Press, New Haven, Connecticut, 1978.*

[10] *John T. Curtis, The Vegetation of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1959.*

[11] *Marston Bates, "Man as an Agent in the Spread of Organisms," in W. L. Thomas (ed.), Man's Role in Changing the Face of the Earth, University of Chicago Press, Chicago, 1955.*

vation in the United Kingdom, initiated a conservation program to maintain geological features as long ago as 1949. Geological sites in the United Kingdom are considered part of the country's natural and historical heritage and receive protection similar to that given to sites of biological and archaeological importance. The Council aims at safeguarding all important localities used for geological education and research for the benefit of research scientists, professional geologists in industry, teachers, students, and amateur geologists. More than a thousand geological sites of special scientific interest, many of only local significance, have been identified and preserved on both public and private lands. Not only are sites protected from destruction, but the Council refurbishes overgrown and obscured outcrops by excavation and vegetation clearing; new exposures are created specially to meet geological needs. The Council provides advice about conservation to local governmental agencies which are empowered to establish parks and nature reserves incorporating sites of special scientific interest, as well as to create agreements allowing limited access to certain private lands. The historical and scientific importance of these sites is highlighted in tourism literature and the Council enhances their educational value by developing nature trails, field guidebooks, and information brochures for use by educators, students, and the general public.

Value of Geologic Features

Rock exposures are indispensable tools in scientific research and need to be preserved so that they can be visited, studied, interpreted, and reinterpreted by geologists far into the future. Of primary importance, the rocks and the fossils such rock exposures contain provide fundamental clues to the history of the planet by revealing information about past life, environments, and geologic processes. In order to interpret these clues correctly, it is essential that this biological and physical information be viewed in context within the rocks. It is also necessary to be able to trace rock exposures through an area to determine patterns of regional geology. This has economic, as well as scientific, value by providing data useful in locating economically workable mineral deposits and in predicting groundwater distribution. Rock exposures provide other practical benefits. For example, engineers can directly examine the physical properties of rock strata involved in construction projects, thereby devising more cost-effective subsurface explorations. Finally, specific rock outcrops, called type sections, akin to type specimens in biological nomenclature, serve as a "library" of geological information that illustrates typical features of a named rock unit. These exposures must be preserved so that future geologists can see firsthand why strata were interpreted in a particular way or how specific evidence was used in formulating geologic concepts.

Some geologic features possess historical importance of local, national, and even international significance because of their role in the formulation of scientific concepts and the general history of science. For example, the ancient reefs in the Milwaukee area have international significance because they are the first North American fossil reefs recognized in the geologic record. Geology also influences a society's cultural and industrial heritage. Regional settlement patterns in Southeastern Wisconsin were influenced by geologic features related to such factors as landscape, agricultural suitability, and availability of the raw materials which provided essential construction materials and the bases for some of the earliest industries within the Region.

Because of their scientific and historical significance, rock exposures are effective educational tools. Field experience is essential training for geology students. For elementary- through university-level students, field trips provide exciting hands-on experience that can spark a greater understanding of, and a lifelong interest in, science and nature. Rock outcrops evoke a natural curiosity in people and can be used to inform the public about regional geology and history through signage and other methods in parks and public lands, thereby enhancing park usefulness and enriching the visitor's experience. Some old quarries and lime kilns make fine historical sites to educate the public about the important regional lime and stone industry and to remind them of the link between the cultural and industrial heritage of the Region and the natural world. The ability to reach large numbers of students and others makes geological sites near urban areas, such as many in the Region, especially important teaching devices.

Rock exposures have significant recreational value. Amateur fossil collectors need outcrops to pursue their hobby, but the large exposures required for collecting are disappearing rapidly. It is now nearly impossible to collect fossil specimens of the trilobite Calymene celebra, Wisconsin's State fossil, although rock exposures containing this fossil were once common in Milwaukee County. Swimming beaches and fishing ponds, such as the pond provided in Waukesha County's Menomonee Park, are among the most popular recreational uses for abandoned water-filled quarries, and some sites, such as the Quarry Lake Park in Racine County, are also popular with scuba diving enthusiasts. The most basic recreational value of these geological features, however, is their aesthetically pleasing attributes. Rock exposures, both natural and reclaimed quarry faces, can add interest to an otherwise monotonous, manicured landscape in parks, public lands, and along roadsides.

Not only are rock outcrops picturesque natural features of the landscape, but they may host vegetation different from their surroundings, thereby varying the scenery as well. This also underscores the ecological value of rock outcrops. Rock substrates provide distinctive habitats that support plants and animals different from surrounding soil substrates, which increases biotic diversity. Much of the rock habitat in Southeastern Wisconsin has already been destroyed; preserving remaining outcrops will help ensure the survival of the rock-dwelling biota.

Lost Resources and Potential Threats

Rock exposures constitute a valuable nonrenewable natural resource that has been largely overlooked in conservation; many important sites in Southeastern Wisconsin have already been lost. As it is, few natural bedrock exposures exist in the area for geological reasons related primarily to glaciation. As glaciers advanced through the Region, they scoured the bedrock down to a relatively flat surface. As the glaciers retreated, much of the bedrock surface was buried beneath a thick blanket of till, sand, and gravel. Since the last of these sediments were deposited only about 10,000 years ago, most streams and rivers in the area have not had adequate time to cut down to the bedrock. Consequently, natural bedrock exposures in the Region are limited mainly to scattered stream cuts and to resistant rock knobs that rise above the general ground surface.

Beginning in the mid-19th century, many of these natural exposures were expanded by quarrying. These larger quarry exposures aided greatly in the geological investigation of the area. Additionally, the quarrying activity itself uncovered abundant fossils that were collected eagerly by amateurs and professionals alike; some of these fossil collections now reside in major museums across the country. Many of the stone quarries were abandoned by the turn of the century, and have since disappeared.

Since the 1960s, more than 40 geologic sites have been completely or largely destroyed, primarily through the filling of abandoned quarries. In addition, several very important exposures, such as the Rockfield, Germantown West, Grafton East, Trimborn, Wauwatosa Road Reef, Granville Road Reef, and a number of minor exposures, have been incorporated into residential landscaping, essentially removing them from public access. Also during this period, nearly all the sites that furnished abundant fossils for collecting by both amateurs and professionals have been destroyed, altered in ways that restrict collecting, or removed from public access. Therefore, very few bedrock exposures are left to preserve in the Region, and no new exposures are being created. Many of the remaining exposures face imminent destruction and must be protected as soon as possible before they, too, are lost. Potential threats to the remaining bedrock exposures are numerous and varied. Destruction is not inevitable, however, and in most cases it can be prevented through responsible land use planning and development.

Common causes of outcrop destruction are public works projects, such as road construction, erosion control projects, and park development. Road construction, however, has also been one of the primary means of creating new rock exposures. In the last 20 years, however, rock uncovered during road building has often been reburied and vegetated, thus eliminating the exposures. For example, important road cuts along STH 16 in Pewaukee which had existed since the 1950s were covered when the road was rebuilt in the 1980s.

Excavations for stream rechanneling may remove exposures. Streams may also be diverted from their natural rock channels, which are then filled, as occurred along parts of Lincoln Creek in Milwaukee. In addition, outcrops may be buried and landscaped as part of erosion-control programs, as was done in Milwaukee's Estabrook Park. Park-related improvements may also destroy rock exposures. For example, public rest-room facilities were constructed over the only publicly owned outcrop on the Root River Parkway in Greendale. In Cedarburg, when the old water-filled Groth quarry was incorporated into a park, most of the walls were buried.

Abandoned quarries have often been used as landfill sites and eventually landscaped, and in some cases built on as part of their reclamation effort. Urban sprawl may destroy both natural and quarry exposures. If outcrops are not buried or destroyed directly during construction, they may, because of their scenic value, be incorporated into private homesites or residential developments, as was Granville Road Reef. Although these exposures are preserved, public access to them becomes restricted or precluded.

Finally, because many rock outcrops have vanished, the few remaining exposures become over-collected by fossil and mineral collectors. For example, the best exposure of Devonian rocks along the Milwaukee River in Estabrook Park has been reduced to a small, endangered outcrop through both park maintenance and collecting pressures.

Recently, even publicly owned sites thought to be relatively safe, such as the Soldiers' Home Reef, have been faced with destruction. There has been no official program to protect and preserve geologic sites in the Region. Several individuals or organizations have attempted to save sites, but to little avail. In the early 1980s, the Regional Planning Commission was successful in preventing the STH 16 road cut exposures in the Pewaukee area from being completely buried in a highway reconstruction program. In the early 1970s, K. C. Gass tried unsuccessfully to save the Fieldhack quarry near Pewaukee, which was noted for its splendid glacial striae, from being over-collected by amateurs and covered. In the 1960s, the Wisconsin Geological Society erected a geologic marker at McGovern Reef in order to point out the roche moutonee, only to have the visible portions of the reef blasted away during road construction. In the 1920s and 1930s, Charles Whitnall and the Milwaukee County Park Commission tried to protect the Blue Hole at Estabrook Park, the Menomonee River bluff at Schoonmaker Reef, and the Manegold and Schweickhart quarry sites, but all were eventually filled. In 1993, one of the most important sites, Soldiers' Home Reef, was designated a National Historic Landmark in the History of Science by the National Park Service, which affords it some protection. Two additional geologic sites in Southeastern Wisconsin, the Horlickville Bluffs and Quarries and Schoonmaker Reef, are now under consideration for designation as landmarks. Most other geologic sites in the Region are not protected, however.

PRINCIPLES OF LANDSCAPE ECOLOGY

Recently, the science of landscape ecology has emerged as a discipline which deals with the landscape as its central focus. It studies the various interrelated components of heterogeneous land areas, such as woodlands, wetlands, lakes and streams, meadows, and croplands; their structure; their function; their spatial patterns at different scales; and how they interact and change.

Landscape Fragmentation

Any attempt at natural area and species preservation in Southeastern Wisconsin must consider the patchy nature of the human-dominated landscape. Centuries of occupation by Europeans and their descendants has produced a Region in which scattered remnants of the presettlement vegetation are surrounded by an agricultural and urban matrix. The small remnant patches of natural communities have suffered various degrees of disturbance, altering the physical as well as biological nature of these patches. For example, woodlands have been divided into smaller and smaller parcels,[12] with the effect of increasing the proportion of edge and, consequently, light penetration, wind,

[12] *David M. Sharpe, Forest Stearns, Lawrence A. Leitner, and John R. Dorney, "Fate of Natural Vegetation during Urban Development of Rural Landscapes in Southeastern Wisconsin," Urban Ecology, Vol. 9, 1986, pp. 267-287.*

predators, and noise. The interiors of the remaining woods have begun to resemble their perimeters.[13,14]

Some landscape ecologists have attempted to utilize the theory of island biogeography in the preservation of natural areas. As originally formulated, this theory developed to explain the numbers of species found on oceanic islands.[15] Basically, the biota of any island was considered to be in dynamic equilibrium between species immigration and local extinction or extirpation. Species richness reaches equilibrium when immigration equals extinction. The actual number of species was related to several key factors, including island size, habitat diversity, and degree of isolation, or distance to a source-pool of species such as a continent.

Attempts have subsequently been made to compare terrestrial habitat "islands" to oceanic islands, and thus explain the number of species found in these landscape patches.[16,17] Local extinctions will occur as a normal process, but the extinct species will be replaced by species from surrounding sources, with the chances of this occurring depending upon, among other things, the isolation of the patch. Larger islands should be able to support more species, primarily because they tend to provide a greater variety of habitats.

Basically, there are two components of the effect of fragmentation on species.[18] First, the creation of distinct fragments affects species dispersal and immigration rates. Second, the reduced habitat area and relative edge amounts primarily affect population size and, consequently, predation and extinction rates.

This theory, particularly its relevance to terrestrial systems, is not without controversy.[19,20] There has been considerable debate in the literature concerning the importance of island size, shape, and isolation in determining species richness. There are substantial differences between oceanic and terrestrial islands. For example, terrestrial patches frequently have connections or corridors to other, similar habitats, thus facilitating species flow. There is often no "continental" source-pool of species for land patches, merely other islands. History of disturbance may be a confounding factor. The terrestrial matrix may support predators.

Despite these and other reservations, the concepts of island biogeography can offer some valuable insight into native resource preservation, where the goal is to maintain maximum diversity of native species within any given region. While island size is of undoubted impor-

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[13]*James B. Levenson, "Woodlots as Biogeographic Islands in Southeastern Wisconsin," in R. L. Burgess and David M. Sharpe (eds.), Forest Island Dynamics in Man-Dominated Landscapes, Springer-Verlag, New York, 1981, pp. 12-39.*

[14]*Gordon G. Whitney and James R. Runkle, "Edge Versus Age Effects in the Development of Beech-Maple Forest," Oikos, Vol. 37, 1981, pp. 377-381.*

[15]*Robert H. MacArthur and Edward O. Wilson, The Theory of Island Biogeography, Princeton University Press, Princeton, New Jersey, 1967.*

[16]*Jared M. Diamond, "The Island Dilemma: Lessons of Modern Biogeographic Studies for the Design of Natural Reserves," Biological Conservation, Vol. 7, 1975, pp. 129-147.*

[17]*Richard T. T. Forman, Anne E. Galli, and C. F. Leck, "Forest Size and Avian Diversity in New Jersey Woodlots with Some Land Use Implications," Oecologia, Vol. 26, 1976, pp. 1-8.*

[18]*David S. Wilcove, Charles H. McLellan, and Andrew P. Dobson, "Habitat Fragmentation in the Temperate Zone," in Michael E. Soule (ed.), Conservation Biology, The Science of Scarcity and Diversity, Sinauer Associates, Inc., Sunderland, Massachusetts, 1986.*

[19]*Jared M. Diamond, "Island Biogeography and Conservation: Strategy and Limitations," Science, Vol. 193, 1976, pp. 1,027-1,029.*

[20]*William J. Boecklen and Nicholas J. Gotelli, "Island Biogeographic Theory and Conservation Practice: Species-Area or Specious-Area Relationships," Biological Conservation, Vol. 29, 1984, pp. 63-80.*

tance, maximization of habitat diversity within a given region would allow for greatest species richness. Patch-to-patch distance should be minimized, and connections to other habitat islands should be maintained to aid species movement. Greater isolation increases the risk of permanent local species extinction.

Importance of Landscape Connections or Corridors

Habitat fragmentation and natural area degradation, even if not directly resulting in species destruction, may have long-term deleterious effects upon species. If a species should become locally extinct within an isolated habitat patch, the chances of that species repopulating that patch depends upon several factors, including the mechanism of dispersal of that particular species and the proximity to another population.[21] In addition, isolated populations in remnant patches potentially suffer from genetic stagnation as a result of inbreeding. This drastically reduced genetic variation may well have negative effects on a species.[22]

Relief from some of the adverse effects of fragmentation may be found in connections, or corridors, that link similar habitat patches.[23,24] Connections may be wide or narrow, such as fencerows. and either upland or lowland, such as riparian habitats.[25,26,27] Whatever their nature, they serve as conduits, facilitating gene flow across landscapes by enabling organisms to move from one patch to another.[28] They may be crucial in the survival of certain species. Interconnections between patches may be as or more important than island area in maintaining species diversity.[29,30,31] For example, in general, birds and small mammals use fencerows between woodlots much more than they traverse

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[21] *Richard T. T. Forman and Michel Godron, "Landscape Ecology Principles and Landscape Function," in J. Brandt and P. Agger (eds.), Proceedings of the First International Seminar on Methodology in Landscape Ecological Research and Planning, Vol. 5, Raskilde Universitetsforlay GeoRuc., Raskilde, Denmark, 1984, pp. 4-15.*

[22] *Alan R. Templeton, Kerry Shaw, Eric Routman, and Scott K. Davis, "The Genetic Consequences of Habitat Fragmentation," Annals of the Missouri Botanical Gardens, Vol. 77, 1990, pp. 13-27.*

[23] *Reed F. Noss, "Corridors in Real Landscapes: A Reply to Simberloff and Cox," Conservation Biology, Vol. 1, 1987, pp. 159-164.*

[24] *Richard T. T. Forman, "Corridors in a Landscape: Their Ecological Structure and Function," Ekologia (CSSR), Vol. 2, 1983, pp. 375-387.*

[25] *A. R. Geier and L. B. Best, "Habitat Selection by Small Mammals of Riparian Communities: Evaluating Effects of Habitat Alterations," Journal of Wildlife Management, Vol. 44, 1980, pp. 16-24.*

[26] *I. J. Schlosser and James R. Karr, "Water Quality in Agricultural Watersheds: Impact of Riparian Vegetation During Base Flow," Water Resources Bulletin, Vol. 17, 1981, pp. 233-240.*

[27] *I. J. Schlosser and James R. Karr, "Riparian Vegetation and Channel Morphology Impact on Spatial Patterns of Water Quality in Agricultural Watersheds," Environmental Management, Vol. 5, 1981, pp. 233-243.*

[28] *Larry D. Harris, The Fragmented Forest: Island Biogeography Theory and the Preservation of Biotic Diversity, University of Chicago Press, Chicago, 1985.*

[29] *K. A. Morgan and J. E. Gates, "Bird Population Patterns in Forest Edge and Strip Vegetation at Remington Farms, Maryland," Journal of Wildlife Management, Vol. 46, 1982, pp. 933-944.*

[30] *Reed F. Noss, "A Regional Landscape Approach to Maintain Diversity," BioScience, Vol. 33, 1983, pp. 700-706.*

[31] *Richard T. T. Forman and Michel Godron, Landscape Ecology. John Wiley & Sons, New York, 1986, passim.*

open fields.[32,33,34] Some studies have shown that forest-interior birds could breed in forest patches as small as 35 acres if these small remnants were connected to larger forests by habitat strips.[35] Soule found that the persistence of chaparral-restricted birds in isolated canyons depended not on the distance to other patches of chaparral, but on whether they were connected by chaparral corridors.[36] Wildlife managers have used the technique of environmental corridors to enhance certain species.[37,38] Plant species that rely on animal vectors for seed dispersal are adversely affected by an inability of those animals to migrate to new habitats. For instance, the dispersal of some climax tree species may be greatly influenced by the presence of environmental corridors.[39,40,41]

The optimal approach to enhance biological diversity throughout a region would be to maximize connectivity, that is, to maintain physical connections between patches. Smaller islands could serve as "stepping-stones" between larger patches, with the migration of species facilitated by corridors.[42] Such concepts are an integral part of the primary environmental corridor concept of the Commission. Although corridors must be analyzed and planned on a case-by-case basis,[43] that is, according to the particular species and habitat types involved, in general, maximization of interactions between patches through the use of environmental corridors is integral to maintaining regional biological diversity.[44]

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[32]*John F. Wegner and Gray Merriam, "Movements by Birds and Small Mammals Between a Wood and Adjoining Farmland Habitats," Journal of Applied Ecology, Vol. 16, 1979, pp. 349-358.*

[33]*Lenore Fahrig and Gray Merriam, "Habitat Patch Connectivity and Population Survival," Ecology, Vol. 66, 1985, pp. 1,762-1,768.*

[34]*B. M. Gottfried, "Small Mammal Populations in Woodlot Islands," American Midland Naturalist, Vol. 102, 1979, pp. 105-112.*

[35]*Lucy MacClintock, Robert F. Whitcomb, and Bruce L. Whitcomb, "Evidence for the Value of Corridors and Minimization of Isolation in Preservation of Biotic Diversity," American Birds, Vol. 31, 1977, pp. 6-12.*

[36]*Michael E. Soule, "Land Use Planning and Wildlife Maintenance: Guidelines for Conserving Wildlife in an Urban Landscape," Journal of the American Planning Association, Vol. 57, 1991, pp. 313-323.*

[37]*G. A. Gehrken, "Travel Corridor Technique of Wild Turkey Management," in L. K. Halls (ed.), Proceedings of the National Turkey Symposium Number Three, Austin Chapter of the Wildlife Society, Austin, Texas, 1975, pp. 113-117.*

[38]*J. L. Buckner and J. L. Landers, A Forester's Guide to Wildlife Management in Southern Industrial Pine Forests, International Paper Company Technical Bulletin 10, Bainbridge, Georgia, 1980.*

[39]*D. H. Boucher, "Seed Predation and Dispersal by Mammals in a Tropical Dry Forest," Ph.D. dissertation, University of Michigan, Ann Arbor, 1979.*

[40]*V. L. Sark, "Demographic Consequences of Mammalian Seed Dispersal for Pignut Hickory," Ph.D. dissertation, University of Michigan, Ann Arbor, 1979.*

[41]*James B. Levenson, The Southern Mesic Forest of Southeastern Wisconsin: Species Composition and Community Structure, Contributions in Biology and Geology, Milwaukee Public Museum, Milwaukee, 1981.*

[42]*Larry D. Harris, The Fragmented Forest: Island Biogeography Theory and the Preservation of Biotic Diversity, University of Chicago Press, Chicago, 1985.*

[43]*Michael E. Soule, "Land Use Planning and Wildlife Maintenance: Guidelines for Conserving Wildlife in an Urban Landscape," Journal of the American Planning Association, Vol. 57, 1991, pp. 313-323.*

[44]*V. A. Rudis and A. R. Ek, "Optimization of Forest Island Spatial Patterns: Methodology for Analysis of Landscape Pattern," in R. L. Burgess and David M. Sharpe (eds.), Forest Island Dynamics in Man-Dominated Landscapes, Springer-Verlag, New York, 1981.*

Habitat Area

The number of species present in a particular habitat is strongly influenced by the size of the habitat. While some species in some groups of organisms can cope with habitats of small size, other organisms are area-dependent.

Reducing the size of a patch lowers the number of species able to exist in several ways. Smaller patches tend to contain fewer habitat types, thus reducing the potential pool of species that could be supported.[45] Furthermore, as the sizes of natural area patches decrease, the relative proportion of edge versus interior increases until, as in small, linear patches of forest, there is effectively no interior environment. This is especially true for mesic forests, where it was found that woodlots smaller than 6.0 acres (2.4 ha) were dominated by edge species.[46]

Many mammals, particularly predators, require large natural areas for survival. Several studies have shown that the number of forest-dwelling birds in a woodlot is directly related to habitat area.[47,48,49] Long-distance bird migrants were shown to be poorly represented in small forests, while large reserves were more likely to support more of these species.[50] Carnivorous bird species such as the red-shouldered hawk are particularly size-dependent, requiring a large expanse of forest interior.[51] For example, the number of bird species was found to increase significantly in mature oak woods up through 100 acres (40 ha) in area, principally because of the ability of such areas to support additional carnivorous species.[52] Furthermore, it was determined that one large woodlot held more species than several smaller patches of the same total area, and, as such, larger forest patches are essential in maintaining a complete regional avian community. Small, isolated woodlot patches are typically dominated by generalist bird species, those species able to exist in a variety of habitats. More specialized birds may require larger woodlots to breed and forage.[53] In addition, other researchers of forested habitat in the eastern portion of the United States have concluded that much larger woodlands, as large as 240 acres (97 ha), or even 1,000 acres (400 ha), are necessary to sustain breeding populations of the more area-sensitive bird species.[54,55]

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[45]*Kathryn E. Freemark and H. G. Merriam, "Importance of Area and Habitat Heterogeneity to Bird Assemblages in Temperate Forest Fragments," Biological Conservation, Vol. 36, 1986, pp. 115-141.*

[46]*James B. Levenson, "Forested Woodlots as Biogeographic Islands in an Urban-Agricultural Matrix," Ph.D. dissertation, University of Wisconsin-Milwaukee, Milwaukee, 1976.*

[47]*Chandler S. Robbins, "Effects of Forest Fragmentation on Bird Populations," in R. M. DeGraaf and K. E. Evans (eds.), Proceedings of the Workshop on Management of North-central and Northeastern Forests for Nongame Birds, U. S. Department of Agriculture, Forest Service, North Central Forest Experiment Station, St. Paul, Minnesota, 1979.*

[48]*J. Lussenhop, "Urban Cemeteries as Bird Refuges," Condor, Vol. 79, 1978, pp. 456-461.*

[49]*James F. Lynch and Dennis F. Whigham, "Effects of Forest Fragmentation on Breeding Bird Communities in Maryland, USA," Biological Conservation, Vol. 28 1984, pp. 287-324.*

[50]*John G. Blake and James R. Karr, "Species Composition of Bird Communities and the Conservation Benefit of Large versus Small Forests," Biological Conservation, Vol. 30, 1984, pp. 173-187.*

[51]*Anne E. Galli, C. F. Leck, and Richard T. T. Forman, "Avian Distribution Patterns in Forest Islands of Different Sizes in Central New Jersey," Auk, Vol. 93, 1976, pp. 356-364.*

[52]*Richard T. T. Forman, Anne E. Galli, and C. F. Leck, "Forest Size and Avian Diversity in New Jersey Woodlots with Some Land Use Implications," Oecologia, Vol. 26, 1976, pp. 1-8.*

[53]*John G. Blake, "Nested Subsets and the Distribution of Birds on Isolated Woodlots," Conservation Biology, Vol. 5, 1991, pp. 58-66.*

[54]*Stanley A. Temple, "When Is a Bird's Habitat not Habitat?" in Passenger Pigeon, Vol. 50, 1988, pp. 37-41.*

[55]*Chandler S. Robbins, Deanna K. Dawson, and Barbara A. Dowell, "Habitat Area Requirements of Breeding Forest Birds of the Middle Atlantic States," Wildlife Monographs, Vol. 103, 1989, pp. 1-34.*

Many songbirds are also area-sensitive, able to reproduce only in extensive forest tracts. Contributing factors for this may be increased nest predation,[56,57,58,59] and higher rates of nest parasitism by such birds as cowbirds in smaller, more dissected woods. Cowbirds, which lay their eggs in the nest of other host species, prefer forest edges and openings, but are absent from large expanses of unbroken interior forest. Recent declines in songbird numbers have been related to the reduced reproductive success caused by these parasites,[60] and the frequency of parasitized nests has been correlated to the amount of available open habitat.[61]

The Wisconsin Natural Heritage Program

The Wisconsin Natural Heritage Program was established in 1985 as a collaborative effort between The Nature Conservancy and the Wisconsin Department of Natural Resources to create a comprehensive statewide database on Wisconsin's natural diversity. This is one of a series of nationwide programs intended to focus protection efforts on the most threatened natural features. The initial focus is on identifying the components, or elements, of natural diversity. These are natural features of particular interest, such as an individual species, plant communities, aquatic habitats, soil types, or geological features, because they are exemplary, unique, or endangered on a statewide or national basis. An actual location of an element is an "element occurrence." Information is collected on the numbers, condition, and location of the elements within the State in order to assign a rank indicating each element's status and degree of endangerment. By evaluating these data, the highest-quality sites of Wisconsin's rarest natural features are ranked in priority order for protection. Since the natural world is constantly changing, elements are continually monitored so that the Natural Heritage Program inventories may be updated and refined.

It is intended that information collected during the course of the regional natural areas and critical species habitat protection program be made available to the Wisconsin Department of Natural Resources to be incorporated into the Natural Heritage Program data base. Furthermore, it is expected that the resources of the Wisconsin Natural Heritage Program be utilized in the regional inventory. For example, the regional natural areas protection program will follow the species status ranks established by the Natural Heritage Program. This is especially important in assessing the ecological value of a natural area. In addition, the regional inventory will follow the natural community working list used by the Wisconsin Department of Natural Resources (see Tables 2 and 3), and utilize the Site Summary forms and Community Survey forms in compiling data on natural areas.

NATURAL AREA AND CRITICAL SPECIES HABITAT EVALUATION METHODOLOGIES

Background

As important as it is to preserve natural areas and critical species habitat, limited financial resources, as a rule, have been available for their acquisition and protection. Therefore, there is a need for a systematic method of evaluating and ranking natural areas and critical species habitat on the basis of value and hence priority for preservation. Over the years, many investigators have proposed such assessment schemes, each with their proponents and detractors. The common goal, though, of all ecological evaluation techniques is to provide a concise, quantitative measure of the relative worth of a particular ecosystem. But it must be remem-

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[56] *David S. Wilcove, "Nest Predation in Forest Tracts and the Decline of Migratory Songbirds," Ecology, Vol. 66, 1985, pp. 1,211-1,214.*

[57] *Thomas E. Martin, "Habitat and Area Effects on Forest Bird Assemblages: Is Nest Predation an Influence?" in Ecology, Vol. 69, 1988, pp. 74-84.*

[58] *Bruce Ambuel and Stanley A. Temple, "Area-Dependent Changes in the Bird Communities and Vegetation of Southern Wisconsin Forests," Ecology, Vol. 64, 1983, pp. 1,057-1,068.*

[59] *Henrik Andren and Per Angelstam, "Elevated Predation Rates as an Edge Effect in Habitat Islands: Experimental Evidence," Ecology, Vol. 69, 1988, pp. 544-547.*

[60] *Harold Mayfield, "Brown-headed Cowbird: Agent of Extermination?" in American Birds, Vol. 31, 1977, pp. 107-113.*

[61] *Margaret Clark Brittingham and Stanley A. Temple, "Have Cowbirds Caused Forest Songbirds to Decline?," BioScience, Vol. 33 1983, pp. 31-35.*

Table 2

NATURAL COMMUNITY WORKING LIST, WISCONSIN NATURAL HERITAGE PROGRAM, WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Scientific Community	Global Rank	State Rank	Presence in Southeastern Wisconsin
Acid Bedrock Glade	- -	S2	- -
Alder Thicket	G4	S4	X
Algific Talus Slope	G2	S1	- -
Alkaline Bedrock Glade	- -	SU	- -
Bat Hibernaculum	- -	SU	- -
Beach	G3	S2	X
Lake Michigan Bedrock Shore	- -	S2	- -
Lake Superior Bedrock Shore	- -	SU	- -
Bird Rookery	- -	SU	X
Bog Relict	G3	S3	X
Boreal Forest	G3[a]	S2	- -
Bracken Grassland	G3	SU	- -
Calcareous Fen	G3	S3	X
Cedar Glade	- -	S4	X
Coastal Plain Marsh	GU	S1	- -
Cobble Beach	- -	SU	- -
Dry Prairie	G3	S3	X
Dry Sand Prairie	- -	S2[a]	X
Dry-Mesic Prairie	G3	S2	X
Emergent Aquatic	G4	S4	X
Ephemeral Pond	- -	SU	X
Floodplain Forest	G3[a]	S3	X
Hemlock Relict	G4	S2	- -
Herptile Hibernaculum	- -	SU	X
Interdunal Wetland	G2[a]	S1[a]	X
Lake Dune	G3	S2	X
Deep, Hard, Drainage Lake	GU	S3	X
Deep, Hard, Seepage Lake	GU	S2	X
Deep, Soft, Drainage Lake	GU	S1	- -
Deep, Soft, Seepage Lake	GU	SU	- -
Deep, Soft, Seepage Lake (sterile)	GU	S3	- -
Hard Bog Lake	GU	S2	X
Meromictic Lake	GU	S1[a]	- -
Oxbow Lake	- -	SU	X
Shallow, Hard, Drainage Lake	GU	SU	X
Shallow, Hard, Seepage Lake	GU	SU	X
Shallow, Soft, Drainage Lake	GU	S3	- -
Shallow, Soft, Seepage Lake	GU	S4	X
Soft Bog Lake	GU	S4	- -
Unique Lake	- -	SU	- -
Mesic Prairie	G2	S1	X
Migratory Bird Concentration Site	- -	SU	X
Mussel Bed	- -	S3[a]	X
Northern Dry Forest	G3[a]	S3	- -
Northern Dry-Mesic Forest	G4	S3, S4	- -
Northern Hardwood Swamp	G4	S3	X
Northern Mesic Forest	G4	S4	- -
Northern Sedge Meadow	G4	S3	- -
Northern Wet Forest	G4	S4	- -
Northern Wet Forest (relict)	G3	S3	X

Table 2 (continued)

Scientific Community	Global Rank	State Rank	Presence in Southeastern Wisconsin
Northern Wet-Mesic Forest	G3[a]	S3, S4	X
Northern Wet-Mesic Forest (white pine)	G2[a]	S2	- -
Oak Barrens	G2[a]	S1	- -
Oak Opening	G1	S1	X
Open Bog	G4	S4	X
Open Cliff	- -	S4	- -
Patterned Bog	- -	S1	X
Pine Barrens	G3	S2	- -
Pine Relict	G4	S3	- -
Sand Barrens	- -	SU	X
Shaded Cliff	- -	S4	X
Shrub-Carr	- -	S4	X
Southern Dry Forest	G4	S3	X
Southern Dry-Mesic Forest	G4	S3	X
Southern Hardwood Swamp	G3[a]	SU	X
Southern Mesic Forest	G3[a]	S3	X
Southern Sedge Meadow	G3[a]	S3	X
Spring Lake	- -	S3	X
Spring Pond	GU	S3, S4	X
Hard Springs and Spring Runs	GU	S4	X
Soft Springs and Spring Runs	- -	SU	- -
Fast, Hard, Cold Stream	GU	S4	X
Fast, Hard, Warm Stream	- -	SU	X
Fast, Soft, Cold Stream	GU	SU	- -
Fast, Soft, Warm Stream	- -	SU	- -
Slow, Hard, Cold Stream	- -	SU	X
Slow, Hard, Warm Stream	- -	SU	X
Slow, Soft, Cold Stream	- -	SU	- -
Slow, Soft, Warm Stream	- -	SU	- -
Wet Prairie	G3	S2	X
Wet-Mesic Prairie	G2	S2	X

[a]*Tentative classification.*

Source: Wisconsin Department of Natural Resources.

bered, in this respect, that ecologically, all ecosystems have value. As pointed out by Van der Ploeg and Vlijm,[62] "if ecology is . . . considered to be science in the modern sense, ecological evaluation does not exist, as science does not attach value judgments to the objects of study." Nonetheless, within the operation of a larger society, public and private actions to preserve natural areas require evaluation of those areas. If accurate and reasonable values are to be assigned to natural areas, a scientifically sound system for quantifying and ranking natural area values is essential. Accordingly, a

[62]*S. W. F. Van der Ploeg and L. Vlijm, "Ecological Evaluation, Nature Conservation and Land Use Planning with Particular Reference to Methods Used in the Netherlands," Biological Conservation, Vol. 14, 1978, pp. 197-221.*

Table 3

WISCONSIN'S NATURAL HERITAGE INVENTORY RANKS

Global and State element ranks are listed and defined below.

Global Element Ranks

- G1 = Critically imperiled globally because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction
- G2 = Imperiled globally because of rarity (six to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range
- G3 = Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g., a single western state, a physiographic region in the east) or because of other factors making it vulnerable to extinction throughout its range; in terms of occurrences, in the range of 21 to 100
- G4 = Apparently globally secure, although it may be quite rare in part of its range, especially at the periphery
- G5 = Demonstrably secure globally, although it may be quite rare in parts of its range, especially at the periphery
- GH = Of historical occurrence throughout its range, i.e., formerly part of the established biota, with the expectation that it may be rediscovered (e.g., Bachman's warbler)
- GU = Possibly in peril range-wide, but its status is uncertain. More information is needed. A question mark is used to express uncertainty (e.g., G2?) or a range is used to delineate the limits of uncertainty (e.g., G2-G3)
- GX = Believed to be extinct throughout its range (e.g., passenger pigeon) with virtually no likelihood that it will be rediscovered

State Element Ranks

- S1 = Critically imperiled in the State because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extirpation from the State
- S2 = Imperiled in the State because of rarity (six to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extirpation from the State
- S3 = Rare or uncommon in the State (21 to 100 occurrences)
- S4 = Apparently secure in the State, with many occurrences
- S5 = Demonstrably secure in the State and essentially ineradicable under present conditions
- SA = Accidental in the State, including species (usually birds or butterflies) recorded once or twice or only at very great intervals, hundreds or even thousands of miles outside their usual range; a few of these species may have even bred on one or two occasions they were recorded (e.g., European strays or western birds on the East Coast and vice versa)
- SE = An exotic established in the State; may be native elsewhere in North America (e.g., European starling)
- SH = Of historical occurrence in the State, perhaps having not been verified in the past 20 years, and suspected to be still extant. Naturally, an element would be ranked SH without such a 20-year delay if the only known occurrence in a state were destroyed or if it had been extensively and unsuccessfully looked for. Upon verification of an extant occurrence, SH-ranked elements would typically receive an S1 rank. The SH rank should be reserved for elements for which some effort has been made to relocate occurrences, rather than simply assigning it to all elements not know from verified extant occurrences
- SN = Regularly occurring, usually migratory and typically nonbreeding species for which no significant or effective habitat conservation measures can be taken in the State. This category includes: migratory birds, bats, sea turtles, and cetaceans which do not breed in a given state but pass through twice a year or may remain in the winter (or, in a few cases, the summer), and certain lepidoptera which regularly migrate to a state where they reproduce, but then completely die out every year with no return migration. Species in this category are so widely and unreliably distributed during migration and in winter that no small set of sites could be set aside with the hope of significantly furthering their conservation. Other nonbreeding, highly globally-ranked species (such as the bald eagle, whooping crane, and some seal species) which regularly spend some portion of the year at definite localities (and therefore have a valid conservation need in the State) should NOT be ranked SN, but rather S1, S2, etc. This rank is not for "lost causes" which in someone's opinion cannot be saved
- SR = Reported from the State, but without persuasive documentation which would provide a basis for either accepting or rejecting the report. Some of these are very recent discoveries for which the program has not yet received firsthand information; others are documented only through old, obscure reports that are hard to dismiss because the habitat is now destroyed
- SRF = Reported falsely (in error) from the State but this error is persisting in the literature
- SU = Possibly in peril in the State, but its status is uncertain. More information is needed. A question mark is used to express uncertainty (e.g., G2?) or a range is used to delineate the limits of uncertainty (e.g., S2-S3)
- SX = Apparently extirpated from the State

Source: Wisconsin Department of Natural Resources.

critical analysis of the more pertinent ecological assessment methodologies found in the recent literature follows.

- William Tans, "Priority Ranking of Biotic Natural Areas," Michigan Botanist, Vol. 13, 1974, pp. 31-39.

  A critical need for a systematic, standardized method to evaluate natural areas led Tans to develop a technique for this purpose. The aim was to be as objective as possible in establishing priority rankings, yet to do so in a relatively rapid as well as accurate manner for comparing areas. The method is based on the vegetation present on the site, the implied rationale was that the plant cover represents the best and most easily measured factor in site evaluation.

  Four categories of criteria are used in this method for evaluation: 1) natural area value, that is, biological characteristics, 2) physical characteristics and use value, 3) degree of threat, and 4) availability. Biological characteristics include site quality, which considers native species diversity, plant community structure and integrity, extent of human disturbance, and the degree to which the area represents the presettlement vegetation; commonness; and community diversity. Biological and physical factors are combined, so that the final scoring system consists of three separate values. Tans omitted management and protection as relevant factors, considering these to be separate issues.

  The method uses a weighted, additive system of point allocation to arrive at a final numerical ranking of each area. Tans considered quality and threat to be most important; consequently, these are given the greatest weight. Other factors, in decreasing order of magnitude, are size and buffer, commonness, community diversity, availability, and use value. In the case of biological characteristics, each subfactor is scored individually. Scores within each of the three major factor groups are tallied to arrive at three final values.

  "Threat" and "availability" are not natural area values, but rather socio-economic judgments, and the scores for these two criteria are kept separate from the ecological ranking. In later presentations of this method,[63] no mention is made of these two criteria as components of the assessment scheme. These factors are then considered after an ecological ranking, resulting in essentially a two-step procedure.

  The biological characteristics noted and area size are indeed "scientific criteria." The question arises concerning "use," which includes such things as educational value, nearness to metropolitan areas or universities, and potential for scientific research, as to whether or not scientific criteria and use values are truly additive. "Use" is not a scientific value, per se. And, as Wathern et al.[64] point out, "the aggregation of scientific and nonscientific values in a composite score may result in the intrinsic quality of a site being obfuscated." In fact, Tans considers educational value to be of secondary importance, and thus gives it the lowest weighted score.

  Also, as Gehlbach[65] emphasizes, Tans's system is purely additive, which results in the possibility of several sites being closely ranked. Thus, power of discrimination is reduced. Tans himself suggests that a multiplicative scheme might perform better, as this would tend to accentuate differences between sites. It should be noted that Tans stresses that the method as presented is only a "preliminary approach," that in time will be, and should be, reevaluated and refined.

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[63] *William Tans and Raphael Dawson, Natural Area Inventory: Wisconsin's Great Lakes Coast, Office of Coastal Management, Wisconsin Department of Administration; Scientific Areas Section, Wisconsin Department of Natural Resources, 1980.*

[64] *P. Wathern, S. N. Young, I. W. Brown, and D. A. Roberts, "Ecological Evaluation Techniques," Landscape Planning, Vol. 12, 1986, pp. 403-420.*

[65] *Frederick R. Gehlbach, "Investigation, Evaluation, and Priority Ranking of Natural Areas," Biological Conservation, Vol. 8, 1975, pp. 79-88.*

- Frederick R. Gehlbach, "Investigation, Evaluation, and Priority Ranking of Natural Areas," Biological Conservation, Vol. 8, 1975, pp. 79-88.

  The natural area evaluation scheme developed by Gehlbach uses weighted values of five criteria: 1) climax condition or "heritage value," 2) educational suitability, 3) species significance, 4) community representation, and 5) human impact, in order of increasing importance on a scale of 1 to 5. Thus, he considers the extent of human influence to be most critical, and climax condition least important. Within each criterion are subcategories, with their own rankings. To obtain a natural area score, the criteria values are multiplied by the appropriate category value, and then summed. Through comparison of these final scores, natural areas may be prioritized.

  This scheme has obvious similarities to that of Tans,[66] with many of the same categories and features. Thus, "educational utility" and "community representation" correspond to Tans's "use value" and "community diversity." There is somewhat less of a direct correspondence between Gehlbach's "heritage value" and "species significance," and Tans's "quality" and "commonness." "Quality," as used by Tans, is an inclusive term encompassing overall excellence of the salient features of the natural area, taking into account such factors as species diversity, structural integrity, and disturbance. These are features that Gehlbach has segregated into different categories. Both authors consider human influence to be of paramount importance, but Tans maintains this as a distinct and separate category, not to be added into the ecological value of the site.

  A major departure in methodology from Tans is that Gehlbach uses a multiplicative as well as weighted system to arrive at a natural area score. He provides comparisons between several variations on ranking techniques and concludes that a weighted/multiplicative scheme gives the best results, primarily because differences between sites are more pronounced.

  The degree of human influence on a site, whether termed "human impact," "degree of threat," "possibility of encroachment," or some other phrase, is clearly significant in assessing the viability of any natural area, and its extent should not be ignored. But, as in Gehlbach's system, can it be added to an otherwise scientific evaluation? Perhaps it would be more accurate to retain a "human impact" ranking as a separate category, as did Tans.

  The two methods suffer from a problem common to most assessment techniques and for which there will always be criticism. Despite the apparently objective ecological scores produced, the actual weights and applications of values are based on subjectively defined criteria. It is more than likely that any technique is bound to contain subjective elements, so that no method can be purely objective. This is important to consider when any particular technique is used.

- D. F. Wright, "A Site Evaluation Scheme for Use in the Assessment of Potential Nature Preserves," Biological Conservation, Vol. 11, 1977, pp. 293-305.

  Because limited funds are available for nature reserve acquisition, an order of priority must be established if the most valuable areas are indeed to be permanently protected. Wright proposes a semiquantitative evaluation scheme, which he compares to other, similar efforts.[67,68] He emphasizes that any technique must begin with a systematic, standardized site survey, and provides an example of a site survey card. He lists four general evaluation criteria:

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[66] *William Tans, "Priority Ranking of Biotic Natural Areas," Michigan Botanist, Vol. 13, 1974, pp. 31-39.*

[67] *Ibid.*

[68] *Frederick R. Gehlbach, "Investigation, Evaluation, and Priority Ranking of Natural Areas," Biological Conservation, Vol. 8, 1975, pp. 79-88.*

scientific appraisal, management appraisal, potential amenity use, and potential educational use. Each site is ranked on the basis of these four criteria, the investigator choosing between low value (score of 1), moderate value (score of 2), or very high value (score of 3). Scientific and management criteria include subcategories on which similar scoring decisions are made and then summed. The final evaluation, then, consists of four separate scores for each site, each derived from additive, weighted values.

For the most part, the scientific categories include those used in most other assessment methods, although perhaps in somewhat different forms, such as degree of naturalness, diversity of species and habitats, presence of threatened or endangered species, and disturbance. However, there is no attempt to order these by degree of importance; they are all given equal weights. Thus, community diversity is accorded the same degree of importance as geological representativeness or recorded history. In fact, the latter should probably not be included in a scientific appraisal; it is an artificial designation which may give high or low scores for a variety of reasons not necessarily having anything to do with the ecological importance of a site.

Distinct scientific and nonscientific criteria should be maintained. In this respect, this method seems preferable to those of either Tans[69] or Gehlbach,[70] both of which include at least some nonscientific criteria, such as educational use, in an ecological score. Wright's placing of secondary importance on natural area size may be disputed. Except for brief consideration of buffer and area under "sensitivity to disturbance," he gives little consideration to size. The stated reservations notwithstanding, Wright's method should be considered when developing an assessment scheme.

- John R. Dorney and Lawrence A. Leitner, "Woodlot Scale: A Method for Rapid Assessment of Woodlot Values," Environmental Management, Vol. 9, 1985, pp. 27-34.

  Because development tends to destroy woodlots indiscriminately, there is a need in environmental assessment and regional planning for a quantitative approach to determine woodlot quality. The survey method should be rapid and accurate and designed to identify the woodlots of highest ecological value in a geographic region. The authors define "ecologically valuable woodlots" as those stands whose canopy is dominated by tree species that were dominant in the pre-settlement forest, that have sustained minimal human disturbance, and that are large enough to ensure reproduction of the dominant interior tree species rather than only edge species.

  The method is based on the three dominant tree species in a woodlot. The observer enters the woodlot at a convenient point and meanders throughout, attempting to cover, in a random fashion, most of the stand. Tree species are recorded and, through a visual estimate of relative density and basal area, listed in order of apparent decreasing importance. Saplings, shrubs, and seedlings are also listed, using density only. Overall tree density is estimated on a seven-level scale, and all recent disturbances are noted.

  At conclusion, a Woodlot Index (WI) is calculated for each site, using species adaptation values of Curtis.[71] Experience in Southeastern Wisconsin indicates that use of the three most dominant tree species yielded optimal results. Because the pre-settlement vegetation may have differed, the WI must be scaled to reflect this. A maximum WI was determined for each pre-

[69] *William Tans, "Priority Ranking of Biotic Natural Areas," Michigan Botanist, Vol. 13, 1974, pp. 31-39.*

[70] *Frederick R. Gehlbach, "Investigation, Evaluation, and Priority Ranking of Natural Areas," Biological Conservation, Vol. 8, 1975, pp. 79-88.*

[71] *John T. Curtis, The Vegetation of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1959.*

settlement forest type in Southeastern Wisconsin and used to scale the WI for each stand. Thus, each WI was scaled from 0 to 100, to give a Woodlot Scale (WS). These permitted comparison of the ecological value of woodlots regardless of pre-settlement composition.

Woodlot Scales were calculated for 293 woodlots in Southeastern Wisconsin. The authors verified the results by comparing WS with previous field studies of the same sites. Final results, taking into account WS, stand size, density, and recent disturbance, identified 32 woodlots, or 11 percent of the stands studied, as having high ecological value, thus deserving of special attention for preservation.

This method is rapid and accurate, may be conducted at any season, and gives quantitative results which may be easily compared. There are three substantial obstacles, however, to its more universal employment:

1. It is obviously suited only for wooded areas, so that herbaceous and shrub-dominated habitats, such as prairies, marshes, and shrub-carrs, must be surveyed using other methods. This makes it impossible to compare ecologically the value of wooded and nonwooded areas.

2. For scaling, fairly detailed pre-settlement maps are required. These may or may not be available, and if available, may vary in quality.

3. The herb layer was not surveyed.

A potential use for the Woodlot Scale and rapid survey technique would be to determine, from among a large number of woodlots, a selected few which could be studied in greater detail, perhaps utilizing the timed meander search procedure[72] to investigate herbaceous species presence.

[72]*F. Glenn Goff, Gary A. Dawson, and John J. Rochow, "Site Examination for Threatened and Endangered Plant Species," Environmental Management, Vol. 6, 1982, pp. 307-316.*

- F. Glenn Goff, Gary A. Dawson, and John J. Rochow, "Site Examination for Threatened and Endangered Plant Species," Environmental Management, Vol. 6, 1982, pp. 307-316.

In the light of the need to conduct environmental impact analyses and prepare environmental impact statements involving development of natural areas, the authors pose the issues of how to determine whether any threatened or endangered plant species are present at the particular location concerned and what the degree of assurance may be that such species are not present. The authors propose a rapid and systematic inventory procedure that will generate a complete species list, rather than an elaborate quantitative analysis of the dominant vegetation that may well not sample rare species, and at the same time ensure that the flora has been thoroughly examined.

The method developed, identified as a "timed meander procedure," is a semiquantitative search method that focuses on discovery of rare vascular plant species. After the field unit has been delineated, the first step is to enter at a convenient point, noting the time. The investigator then stops and records all species as they are encountered. After a predetermined period of time, about 10 minutes, the investigator continues in a meandering fashion, attempting to cover all habitats, with the intention of being oriented toward maximum floristic variation, that is, the investigator should continue walking in the direction of greatest apparent concentration of new species. After each few, less than 10, minutes of examination, the time elapsed is noted. This divides the species list into sets of species recorded during each interval. As the search continues and fewer new species are encountered, the time for observation may be shortened. This continues until, in the observer's judgment, no further effort will result in new species being added. The authors suggest spending 30 minutes without discovering additional species. They estimate that it would take two to four hours to cover a field unit of 2.5 to 10 acres. They also recommend re-sampling at other logical points during the growing season, especially when any expected rare species will be evident.

The results give not only a complete species list, but also confirm a responsible level of effort from which to justify the results by providing a measure of effort, specifically, time expended. Species-effort curves, analogous to the species-area curves used in the releve approach to sampling vegetation, may be constructed to provide a visual means not only of interpreting floristic variations, but also of documenting the level of effort expended.

This procedure does not evaluate sites by itself; rather, the results may provide the baseline data to enter into an evaluation scheme. For example, the Rating Index of Swink and Wilhelm[73] could easily be generated. The method may best be used to advantage on a need-to-examine basis, that is, instead of attempting to survey all sites, which may be too time-consuming given the resources available, a subset of sites, consisting of those most likely to contain rare species, could be chosen for search by the timed meander method.

- Gerald Domon and Yves Bergeron, "Development of Synthetic Criteria for the Ecological Evaluation of Woodlots and Woodlot Units," Environmental Management, Vol. 11, 1987, pp. 667-673.

  Evaluation of natural areas has traditionally relied on relatively exhaustive, quantitative survey methods. But if there are budgetary and related staff constraints or time constraints, simplified but still valid procedures are available, that is, a few workable "synthetic" criteria can be identified that give results approximating those of more detailed surveys. Using woodlots as examples, the authors offer a multivariate statistical method or principal components analysis (PCA) to determine "easily measurable" synthetic criteria for site evaluation.

  The object was to determine from detailed studies of a number of woodlots which criteria were most significant. The results indicated that two synthetic criteria were of overriding importance: total site area and a "succession-perturbation" composite factor. Area was related to species richness, the number of rare species, and the extent to which a woodlot represented the ideal or pre-settlement community type. Succession-perturbation is characterized by the successional status and degree of disturbance of a woodlot and is related to abundances of nonnative species and shade-intolerant tree species. The latter may be determined by a rapid survey of the canopy trees.

  The authors suggest that the succession-perturbation factor is analogous, although inversely related, to the Woodlot Index of Dorney and Leitner.[74] They recommend that when detailed pre-settlement maps, as are required by Dorney and Leitner, are not available for a given area, the abundance index of intolerant trees could be substituted for the Woodlot Index.

  In summary, two synthetic factors, woodlot area and the level of succession/disturbance, were identified as best incorporating a large number of ecological variables. For other community types, a similar multivariate approach could be undertaken to simplify assessment.

  Primary reservations concern the use of the multivariate analysis itself. Issues in this respect include concern as to whether or not the statistical procedures are too elaborate and are readily explainable. The results of principal components analysis, which require incisive interpretation, are not intuitively decipherable to those not already familiar with this type of analysis. PCA is a linear model, while much ecological information is nonlinear. Thus, PCA may poorly represent true relationships. Simply because PCA seems to have worked for the woodlots in this particular study does not necessarily mean analysis of other communities, in other regions, would yield similarly satisfactory results. PCA shares a problem inherent with other mathematically elegant

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[73] *Floyd Swink and G. Wilhelm, "A Method for Environmental Assessment of Open Land," in Plants of the Chicago Region, Morton Arboretum, Lisle, Illinois, 1979, pp. 850-880.*

[74] *John R. Dorney and Lawrence A. Leitner, "Woodlot Scale: A Method for Rapid Assessment of Woodlot Values," Environmental Management, Vol. 9, 1985, pp. 27-34.*

statistical procedures in which the investigator simply "plugs" a mass of data into a package and relies on the computer to obtain a solution. Multivariate analysis, such as PCA, may indeed become a useful tool in ecological evaluation, as Domon and Bergeron have demonstrated for one particular situation, but its use has yet to be studied thoroughly.

- Floyd Swink and G. Wilhelm, "A Method for Environmental Assessment of Open Land," in Plants of the Chicago Region, Morton Arboretum, Lisle, Illinois, 1979, pp. 850-880.

  Citing a need for a quantitative measure of site quality, the authors have developed a method of ranking sites including natural areas, disturbed places, and fencerows, based on the presence of vascular plant species. Each species found in the Chicago region has been given a numerical rating expressing its relative ecological value with respect to all other species in the Chicago regional flora. Native species have generally been ranked between 0 and 10, with 0 applying to those species nearly ubiquitous under a broad set of environmental conditions. Species ranked 10 are found typically in stable, mature communities, exhibiting a high degree of fidelity to a narrow range of ecological parameters. These species could be termed "modal," or, species which reach their highest frequency of occurrence in a particular community. "Succession" refers to the orderly and progressive replacement of one community by another, with changes in species composition. The early stages are called "pioneer," and consist of fast-growing, short-lived, rather "weedy" species, while the final stage, or "climax," consists of slow-growing, long-lived species. Thus, the scale approximates a successional gradient, from pioneer (0) to climax (10). Relatively rare species otherwise similar to those ranked 10 have been given a ranking of 15, while locally endangered/threatened species have been given a ranking of 20. On the other hand, introduced species have been assigned low values, for example, 0, 1, or 2, if they are considered to have little or no impact on plant communities, or a negative ranking if they are invasive or noxious.

  A site is evaluated in the following manner:

  1. An inventory of species within the site is made.
  2. Species evaluations are determined.
  3. A "mean rated quality" is computed by dividing the sum of the ratings (R) by the number of taxa (N).
  4. The Rating Index (I) is computed by multiplying the "mean rated quality" by the square root of N.

  Since the object is to evaluate native plant communities according to their "nativeness," for natural areas Swink and Wilhelm recommend disregarding introduced species and instead using only native species to calculate the Rating Index. When evaluating disturbed areas dominated by introduced species, all species are considered.

  Although easy to use, this method has several drawbacks. Since species presence alone is used, all species are treated equally, regardless of abundance. Some botanists and ecologists may prefer an ecological index to reflect some measure of relative quantity. Also, the method requires the compilation of a relatively complete species list, which can be time-consuming. While the authors contend that one or two visits to a site during the growing season should be sufficient to record most taxa, and that additional species records should affect the Rating Index only minimally, the time involved may be prohibitive if a substantial number of sites need to be evaluated.

  Probably the greatest obstacle to a more universal acceptance of this technique involves the species rankings themselves. These rankings are subjective, although based on extensive knowledge of the regional flora by acknowledged authorities. Other botanists and ecologists might apply different rankings. The rankings, moreover, are applicable only in the area for which they were developed, namely, the greater Chicago area. The greater the distance from this area, the more the flora changes as new species are encountered and old ones drop out. In addition, species ratings may need adjusting in different parts of their ranges.

Indeed, the authors have emphasized this fact, strongly suggesting that new ratings be assigned as the situation warrants.

As an indicator of site quality utilizing plant species, the Swink and Wilhelm assessment method can be a useful tool. Yet other factors, such as natural area size, overall quality and structural integrity, and presence of animal species, need consideration to arrive at an inclusive ecological assessment. The method is perhaps best seen as one of a number of procedures available for use to arrive at that goal.

- British Methods

The findings of a number of studies dealing with assessing the value of various natural areas in Great Britain have been published in the last two decades. Although providing insight into ecological assessment, the methods themselves are generally inapplicable for work in the United States because of the substantially longer history of mapping and greater detail of information available to researchers in Great Britain.

For instance, a commonly used approach in identifying the most valuable woodlots involves the concept of "ancient" woods versus "recent" woods.[75,76,77,78] Ancient, or primary, woods are considered to be survivors of the much more extensive woods of the Middle Ages, existing prior to 1600. The land they occupy has remained wooded throughout the historical period; they are thus more or less directly descended from the original woodland. They are considered to be more deserving of preservation than secondary woods, arising between 1600 and 1820, and recent secondary woods, originating on cleared land after 1820. Determination of the age of woods may be based on a number of historical sources, including estate maps dating from as early as 1588, Forestry Commission stock maps, and especially the first-edition maps of the British Ordinance Survey, which accurately delineated woodlands as they existed in about 1820. However, the long historical record and detailed maps necessary preclude use of this method in the United States, where such maps are extremely rare to nonexistent.

Several studies[79,80] utilize the Atlas of the British Flora, in which the presence of plant species has been recorded on the basis of 10-by-10-kilometer areas for the entire country. From this, those species determined to be rare in a given region may be used in evaluating particular woodlots. Extensive and detailed species range maps, based on a systematic procedure, have not been compiled in the United States. Others[81] have used lists of selected "indicator" species, defined as being "woodland" species, whose presence in woods can be used to determine a given woodlot's ecological value. Ward and Evans use a similar, and

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[75] *M. Game and G. F. Peterken, "Nature Reserve Selection Strategies in the Woodlands of Central Lincolnshire, England," Biological Conservation, Vol. 29, 1984, pp. 157-181.*

[76] *Suzanne Goodfellow and G. F. Peterken, "A Method for Survey and Assessment of Woodlands for Nature Conservation Using Maps and Species Lists: The Example of Norfolk Woodlands," Biological Conservation, Vol. 21, 1981, pp. 177-195.*

[77] *G. F. Peterken, "A Method for Assessing Woodland Flora for Conservation Using Indicator Species," Biological Conservation, Vol. 6, 1974, pp. 239-245.*

[78] *G. F. Peterken and M. Game, "Historical Factors Affecting the Number and Distribution of Vascular Plant Species in the Woodlands of Central Lincolnshire," Journal of Ecology, Vol. 72, 1984, pp. 155-182.*

[79] *J. G. Dony and I. Denholm, "Some Quantitative Methods of Assessing the Conservation Value of Ecologically Similar Sites," Journal of Applied Ecology, Vol. 22, 1985, pp. 229-238.*

[80] *S. D. Ward and D. F. Evans, "Conservation Assessment of British Limestone Pavements Based on Floristic Criteria," Biological Conservation, Vol. 9, 1976, pp. 217-233.*

[81] *G. F. Peterken, "A Method for Assessing Woodland Flora for Conservation Using Indicator Species," Biological Conservation, Vol. 6, 1974, pp. 239-245.*

simplified, version of Swink and Wilhelm's[82] assessment scheme. They assigned values to species, in this case, those occurring on limestone pavements, based essentially on rarity, and used a weighted index to derive a natural area "value."

Another drawback to several British techniques[83,84] is the employment of rather convoluted and arcane statistical methods in the selection of the most valuable natural areas. This, in addition to an unfamiliarity with the British flora and its natural areas and the restrictions noted above, makes these methods unwieldy. They have been tailored to a particular landscape with its own unique history, and do not readily lend themselves to universal employment. They are, therefore, not recommended for adoption for use in the United States.

REQUIREMENTS FOR COMMISSION ECOLOGICAL ASSESSMENT TECHNIQUE

Whatever the details of the ecological assessment technique to be applied by the Regional Planning Commission in this study, there are four basic requirements:

1. The technique to be used should have universal utility; it should be applicable to all natural areas and critical species habitats over a wide area.

2. It should be simple to use and unambiguous.

3. The scheme must be readily explainable, that is, it should be intuitively reasonable.

4. The method should be as objective as possible, thus making any priority ranking more easily defensible. Herein, though, lies the greatest obstacle to any assessment scheme, since assessment is judgmental, subjectivity is unavoidable. An evaluation is subjective by definition.

It is assumed that anyone using the scheme would have experienced knowledge of the regional vegetation and be facile with species identification.

Evaluation Criteria

Natural ecosystems are composed of any number of interrelated characteristics which may be measured and quantified, but any reasonable assessment scheme should concentrate on a relatively small number of readily observable characteristics. On the other hand, nature reserves should not be ranked on the basis of a single criterion. In general, ecological evaluation should focus on the irreplaceability of natural environments. Most studies involve biological parameters, predominately aspects of the flora/vegetation. These are considered to fairly represent soil, water, climatic conditions, and the level of human disturbance to the ecosystem. At the same time they are relatively easy to measure.

The object and intent of any assessment scheme should be stated clearly. In that regard, scientific and nonscientific criteria should be kept separate, so that final scores may be disaggregated. Nonscientific criteria should not be added to an otherwise ecological evaluation. Management, protection, threat, and availability are separate issues and, however important, are not natural area values, but, rather, socio-economic ones. "The aggregation of scientific and nonscientific values in a composite score may result in the intrinsic quality of a site being obfuscated."[85]

The following criteria are those that have been mentioned frequently in the literature as being relevant to natural area assessment, but have

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[82] *Floyd Swink and G. Wilhelm, "A Method for Environmental Assessment of Open Land," in Plants of the Chicago Region, Morton Arboretum, Lisle, Illinois, 1979, pp. 850-880,*

[83] *Suzanne Goodfellow and G. F. Peterken, "A Method for Survey and Assessment of Woodlands for Nature Conservation Using Maps and Species Lists: The Example of Norfolk Woodlands," Biological Conservation, Vol. 21, 1981, pp. 177-195.*

[84] *J. G. Dony and I. Denholm, "Some Quantitative Methods of Assessing the Conservation Value of Ecologically Similar Sites," Journal of Applied Ecology, Vol. 22, 1985, pp. 229-238.*

[85] *P. Wathern, S. N. Young, I. W. Brown, and D. A. Roberts, "Ecological Evaluation Techniques," Landscape Planning, Vol. 12, 1986, pp. 403-420.*

usually been organized in different arrangements and given different emphasis. Here, the criteria are listed in what is considered to be a generally decreasing order of significance.

Scientific Criteria

Natural Area Quality/Human Impact: This is an estimate of past or present human-induced disturbance, such as selective logging, burning, grazing, trash, excavations, roads, and trails, but it should not include the degree of threat, that is, the possibility of future disturbance, which is a nonbiological criterion. It should also take into account lack of proper management. By this is meant the human-induced absence of natural processes which helped form and perpetuate certain native communities. A prime example is the cessation of periodic fires which has altered the structure of prairies and savannas. In this light, perhaps a better designation would be "human interference." This category may also be described as "degree of naturalness." Issues to be addressed include:

1. The degree of damage/disturbance/interference.
2. The degree of recovery from past disturbance.

Evidence to consider includes:

1. Biotic: presence of exotic weedy invaders, absence or loss of sensitive species; increase in such aggressive native plants as prickly-ash; abundance of such thorny or spiny species as barberry, hawthorn, bramble, rose, buckthorn, and prickly-ash; and loss of structural integrity, such as absence of size classes or certain growth forms.
2. Nonbiotic: presence of worn paths, cut tree stumps, old foundations, fire scars, or other evidence of artificial disturbance.

Size and Buffer Lands: The size of a natural area includes the actual extent of the tract and the amount of suitable surrounding buffer lands. Also, the amount of habitat edge versus habitat interior should be considered. These criteria are important in several ways, including maintenance of interior environmental conditions, provision of habitat for predators, and provision of suitable habitat for breeding birds through such means as protection from brood parasites like cowbirds.

In less heavily developed areas, Tans has provided the following minimum size guidelines: a minimum size of 40 acres for woodlots and five acres for prairies.[86] While Tans's methodology is an excellent guide for evaluating natural areas of statewide significance, some criteria, such as size, may not adequately address natural area evaluation on a regional basis. For example, there exist numerous woodlots in Southeastern Wisconsin which are less than 40 acres in size and contain critical species habitats, which have diverse and rich native plant and/or animal populations, or which have other attributes of significant quality. Accordingly, a minimum woodland size criterion of 20 acres was adopted for use in the study. Smaller sites were investigated in specific instances where significant resource elements were known to occur.

Few minimum size guidelines for nonforested natural areas have been developed. Several natural area types in Southeastern Wisconsin, such as fens and prairie remnants, may be very small, less than five acres in size, but, nevertheless, are ecologically valuable. Accordingly, no minimum size criteria were established in the study for nonforested natural areas.

Species Diversity: This category refers specifically to the diversity of native plant species present in a natural area. The term "species diversity" is often used interchangeably with "species richness," but the two terms are in fact different measures. "Species richness" refers only to the number of species present, while "species diversity" includes richness along with relative abundances of species and therefore may be more difficult to quantify. A community is said to have a high species diversity if many species are present, in nearly equal abundances, while low species diversity characterizes a community in which only a few species are present, or if only a few are abundant. For example, a community of 10 species would have a species richness of 10. If each of those 10 species had 10 individuals, species diversity would be high. At the other extreme, if one species had 91 individuals, and the other nine were represented by only one individual each, species diversity would be low. In both examples, species richness is identical, but species diversity is not.

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[86] *William Tans, "Priority Ranking of Biotic Natural Areas," Michigan Botanist, Vol. 13, 1974, pp. 31-39.*

Community Significance: Community significance takes into account the degree to which a particular type of ecosystem is representative of the pre-settlement and present landscape. Issues to be addressed include whether or not the community is unique and the extent to which it is included in the existing preservation system. Tans explained this as "a measure of the importance of a natural area type derived by evaluating the acreage of the type in the pre-settlement vegetation, the . . . conversion of the type and its resultant degree of destruction, restricted nature of occurrence . . . and the amount of the type in the present landscape of the region," and as involving "the comparative evaluation of natural areas rather than a comparison between natural areas and the remaining landscape."[87]

Species Significance: Species significance takes into account the frequency of occurrence and thus the status of individual species on the landscape. This category considers the presence of rare, threatened, or endangered plant or animal species; the stability of their populations; the presence of species at the extreme edges of their natural ranges; and the relict or endemic species present.

Mature Community: Under this criterion, which is to be applied only to forested areas, pre-settlement forest vegetation is used as a standard against which present-day forest communities are to be compared. This criterion addresses such issues as the degree to which a tract is occupied by a forest community approaching a mature, terminal community, as opposed to being occupied by a young, pioneer community, and whether or not the community is successional. An integral concept involved is that of reproducibility. Open communities easily reproduced are considered to be of a lower value, while those reproduced with more difficulty, such as over long periods of time, are considered to be of a higher value. One important natural concept prevails in this regard, however: a mature forest community cannot develop without sufficient time. Older, mature forest communities tend to be ecologically more sensitive, or fragile, with respect to their component species and the microclimate that is produced, because they take longer to replace.

It should be apparent that these criteria are not mutually exclusive; it may be reasonable to combine several into fewer, but broader and more inclusive, criteria. But this should be done judiciously, because the more the criteria are combined, the more difficult it is to assign a score to any given combined criterion, as each such criterion will require consideration of more factors.

A SEWRPC EVALUATION SCHEME

An evaluation scheme using the aforementioned scientific criteria to evaluate natural areas and critical species habitat in Southeastern Wisconsin is set forth in Table 4. Each of four (or, in the case of forests, six) criteria has been assigned a value based on its relative significance, as determined from the literature. Within each criterion are categories from which to choose the most appropriate response for a given natural area. The resulting category value is to be multiplied by the criterion value; the four (or six) scores are then summed to give a final ecological score for the site. In applying this evaluation scheme, it is important to note that several categories contain more than one description. A natural area does not have to match each description, but merely one, to be assigned that value. Intervening values may be awarded when appropriate, even when they may not be specifically listed.

Sample Evaluations

Once the natural area scores have been totaled, the final values may be presented as raw scores, or they may be made relative in one of two ways: either as a percentage of the maximum possible score, in this case, 100 (or 135 for forests), or as a percentage of the highest score achieved by any single natural area. Table 5 lists 30 natural areas occurring in Southeastern Wisconsin. Their individual ecological values are listed as calculated from four different assessment schemes discussed above in detail: the SEWRPC scheme, the Tans scheme, the Gehlbach scheme, and the Wright scheme. To facilitate comparison, all scores in Table 5 are set forth as relative percentages.

[87] *Ibid.*

Table 4

SEWRPC NATURAL AREA ASSESSMENT SCHEME

Natural Area Quality/Human Impact (7) 5: Near-natural conditions; original structure intact; no apparent human disturbance 4: Very minor human influence or, if more severe, human influence restricted in extent of area affected 3: Semi-natural conditions; at least one type of obvious disturbance in past; some effect on structure; mostly native species present; system is recovering 2: One or more types of disturbance is obvious; community integrity threatened; structure being lost; natural area becoming dominated by exotics and aggressive native species 1: Human influence pervades an essentially artificial community; loss of original biotic community structure; few native species characteristic of undisturbed habitats present
Size and Buffer Lands (to be applied to forested areas only) (5) 5: Greatly exceeds minimum habitat criteria size; excellent buffer area present 4: Adequate habitat size and buffer area 2: Adequate habitat size, inadequate buffer area 1: Inadequate habitat size, adequate buffer area 0: Both habitat size and buffer area inadequate
Species Diversity (5) 5: High 3: Good/moderate 1: Low
Community Significance (5) 5: Low-acreage occurrence in presettlement vegetation Low-acreage occurrence in present natural areas system Nearly complete conversion of type Restricted occurrence; a localized or relict community Only known location of a nonbiological feature (such as a unique geological formation or an archaeological site) 3: Moderate amount in presettlement vegetation Moderate acreage presently protected Partial conversion of type Significant nonbiological feature(s) 1: Frequent to abundant in presettlement landscape Common in present landscape Type has increased since settlement Adequate representation of type within system
Species Significance (3) 5: Presence of nationally threatened or endangered species Good populations of State threatened or endangered species 3: Presence of State threatened or endangered species Good populations of State rare species Many species at limits of their ranges 1: Native species present are those characteristic of regional flora, including some uncommon ones 0: No uncommon, rare, endangered, or threatened species; species present are common natives or exotics
Mature Community (to be applied to forested areas only) (2) 5: Mature community, essentially a remnant of the presettlement vegetation 3: Mid-successional community, possibly with some small, older patches 1: Pioneer community

Source: SEWRPC.

Table 5

SITE EVALUATION SCHEME COMPARISON

Site	Evaluation Scheme			
	Southeastern Wisconsin Regional Planning Commission	Tans	Gehlbach	Wright
Cedarburg Bog	100 (1)	100 (1)	100 (1)	100 (1)
Chiwaukee Prairie	100 (1)	89 (2)	100 (1)	85 (2)
Scuppernong Prairie	87 (3)	89 (2)	88 (3)	67 (7)
Renak Woods	87 (3)	78 (4)	74 (6)	78 (4)
Genesee Oak Opening	85 (5)	74 (5)	79 (5)	81 (3)
Riveredge Swamp	76 (6)	59 (6)	68 (8)	70 (5)
Petrifying Spring Woods	71 (7)	44 (15)	51 (15)	63 (9)
Bluff Creek Woods	69 (8)	52 (10)	47 (18)	59 (12)
Field Station Woods	69 (8)	41 (16)	32 (25)	56 (15)
Muskego Woods	68 (10)	52 (10)	70 (7)	70 (5)
Kewaskum Woods	68 (10)	59 (6)	56 (12)	63 (9)
Sanders Woods	64 (12)	52 (10)	62 (11)	59 (12)
Eagle Oak Opening	64 (12)	56 (8)	53 (13)	59 (12)
Kurtz Woods	64 (12)	48 (13)	51 (15)	48 (18)
Benedict Prairie	62 (15)	37 (18)	35 (24)	52 (17)
Cudahy Woods	61 (16)	56 (8)	68 (8)	63 (9)
Fairy Chasm	58 (17)	48 (13)	88 (3)	67 (7)
Bradley Woods	48 (18)	33 (20)	44 (19)	56 (15)
Evans Park Woods	47 (19)	33 (20)	39 (23)	48 (18)
Fox Run Woods	46 (20)	37 (18)	42 (20)	41 (22)
Campbell Woods	44 (21)	41 (16)	68 (8)	41 (22)
Luther Parker Cemetery	42 (22)	30 (23)	32 (25)	37 (26)
Zirbes Woods	41 (23)	33 (20)	51 (15)	41 (22)
Menomonee River Parkway	39 (24)	30 (23)	42 (20)	44 (20)
Thompson Woods	29 (25)	26 (25)	23 (28)	41 (22)
Ruhle Woods	24 (26)	22 (26)	23 (28)	37 (26)
Downer Woods	21 (27)	22 (26)	30 (27)	44 (20)
Bushnell Park Woods	19 (28)	18 (28)	23 (28)	37 (26)
Pritchard Park Woods	14 (29)	18 (28)	42 (20)	37 (26)
Kenosha Bike Trail	12 (30)	18 (28)	53 (13)	37 (26)

NOTE: Numbers in parentheses indicate rank order.

Source: SEWRPC.

Wildlife Habitat

It is anticipated that certain wildlife habitat areas such as mud flats, ephemeral ponds, old fields, and conifer plantations, which provide critical species habitat for some species, may not be identified and may not achieve high scores using the SEWRPC assessment method. For example, conifer plantations, because they are artificial habitats and have low species diversity, would not score high. Yet these areas may well be important as habitat for some critical bird species such as Acadian flycatchers and Cooper's hawks. Therefore, after all significant natural areas and critical species habitats were inventoried and evaluated and those achieving relatively high assessment scores identified, the inventoried sites were reviewed with respect to specific wildlife habitat condition and those sites having special wildlife habitat value were identified. These special wildlife habitat sites were reviewed for suitability as habitat areas for grassland-nesting birds, shorebirds, and forest-interior-nesting birds; as colonially breeding and colony-nesting bird habitats; as amphibium and reptile-rearing areas and hibernacula; as mussel beds; as significant fish-spawning habitat and

Table 6

HIGHEST-RANKING NATURAL AREAS

Southeastern Wisconsin Regional Planning Commission	Tans	Gehlbach	Wright
Cedarburg Bog	Cedarburg Bog	Cedarburg Bog	Cedarburg Bog
Chiwaukee Prairie	Chiwaukee Prairie	Chiwaukee Prairie	Chiwaukee Prairie
Scuppernong Prairie	Scuppernong Prairie	Scuppernong Prairie	Genesee Oak Opening
Renak Woods	Renak Woods	Fairy Chasm	Renak Woods
Genesee Oak Opening	Genesee Oak Opening	Genesee Oak Opening	Muskego Woods
Riveredge Swamp	Riveredge Swamp	Renak Woods	Riveredge Swamp
Petrifying Spring Woods	Kewaskum Woods	Muskego Woods	Scuppernong Prairie
Bluff Creek Woods	Cudahy Woods	Cudahy Woods	Fairy Chasm
Field Station Woods	Eagle Oak Opening	Riveredge Swamp	Kewaskum Woods
Muskego Woods	Muskego Woods	Campbell Woods	Cudahy Woods
Kewaskum Woods	Sanders Woods	Sanders Woods	Petrifying Spring Woods
Sanders Woods	Bluff Creek Woods	Kewaskum Woods	Sanders Woods
Eagle Oak Opening	Fairy Chasm	Eagle Oak Opening	Bluff Creek Woods
Kurtz Woods	Kurtz Woods	Kenosha Bike Trail	Eagle Oak Opening

Source: SEWRPC.

nursery areas; and as other types of critical species habitat areas. If it was found that these sites were deficient in providing suitable habitat for critical species, additional areas would be selected. using the special wildlife habitat criteria, for inclusion in the plan.

Conclusions and Recommendations

Generally, as can be seen from Table 6, the best natural area sites in the Region, such as Chiwaukee Prairie, Cedarburg Bog, Renak Woods, and Scuppernong Prairie, received high scores regardless of the evaluation technique used. Indeed, it would be difficult for any scheme to score such outstanding areas otherwise. It is with sites of lower quality that there are discrepancies, particularly with the Gehlbach ranking scheme. For instance, the Kenosha Bike Trail, a highly disturbed area of low natural area value, is the 13th most valuable site of the 30 ranked in Table 5 under the Gehlbach ranking scheme, while under the other three schemes, it ranks appropriately at or near the bottom. The application of the Gehlbach ranking scheme in this evaluation was found to be somewhat ambiguous and the criteria indistinct.

The actual numerical scores produced by the four aforementioned ranking techniques were compared using simple regression analysis (R^2), and the rankings produced by Spearman's rank correlation (r) (see Table 7). The highest R^2 was between Tans and SEWRPC (0.88). The R^2 results produced by Gehlbach did not correlate well with any of the other three techniques. All pairwise comparisons of the three other schemes showed high degrees of correlation; the highest r was 0.97 between Wright and Gehlbach. These results are not unexpected, since the SEWRPC scheme is in large part derived from Tans and to a somewhat lesser degree from Wright. Any of these three schemes would probably give satisfactory results; the SEWRPC method is preferred here, however, since it was designed as a refinement of the other two methods. More critical, perhaps, than the actual technique employed is the expertise and experience of the investigator. An evaluation method is only as useful as the reliability of the information to which that method is applied.

Nonscientific Criteria

Several nonscientific factors may be deemed important in the overall evaluation of a natural area. These would be more relevant for the development of management and protection plans than for an ecological evaluation. The following list of such factors is by no means exhaustive, nor should it be understood that all items need be considered. It should be stressed, however, that if any nonscientific criteria are used in a ranking scheme, the nonscientific criteria scores should be kept separate from the strictly scientific ones.

Table 7

COMPARISON OF RANKINGS USING SIMPLE REGRESSION ANALYSIS (R^2) AND SPEARMAN'S RANK CORRELATION (r)

Assessment Schemes	Spearman's Rank Correlation (r)			
	Tans	Gehlbach	Wright	Southeastern Wisconsin Regional Planning Commission
Tans		0.83	0.92	0.93
Gehlbach	0.74		0.97	0.67
Wright	0.84	0.68		0.90
Southeastern Wisconsin Regional Planning Commission	0.88	0.56	0.82	
	Regression(R^2)			

Source: SEWRPC.

Amenity Use and Accessibility: Since nature reserves are places where the public can enjoy observation of scenery and wildlife, such sites may be assessed according to the visual attractiveness of features, automobile parking potential, and the ability to withstand the pressures of visitor use.

Availability and Cost of Purchase: This criterion takes into account the actual financial cost of acquiring a site and whether or not the landowner is willing to sell or lease the property to a public or private agency.

Community Diversity: Community diversity refers to the number of plant communities or other natural features within a natural area. The rationale is that the more communities, or habitats, a given site encompasses, the greater value that area has because it contains a gradient of environmental conditions. Thus, more species could conceivably be protected within a diverse area than within one of more uniform habitat. However, other factors must also be considered, such as the nature of the different communities present, their areal extent, degree of disturbance, and successional stage.

Degree of Threat: This criterion considers the possibility of future development on or near the site, the present owner's attitude toward use of the site, existing and potential protection through zoning, the degree to which development would involve complete or partial destruction, and the degree to which restoration of natural features may be feasible. This criterion has a built-in paradox: An otherwise marginally valuable area under a high probability of degradation would be deemed more worthy of protection under this criterion than an ecologically more valuable area under no threat. Natural areas should be considered for protection because they are ecologically valuable, not because they are threatened by potential future uses.

Educational Use: As an effective means of achieving long-term conservation objectives, educational use would consider the proximity of a site to educational institutions, the degree of school use that is feasible, the size of groups using the site, informal use, and the ability of the site to absorb such activities without undue damage.

Functional Values: As explained above in the "Functional Importance of Natural Areas" section of this chapter, natural areas are valuable as environmental regulators. They function in the processing of airborne pollutants, protection of surface water quality and quantity, erosion control, groundwater recharge, and nutrient cycling and in providing vital wildlife habitat for both common and critical species.

Management: This criterion considers ease of access to the site, relation to public and private rights-of-way and easements, security of boundaries, cost of machinery and transportation, and personnel demands. Personnel needs should consider such factors as the need for regular maintenance, labor skills involved, and management costs.

Research Value: This criterion considers the relative ease with which research can be conducted on a site, including relation to a field station, a history of research being conducted on the site, and proximity to educational institutions.

Protection Priorities

On the basis of the Commission's experience ranking the natural areas and critical species habitat areas within the Region, it was determined that, in general, those areas achieving a percentage score of 70 or above, using the SEWRPC assessment method, were of high ecological value, while those areas achieving percentage assessment values from 40 up to 70 were of moderate-to-good value. A limit for assigning natural area status, and therefore allowing an area to receive consideration for protection was set at a percentage assessment value of 20. This low evaluation score limit allows for the inclusion of those natural areas with unique attributes, or those occurring in highly urbanized portions of the Region, such as Downer Woods located on the University of Wisconsin-Milwaukee campus in the City of Milwaukee, which areas would otherwise not be considered for protection. The assessment scores and special wildlife habitat areas were then reviewed and the highest-quality areas further investigated to determine the appropriate level of protection and management to be recommended for each site. The Technical Advisory Committee then selected priorities for protection to be assigned to the identified natural areas throughout the Region. It was at this stage of the planning process that the scientific criteria were combined with the aforementioned non-scientific criteria to determine which specific natural area and critical species habitat sites should be recommended for protection and to identify the most appropriate manner in which such protection can be achieved.

CONCLUSION

If natural areas and threatened and endangered species and their critical habitats in the Region are to be effectively protected and wisely managed, adequate information concerning such resources must be assembled in a readily usable form as soon as possible. Otherwise, significant native plant and animal communities, rare species and their habitats, and areas of archaeological and geological significance will continue to be adversely affected, and in many cases lost entirely, owing to unwise and insensitive urban and agricultural development. Proper planning for protection and management of the unique and sensitive resources of the Southeastern Wisconsin Region should include a standardized means of identifying and evaluating those resources. Effective long-term management planning must occur to ensure the maintenance of the integrity of natural areas and survival of the species dependent on them. By doing so, such planning can contribute immeasurably to the maintenance and restoration of the natural beauty of the Region, to the quality of life within the Region, and to the maintenance of biotic diversity within the Region.

In addition, such planning can facilitate economic development within the Region with respect to the environmental review process by clearly identifying environmentally sensitive lands prior to the preparation of development proposals. Sound economic development could then proceed with confidence and, additionally, in a less costly manner with respect to environmental concerns, reducing the possibility of conflict with respect to required environmental regulatory and review processes.

To be fully effective, the regional natural areas and critical species habitat protection and management plan must relate properly to other Commission plans and recommendations. Regional plans prepared by the Commission are not envisioned as static documents, but, rather, are continuously updated, revised, and refined to reflect changing conditions and needs. The same is true for the various components of plans prepared by the Commission. For example, the natural areas and critical species habitat protection recommendations may result in refinements to the Commission-delineated primary environmental corridors. In addition, the Commission may recommend refinements to the protection, acquisition, and/or management of selected secondary environmental corridors and isolated natural areas that appear in Commission plans.

In this respect, the regional natural areas and critical species habitat protection and management plan will function as an amendment to the regional park and open space plans and the regional land use and transportation plans. The amendment may further affect recommendations made with respect to sanitary sewer service area plans within the Region and the regional water quality management plan.

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Chapter III

DESCRIPTION OF THE REGION'S DEMOGRAPHY, ECONOMY, BUILT FEATURES, AND NATURAL RESOURCE BASE

INTRODUCTION

The escalating losses of natural areas in Southeastern Wisconsin in recent years are directly related to growth and change in the regional population, economy, and urban land use pattern. Complementary demographic and economic studies are essential to the preparation of a sound natural areas protection and management plan. Since such planning is intended to maintain or improve the environment in which people work and live, an understanding of the size, composition, and spatial distribution of the population is essential to all planning for protection and management of the natural resource base. The size, composition, and spatial distribution of the population are greatly influenced by changes in regional economic activity levels. These factors also greatly influence the amount and rate of natural area loss. Accordingly, this chapter includes a brief description and analysis of the significant historic demographic and economic characteristics of the Southeastern Wisconsin Region and of trends in those characteristics and the implications of those trends for natural areas protection and management. It also includes a description of key elements of the built features and natural resource base of the Region.

It should be noted that 1985 is the inventory base year for the economic and demographic data pertinent to the natural areas protection process, such as the number and distribution of population, households, and jobs in the Region. Only limited data were available from the 1990 Federal Census at the time of preparation of this report. The 1990 Census population counts are presented for the seven counties in the Region in Table 8, along with the 1985 population estimates used in the Commission's third-generation land use planning study. As indicated in that table, according to the 1990 Census, the resident population of the Region stood at 1,810,364 persons, about 67,700 persons, or about 4 percent, more than the 1985 estimate of 1,742,700. At the county level, the 1990 Census population counts exceeded the 1985 population estimates by from 2 to 9 percent. Importantly, the relative distribution of population among the seven counties in the Region as indicated by the 1990 Census is very similar to the estimated 1985 distribution. The results of the 1990 Census do not indicate major changes in overall population growth trends in the Region. It is thus believed that the base year 1985 demographic data provide a sound basis for the regional natural areas protection process. This chapter, however, includes those 1990 demographic and economic data which were available at the time of preparation of this report.

Natural resources not only affect, but are affected by, regional growth and development. Any meaningful comprehensive regional natural areas protection effort must, therefore, recognize the existence of a limited natural resource base to which urban and rural development must be properly adjusted if serious environmental problems are to be avoided. This is particularly true in Southeastern Wisconsin, where an increasing number of urbanites are becoming year-round residents of outlying areas of the Region, seeking not only the varied recreational opportunities offered by these areas, but also the feeling of open space which natural areas lend to residential development. A sound evaluation and analysis of the natural resource base of the Region as well as of its park and open space sites and historic sites is therefore important. Because the public utility systems of the Region are so closely linked to its natural resource base, these systems must also be considered in any planning effort.

THE DEMOGRAPHIC BASE OF THE REGION

Population Size

As indicated in Table 9, and as already noted, the 1990 resident population of the Region stood at 1,810,364 persons, or about 0.7 percent of the total population of the Nation and about 37 percent of the population of the State. In 1990, the largest civil division in the Region, the City of Milwaukee, was ranked as the 17th largest city in the Nation.

The Federal Census first included what is now the Southeastern Wisconsin Region in 1850. In

Table 8

POPULATION IN THE REGION BY COUNTY: ESTIMATED 1985 AND 1990 CENSUS

County	Population					
	1985[a]		1990[b]		Change: 1985-1990	
	Number	Percent of Region	Number	Percent of Region	Number	Percent
Kenosha	121,158	7.0	128,181	7.1	7,023	5.8
Milwaukee	939,570	53.9	959,275	53.0	19,705	2.1
Ozaukee	67,465	3.9	72,831	4.0	5,366	8.0
Racine	169,193	9.7	175,034	9.7	5,841	3.5
Walworth	72,203	4.1	75,000	4.1	2,797	3.9
Washington	87,249	5.0	95,328	5.3	8,079	9.3
Waukesha	285,904	16.4	304,715	16.8	18,811	6.6
Region	1,742,742	100.0	1,810,364	100.0	67,622	3.9

[a] *Wisconsin Department of Administration estimate.*

[b] *1990 Census.*

Source: U. S. Bureau of the Census, Wisconsin Department of Administration, and SEWRPC.

Table 9

POPULATION TRENDS IN THE UNITED STATES, WISCONSIN, AND THE REGION

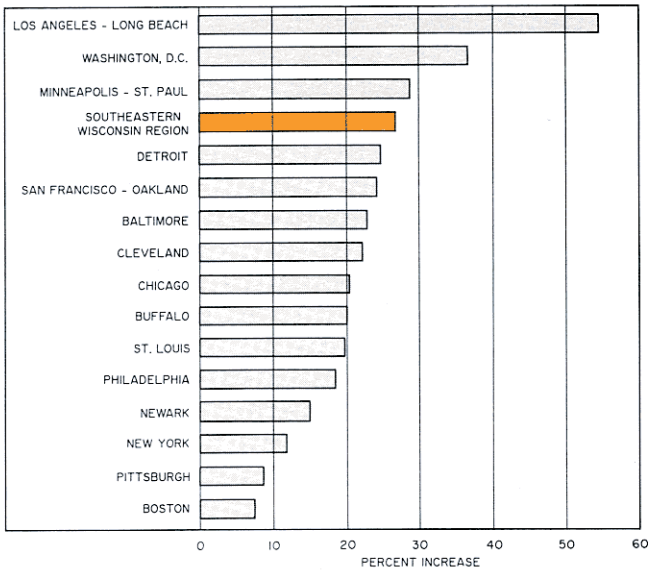
Year	Region			Wisconsin			United States			Regional Population as a Percent of:	
	Population	Changes from Preceding Time Period		Population	Changes from Preceding Time Period		Population	Changes from Preceding Time Period			
		Absolute	Percent		Absolute	Percent		Absolute	Percent	Wisconsin	United States
1850	113,389	--	--	305,391	--	--	23,191,876	--	--	37.1	0.49
1860	190,409	77,020	67.9	775,881	470,490	154.1	31,443,321	8,251,445	35.6	24.5	0.61
1870	223,546	33,137	17.4	1,054,670	278,789	35.9	38,448,371	7,005,050	22.3	21.2	0.58
1880	277,119	53,573	24.0	1,315,497	260,827	24.7	50,155,783	11,707,412	30.4	21.1	0.55
1890	386,774	109,655	39.6	1,693,330	377,833	28.7	62,947,714	12,791,931	25.5	22.8	0.61
1900	501,808	115,034	29.7	2,069,042	375,712	22.2	75,994,575	13,046,861	20.7	24.3	0.66
1910	631,161	129,353	25.8	2,333,860	264,818	12.8	91,972,286	15,977,691	21.0	27.0	0.69
1920	783,681	152,520	24.2	2,632,067	298,207	12.8	105,710,620	13,738,354	14.9	29.8	0.74
1930	1,006,118	222,437	28.4	2,939,006	306,939	11.7	122,755,046	17,044,426	16.1	34.2	0.82
1940	1,067,699	61,581	6.1	3,137,587	198,581	6.8	131,669,587	8,914,541	7.3	34.0	0.81
1950	1,240,618	172,919	16.2	3,434,575	296,988	9.5	151,325,798	19,656,211	14.9	36.1	0.82
1960	1,573,614	332,996	26.8	3,951,777	517,202	15.1	179,323,175	27,997,377	18.5	39.8	0.88
1970	1,756,083	182,469	11.6	4,417,821	466,044	11.8	203,302,031	23,978,856	13.4	39.8	0.86
1980	1,764,796	8,713	0.5	4,705,642	287,821	6.5	226,504,825	23,243,774	11.4	37.5	0.78
1985	1,742,742	-22,054	-1.2	4,779,021	73,379	1.6	237,692,000	11,187,175	4.9	36.5	0.73
1990	1,810,364	67,622	3.9	4,891,769	112,748	2.4	249,632,692	11,940,692	5.0	37.0	0.73

Source: U. S. Bureau of the Census, Wisconsin Department of Administration, and SEWRPC.

the late 19th and early 20th centuries, the population of the Region increased rapidly, at rates ranging from 33,000 to over 222,000 persons per decade. After a relatively small increase of only about 62,000 persons from 1930 to 1940, the population grew by about 173,000 persons from 1940 to 1950, by about 333,000 persons from 1950 to 1960, reaching a historic peak, and by about 182,000 persons from 1960 to 1970. The rate of growth in the regional population has been markedly different since 1970. Between 1970 and 1980, the regional population grew by

Figure 4

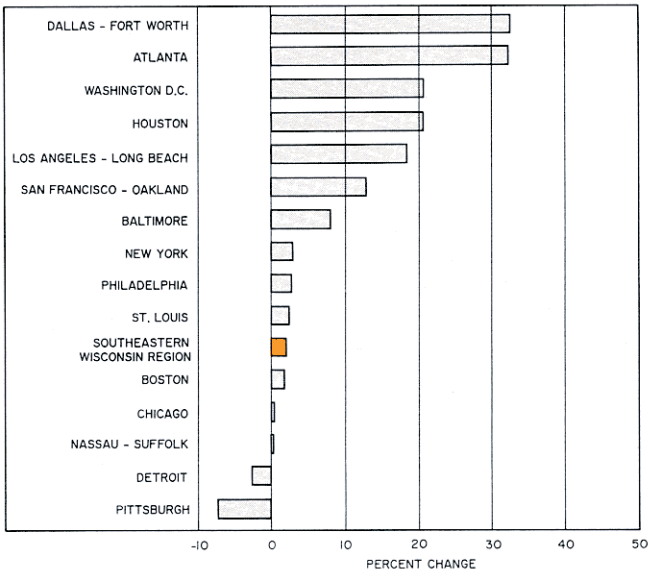
PERCENTILE INCREASE OF POPULATION IN THE 15 LARGEST STANDARD METROPOLITAN STATISTICAL AREAS IN THE UNITED STATES AND IN THE REGION: 1950-1960



Source: U. S. Bureau of the Census and SEWRPC.

Figure 5

PERCENTILE INCREASE OF POPULATION IN THE 15 LARGEST STANDARD METROPOLITAN STATISTICAL AREAS IN THE UNITED STATES AND IN THE REGION: 1980-1990



Source: U. S. Bureau of the Census and SEWRPC.

less than 9,000 persons, or by less than 1 percent. Between 1980 and 1985, it is estimated that the regional population declined by 22,000 persons. The recently completed 1990 Census suggests a recovery during the second half of the 1980s, with the regional population reaching a level of about 1,810,000 persons by the year 1990, an increase of 46,000 persons over 1980 and of 68,000 over 1985.

By 1985, the estimated regional population of 1,742,742 persons represented an increase of 1,629,353 persons, or a population level about 14 times greater than the 1850 population level. During this same period, the population of the Nation increased by slightly over nine times its 1850 level, while that of the State increased by over 14 times its 1850 level. Thus, the regional population increase during this 135-year period was about one and one-half times that of the national increase and about equal to that of the State. As a result of this growth rate, the regional share of the total national population increased from 0.49 percent in 1850 to 0.73 percent in 1985, while remaining at about 37 percent of the population of the State. The 1990 Census indicates very little change in the regional share of the national and State populations between 1985 and 1990.

From 1950 to 1960, only three of the 15 largest metropolitan areas in the Nation in 1950 experienced higher rates of growth than the Southeastern Wisconsin Region (see Figure 4). During this period, the population of the Region increased by 27 percent, from 1,240,618 persons to 1,573,614 persons. From 1980 to 1990, however, 10 of the 15 largest metropolitan areas in the Nation in 1980 experienced higher rates of population growth than the regional increase of about 3 percent, from 1,764,796 persons in 1980 to 1,810,364 in 1990 (see Figure 5). The declining rates of population growth experienced in the Region since 1950 were similar to the trends experienced in many of the large metropolitan areas of the northeastern and midwestern United States.

Consideration of the changes in resident population briefly presented here is important to any areawide planning effort. The figures indicate that the rapid population growth of the 1950s

Table 10

URBAN AND RURAL POPULATION IN THE REGION: CENSUS YEARS 1850-1990

Year	Total Urban		Total Rural		Rural Nonfarm[a]		Rural Farm[a]	
	Number	Percent of Region Total	Number	Percent of Region Total	Number	Percent of Region Total	Number	Percent of Region Total
1850	26,623	23.9	84,766	76.1	--	--	--	--
1860	57,058	30.0	133,351	70.0	--	--	--	--
1870	88,262	39.5	135,284	60.5	--	--	--	--
1880	146,095	52.7	131,024	47.3	--	--	--	--
1890	245,423	63.5	141,351	36.5	--	--	--	--
1900	354,082	70.6	147,726	29.4	--	--	--	--
1910	481,087	76.2	150,074	23.8	--	--	--	--
1920	635,376	81.1	148,305	18.9	--	--	--	--
1930	843,790	83.9	162,328	16.1	91,144	9.1	71,184	7.0
1940	873,629	81.8	194,070	18.2	117,906	11.1	76,164	7.1
1950	1,027,064	82.8	213,554	17.2	152,020	12.3	61,534	4.9
1960	1,376,318	87.5	197,296	12.5	159,921	10.2	37,375	2.3
1970	1,544,858	88.0	211,225	12.0	183,805	10.5	27,420	1.5
1980[b]	1,520,101	86.1	244,818	13.9	229,260	13.0	15,558	0.9
1990	1,570,890	86.8	239,474	13.2	229,861	12.7	9,613	0.5

[a] *The rural population has been divided into rural nonfarm and rural farm since the 1930 Census.*

[b] *The total reported 1980 population of Waukesha County was revised from 280,326 to 280,203 by the U. S. Bureau of the Census, resulting in a decrease in the reported total 1980 population of the Region of 123 persons, from 1,764,919 to 1,764,796. However, attributes of the population, such as urban and rural population components, were not revised. This table therefore contains the earlier figures.*

Source: U. S. Bureau of the Census and SEWRPC.

and 1960s in the Region has been replaced by a more slowly growing population in the 1970s and 1980s.

Population Distribution

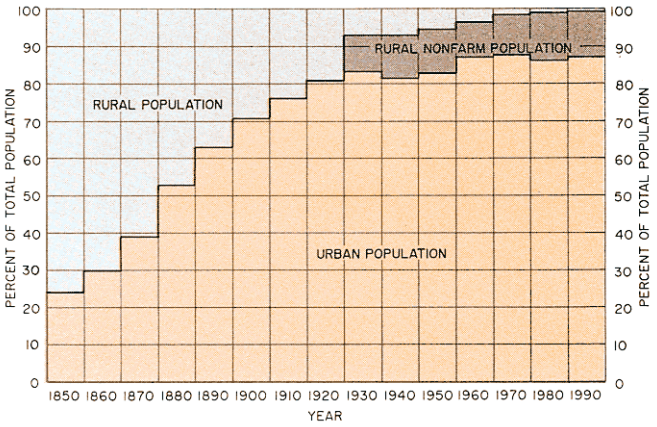
The total number of inhabitants and their spatial distribution are important factors to be considered in any natural areas protection effort. The Southeastern Wisconsin Region, like most metropolitan regions of the United States, is becoming increasingly urban.[1] The change in the Region's rural-urban population distribution over the entire 140-year period from 1850 to 1990 is shown in Table 10 and graphically in Figure 6. Although more than 50 percent of the land in the Southeastern Wisconsin Region is currently in agricultural uses, less than 1 percent of the population derives its income from farming. Map 2 displays the densities of population distribution in the Region in 1963 and 1985.

Varying rates of change in population growth in the Region have resulted in significant distributional shifts of population among the seven counties (see Figures 7 and 8). Since 1930, the outlying counties, most notably Ozaukee, Washington, and Waukesha, have exhibited the highest rates of population increase. The Milwaukee County portion of the total regional population increased by about 6 percent between 1900 and 1930 and then decreased by about 19 percent from 1930 to 1990. In contrast, the Waukesha County portion of the total regional population decreased by approximately 2 percent between 1900 and 1930 and increased by about 12 percent from 1930 to 1990.This diffusion of population has created certain areawide environmental and

[1] *"Urban" population is defined as all persons living in incorporated or unincorporated places of 2,500 persons or more and all persons living in other incorporated or unincorporated territories included in "urbanized areas" as defined by the U. S. Bureau of the Census.*

Figure 6

URBAN AND RURAL POPULATION IN THE REGION: CENSUS YEARS 1850-1990



Source: U. S. Bureau of the Census and SEWRPC.

developmental problems, all related to changing land use, including an increased need for the protection of the remaining high-value natural resource areas of the Region.

Population Characteristics

Certain other population characteristics are also important to natural areas protection planning. These include household size and personal income.

The number and size of the Region's households[2] must be considered in detail as part of the natural areas protection planning effort. From 1950 to 1985, the total number of households in the Region increased by about 289,300, or about 82 percent (see Table 11).

The total number of households in the Region has increased at a more rapid rate than the household population (see Table 12). Household population in the Region has increased, albeit at generally decreasing rates, since 1950. Between 1980 and 1985, household population in the Region declined about 1 percent and then increased about 4 percent between 1985 and 1990. With the total number of households increasing at a faster rate than household population, household size throughout the Region has steadily declined (see Table 13). In 1950, the household size in the Region was about 3.36 persons per household, ranging from a low of 3.25 in Walworth County to a high of about 3.55 in Washington County. By 1990, the household size in the Region had decreased to about 2.62 persons per household and all counties in the Region had household sizes of less than 3.00 persons per household. The overall decline in the number of persons per household since 1950 has occurred primarily as a result of the rapid increase in the number of one-person households. It is also indicative of a tendency for unmarried persons to maintain occupancy away from relatives. Between 1970 and 1990, single-person households in the Region, as shown in Table 14, increased from about 93,100 to about 168,800, an increase of about 75,700, or 81 percent. The spatial distribution of average household sizes in the Region for the years 1960 and 1990 is shown on Map 3.

Personal income is an important demographic and economic indicator. The following analysis of personal income is based on the conversion of all reported income figures to constant dollars[3] to provide for a more meaningful comparison of change in income over time.

Aggregate personal, per capita personal, and median family income levels for the United States, Wisconsin, and the Region as reported for the Census years 1950 through 1990 are set forth in Table 15. As shown in this table, the aggregate personal income within the Region as measured in constant 1989 dollars increased by about 187 percent between 1950 and 1990. This rate of increase was less than the 228 percent increase for the State and the 293 percent increase for the Nation over this same period.

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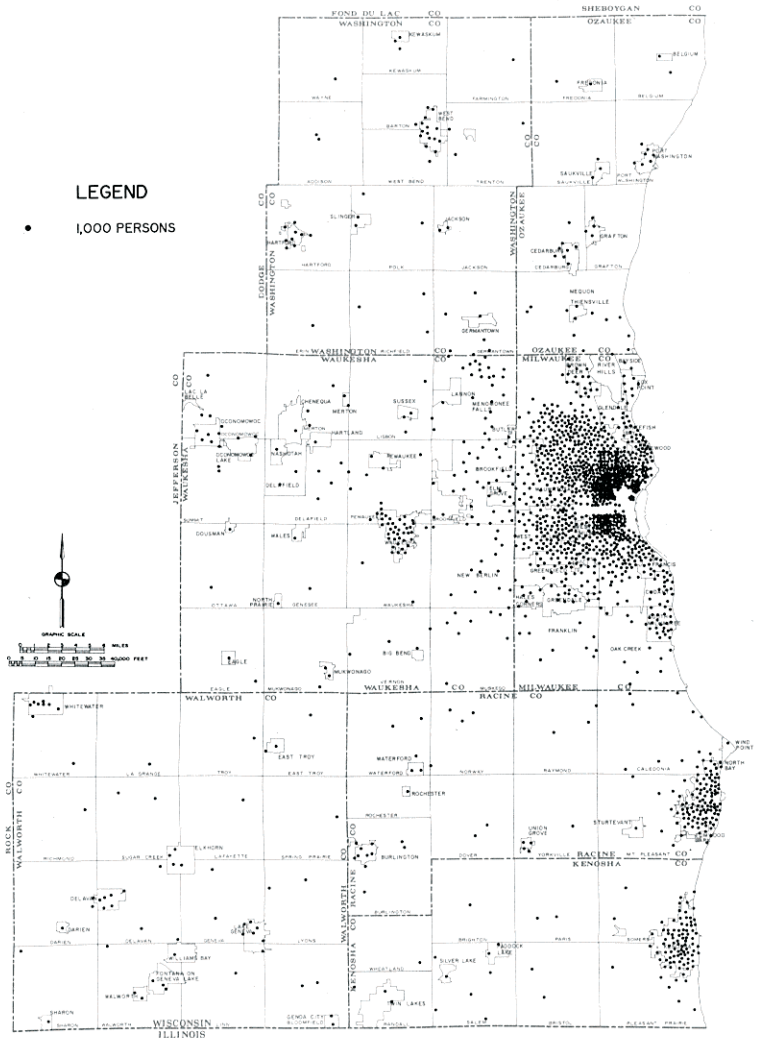
[2] *A "household" is defined as the person or persons occupying a separate dwelling unit, as opposed to persons who reside in group quarters, such as dormitories or boardinghouses, or who are inmates of institutions.*

[3] *Income figures have been converted to constant 1989 dollars, using the U. S. Bureau of Labor Statistics Consumer Price Index (CPI) for urban wage earners and clerical workers. The A series, all items, was the specific series used.*

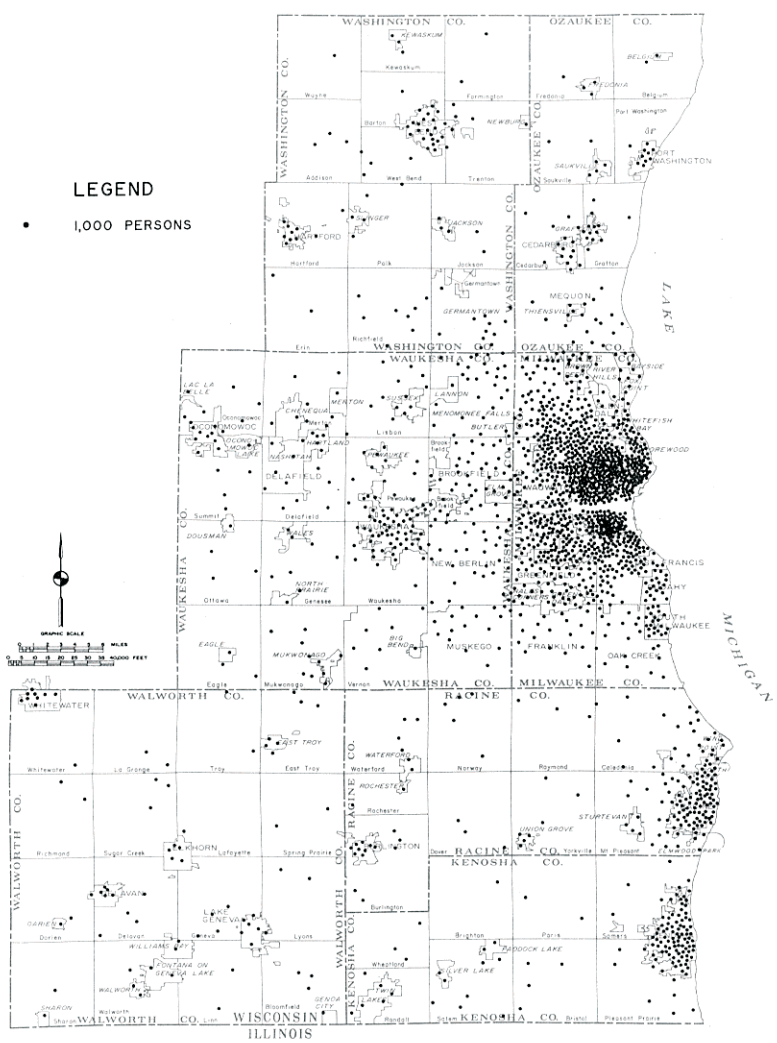
Map 2

POPULATION DISTRIBUTION IN THE REGION: 1963 AND 1985

1963



1985

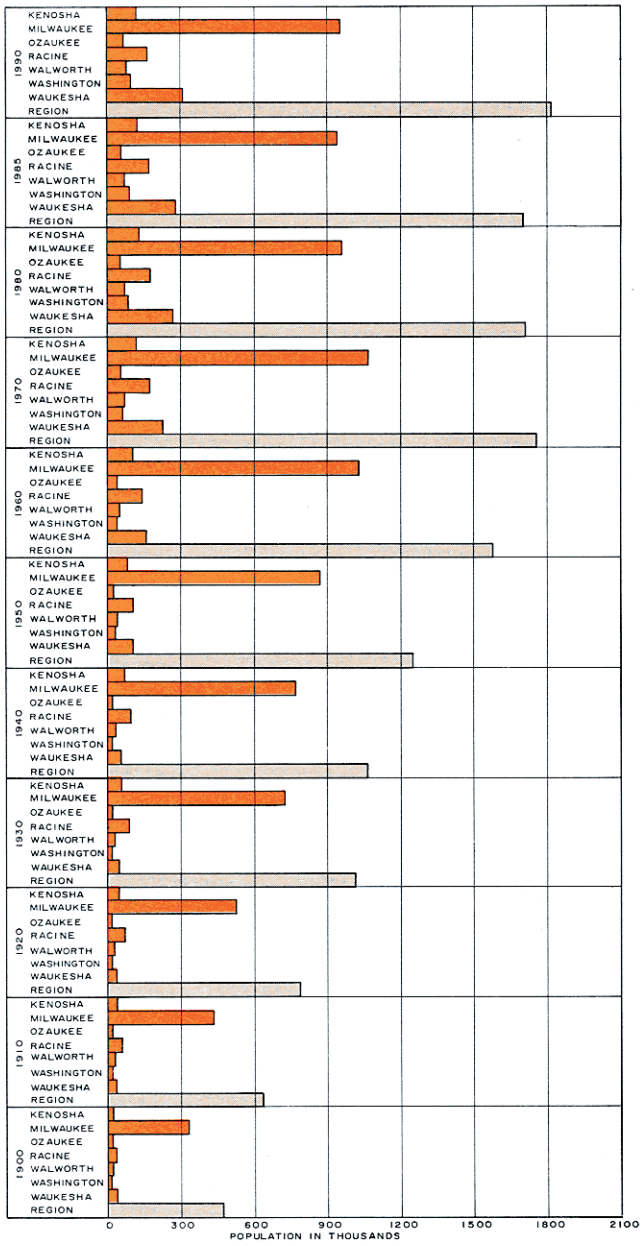


The 1963 resident population of the Region was estimated at 1,674,000 persons, of which about 80 percent was concentrated in Milwaukee, Racine, and Kenosha Counties. By 1985 the resident population of the Region had reach a level of about 1,743,000 persons, of which about 70 percent was concentrated in Milwaukee, Racine, and Kenosha Counties. The proportion of the population residing in Ozaukee, Washington, and Waukesha Counties, the counties which experienced the most rapid population increase between 1963 and 1985, increased from about 16 percent in 1963 to about 25 percent in 1985. This decentralization of population has resulted in the creation of new, and the intensification of existing, environmental and developmental problems. These problems transcend the geographic limits and the fiscal capabilities of local units of government, and therefore require the cooperation of all concerned units and agencies of government for sound resolution.

Source: U. S. Bureau of the Census, Wisconsin Department of Administration, and SEWRPC.

Figure 7

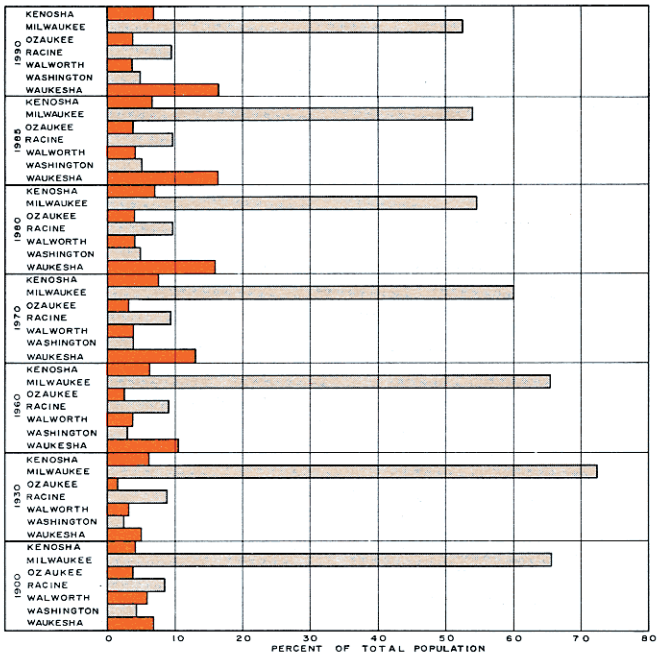
POPULATION DISTRIBUTION IN THE REGION BY COUNTY: SELECTED YEARS, 1900-1990



Source: U. S. Bureau of the Census and SEWRPC.

Figure 8

PERCENTAGE DISTRIBUTION OF POPULATION IN THE REGION BY COUNTY: SELECTED YEARS, 1900-1990



Source: U. S. Bureau of the Census and SEWRPC.

The Region has consistently exhibited higher per capita personal income levels than either the State or the Nation throughout the 1950 to 1990 period. Between 1950 and 1990, per capita income levels, measured in constant 1989 dollars, increased by about 97 percent for the Region, by about 131 percent for the State, and by about 144 percent for the Nation. Hence, per capita income levels for the Region, State, and Nation converged over this period of time.

Income levels declined between 1980 and 1985, partly because of the recession of the early 1980s and partly because of the changing structure of the economy. This decline was greater in the Region, where per capita income, in terms of constant 1989 dollars, remained virtually unchanged between 1980 and 1990, compared to increases of about 3 and 11 percent in the State and Nation, respectively. The spatial distribution of regional income on a household basis for 1963 and 1980 is shown on Map 4.

THE ECONOMIC BASE OF THE REGION

Changes in the resident population of an area are generally closely related to changes in the economic activity in that area. As shown in

Table 11

NUMBER OF HOUSEHOLDS IN THE REGION BY COUNTY: 1950-1990

County	1950	1960	1970	1980	1985	1990
Kenosha	21,958	29,545	35,468	43,064	44,178	47,029
Milwaukee	249,232	314,875	338,605	363,653	368,194	373,048
Ozaukee	6,591	10,417	14,753	21,763	22,916	25,707
Racine	31,399	40,736	49,796	59,418	61,249	63,736
Walworth	12,369	15,414	18,544	24,789	25,615	27,620
Washington	9,396	12,532	17,385	26,718	28,482	32,977
Waukesha	23,599	42,394	61,935	88,552	93,192	105,990
Region	354,544	465,913	536,486	627,955	643,826	676,107

County	1950-1960 Change		1960-1970 Change		1970-1980 Change		1980-1985 Change		1985-1990 Change		1950-1990 Change	
	Absolute	Percent	Absolute	Percent	Absolute	Percent	Absolute	Percent	Absolute	Percent	Absolute	Percent
Kenosha	7,587	34.6	5,923	20.0	7,596	21.4	1,114	2.6	2,851	6.5	25,071	114.2
Milwaukee	65,643	26.3	23,730	7.5	25,048	7.4	4,541	1.2	4,854	1.3	123,816	49.7
Ozaukee	3,826	58.0	4,336	41.6	7,010	47.5	1,153	5.3	2,791	12.2	19,116	290.0
Racine	9,337	29.7	9,060	22.2	9,622	19.3	1,831	3.1	2,487	4.1	32,337	103.0
Walworth	3,045	24.6	3,130	20.3	6,245	33.7	826	3.3	2,005	7.8	15,251	123.3
Washington	3,136	33.4	4,853	38.7	9,331	53.7	1,766	6.6	4,495	15.8	23,581	251.0
Waukesha	18,795	79.6	19,541	46.1	26,617	43.0	4,640	5.2	12,798	13.7	82,391	349.1
Region	111,369	31.4	70,573	15.1	91,469	17.0	15,871	2.5	32,281	5.0	321,563	90.7

Source: U. S. Bureau of the Census and SEWRPC.

Table 12

HOUSEHOLD POPULATION IN THE REGION BY COUNTY: 1950-1990

County	1950	1960	1970	1980	1985	1990
Kenosha	73,707	99,381	115,710	120,460	118,355	125,577
Milwaukee	831,324	1,010,342	1,029,104	940,172	914,729	933,426
Ozaukee	23,122	38,012	53,951	66,211	66,640	71,732
Racine	105,761	138,238	166,977	170,189	166,205	172,209
Walworth	40,183	50,532	58,534	67,973	68,764	71,761
Washington	33,378	45,585	63,135	83,946	86,318	94,271
Waukesha	82,718	155,145	226,789	275,616	281,661	300,144
Region	1,190,193	1,537,235	1,714,200	1,724,587	1,702,672	1,769,120

County	1950-1960 Change		1960-1970 Change		1970-1980 Change		1980-1985 Change		1985-1990 Change		1950-1990 Change	
	Absolute	Percent	Absolute	Percent	Absolute	Percent	Absolute	Percent	Absolute	Percent	Absolute	Percent
Kenosha	25,674	34.8	16,329	16.4	4,750	4.1	-2,105	-1.7	7,222	6.1	51,870	70.4
Milwaukee	179,018	21.5	18,762	1.9	-88,932	-8.6	-25,443	-2.7	18,697	2.0	102,102	12.3
Ozaukee	14,890	64.4	15,939	41.9	12,260	22.7	429	0.6	5,092	7.6	48,610	210.2
Racine	32,477	30.7	28,739	20.8	3,212	1.9	-3,984	-2.3	6,004	3.6	66,448	62.8
Walworth	10,349	25.8	8,002	15.8	9,439	16.1	791	1.2	2,997	4.4	31,578	78.6
Washington	12,207	36.6	17,550	38.5	20,811	33.0	2,372	2.8	7,953	9.2	60,893	182.4
Waukesha	72,427	87.6	71,644	46.2	48,827	21.5	6,045	2.2	18,483	6.6	217,426	262.9
Region	347,042	29.2	176,965	11.5	10,367	0.6	-21,895	-1.3	66,448	3.9	578,927	48.6

Source: U. S. Bureau of the Census, Wisconsin Department of Administration, and SEWRPC.

Table 13

HOUSEHOLD SIZE IN THE REGION BY COUNTY: 1950-1990

County	1950	1960	1970	1980	1985	1990
Kenosha	3.36	3.36	3.26	2.80	2.68	2.67
Milwaukee	3.34	3.21	3.04	2.59	2.48	2.50
Ozaukee	3.51	3.65	3.66	3.04	2.91	2.79
Racine	3.37	3.39	3.35	2.86	2.71	2.70
Walworth	3.25	3.28	3.16	2.74	2.68	2.60
Washington	3.55	3.64	3.63	3.14	3.03	2.86
Waukesha	3.51	3.66	3.66	3.11	3.02	2.83
Region	3.36	3.30	3.20	2.75	2.64	2.62

County	1950-1960 Change		1960-1970 Change		1970-1980 Change		1980-1985 Change		1985-1990 Change		1950-1990 Change	
	Absolute	Percent	Absolute	Percent	Absolute	Percent	Absolute	Percent	Absolute	Percent	Absolute	Percent
Kenosha	0.00	0.0	-0.10	-3.0	-0.46	-14.1	-0.12	-4.3	-0.01	-0.4	-0.69	-20.5
Milwaukee	-0.13	-3.9	-0.17	-5.3	-0.45	-14.8	-0.11	-4.2	0.02	0.8	-0.84	-25.1
Ozeukee	0.14	4.0	0.01	0.3	-0.62	-16.9	-0.13	-4.3	-0.12	-4.1	-0.72	-20.5
Racine	0.02	0.6	-0.04	-1.2	-0.49	-14.6	-0.15	-5.2	-0.01	-0.4	-0.67	-19.9
Walworth	0.03	0.9	-0.12	-3.7	-0.42	-13.3	-0.06	-2.2	-0.08	-3.0	-0.65	-20.0
Washington	0.09	2.5	-0.01	-0.3	-0.49	-13.5	-0.11	-3.5	-0.17	-5.6	-0.69	-19.4
Waukeshe	0.15	4.3	0.00	0.0	-0.55	-15.0	-0.09	-2.9	-0.19	-6.3	-0.68	-19.4
Region	-0.06	-1.8	-0.10	-3.0	-0.45	-14.1	-0.11	-4.0	-0.02	-0.8	-0.74	-22.0

Source: U. S. Bureau of the Census, Wisconsin Department of Administration, and SEWRPC.

Table 14

SINGLE-PERSON HOUSEHOLDS IN THE REGION BY COUNTY: 1970, 1980, AND 1990

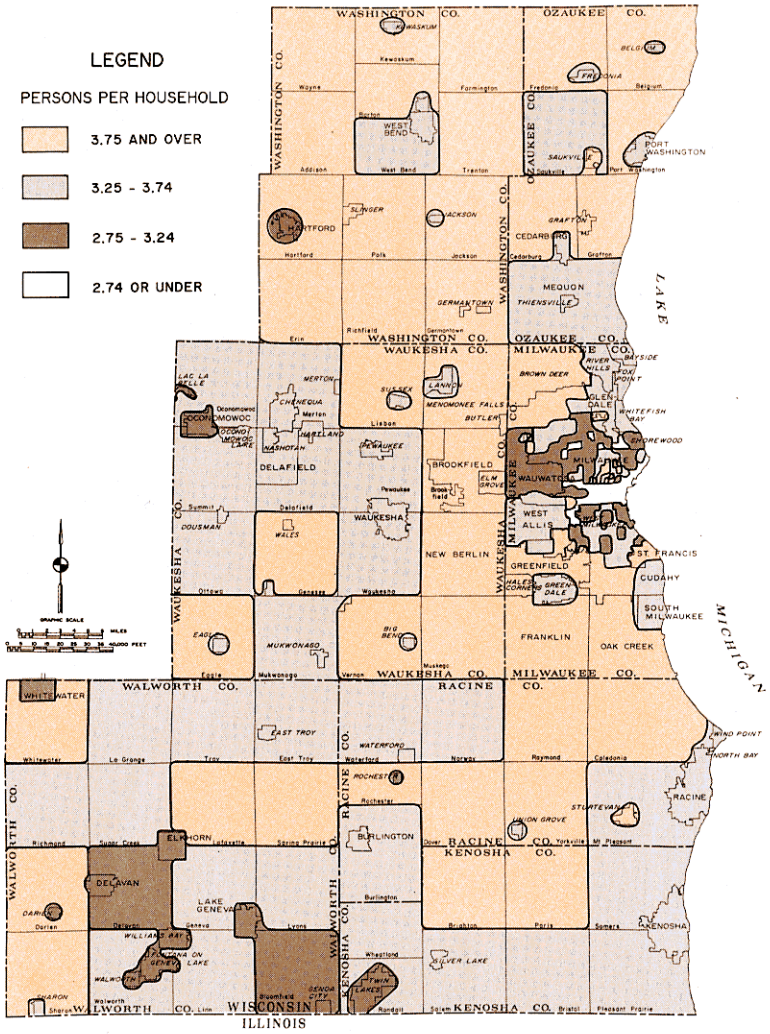
County	1970			1980			1990		
	Single-Person Households		Total Households	Single-Person Households		Total Households	Single-Person Households		Total Households
	Number	Percent of Total		Number	Percent of Total		Number	Percent of Total	
Kenosha	5,666	16.0	35,468	9,467	22.0	43,064	10,923	23.2	47,029
Milwaukee	67,598	20.0	338,605	100,014	27.5	363,653	109,528	29.4	373,048
Ozaukee	1,432	9.7	14,753	3,218	14.8	21,763	4,374	17.0	25,707
Racine	7,669	15.4	49,796	12,246	20.6	59,418	14,049	22.0	63,736
Walworth	3,069	16.6	18,544	5,429	21.9	24,789	6,609	23.9	27,620
Washington	2,019	11.6	17,385	3,940	14.7	26,716	5,657	17.2	32,977
Waukesha	5,649	9.1	61,935	12,163	13.7	88,552	17,619	16.6	105,990
Region	93,102	17.4	536,486	146,477	23.3	627,955	168,759	25.0	676,107

Source: U. S. Bureau of the Census and SEWRPC.

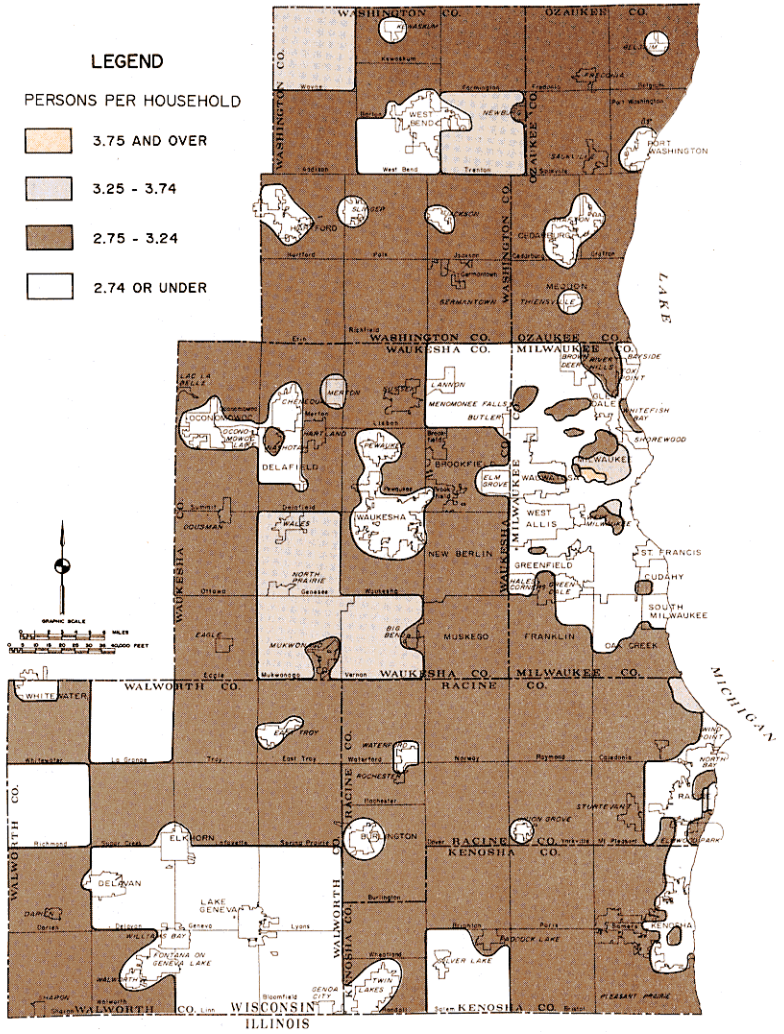
Map 3

AVERAGE HOUSEHOLD SIZE IN THE REGION: 1960 AND 1980

1960



1990



The total number of households in the Region increased by about 45 percent, from about 466,000 in 1960 to about 676,000 in 1990. The average size of households in the Region decreased significantly during this time, from 3.30 persons per household in 1960 to 2.62 persons per household in 1990. This decrease is attributable to, among other factors, the decline in birthrates after 1960 and an attendant decrease in average family size as well as to a significant increase in the number of one-person households. As shown on the above map, most areas of the Region experienced a decline in average household size between 1960 and 1990.

Source: U. S. Bureau of the Census and SEWRPC.

Table 15

PERSONAL INCOME LEVELS IN THE UNITED STATES, WISCONSIN, AND THE REGION: CENSUS YEARS 1950-1990

Geographic Area	1950	1960	1970	1980	1990	Percent Change 1950-1960	1960-1970	1970-1980	1980-1990
United States									
Aggregate Personal Income (millions of dollars)									
Reported Dollars	$165,063	$ 331,700	$ 635,563	$1,653,331	$3,586,467	101.0	91.6	160.1	116.9
Constant 1989 Dollars	911,428	1,471,421	2,291,522	2,952,188	3,586,467	61.4	55.7	28.8	21.5
Per Capita Personal Income									
Reported Dollars	1,070	1,849	3,128	7,298	14,420	72.8	69.2	133.3	97.6
Constant 1989 Dollars	5,908	8,202	11,278	13,031	14,420	38.8	37.5	15.5	10.7
Median Family Income									
Reported Dollars	3,073	5,660	9,590	19,917	35,225	84.2	69.4	107.7	76.9
Constant 1989 Dollars	16,968	25,108	34,577	35,564	35,225	48.0	37.7	2.9	-1.0
Wisconsin									
Aggregate Personal Income (millions of dollars)									
Reported Dollars	$ 3,581	$ 7,287	$ 13,457	$ 34,083	$ 64,945	103.5	84.7	153.3	90.5
Constant 1989 Dollars	19,773	32,325	48,519	60,859	64,945	63.5	50.1	25.4	6.7
Per Capita Personal Income									
Reported Dollars	1,043	1,844	3,046	7,243	13,276	76.8	65.2	137.8	83.3
Constant 1989 Dollars	5,759	8,180	10,982	12,933	13,276	42.0	34.3	17.8	2.7
Median Family Income									
Reported Dollars	3,256	5,926	10,068	20,915	35,082	82.0	69.9	107.7	67.7
Constant 1989 Dollars	17,979	26,288	36,300	37,346	35,082	46.2	38.1	2.9	-6.1
Region									
Aggregate Personal Income (millions of dollars)									
Reported Dollars	$ 1,660	$ 3,492	$ 6,029	$ 14,391	$ 26,343	110.4	72.7	138.7	83.1
Constant 1989 Dollars	9,166	15,491	21,738	25,697	26,343	69.0	40.3	18.2	2.5
Per Capita Personal Income									
Reported Dollars	1,338	2,219	3,433	8,154	14,552	65.8	54.7	137.5	78.5
Constant 1989 Dollars	7,388	9,843	12,738	14,560	14,552	33.2	29.4	14.3	-0.1
Median Family Income									
Reported Dollars	3,846	6,908	11,181	23,515	38,740	79.6	61.9	110.3	64.7
Constant 1989 Dollars	21,236	30,644	40,313	41,988	38,740	44.3	31.6	4.2	-7.7

NOTE: Data reported for Census years are actually for the respective preceding years.

Source: U. S. Bureau of the Census, U. S. Bureau of Labor Statistics, and SEWRPC.

Figure 9, historic population and employment trends have followed quite similar patterns in the Region. This is generally true not only because much of the population migration into an area is dependent upon the availability of jobs in that area, but also because jobs must ultimately be available to hold the natural increase and prevent the out-migration of native young people entering the labor force. The rapid historic growth of population in the Region may, therefore, be basically attributed to increasing economic activity in the Region.

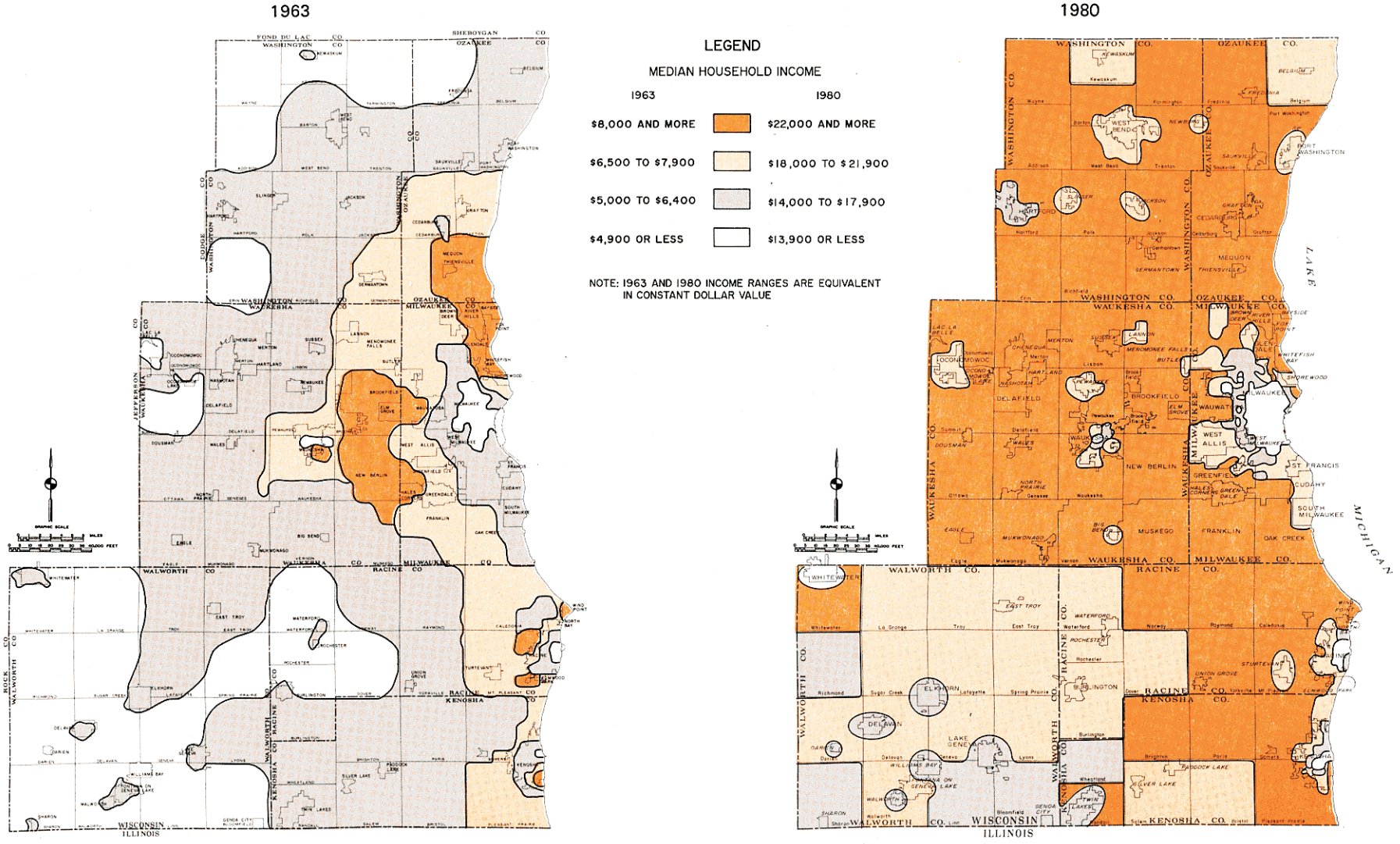
Number of Available Jobs

An important measure of economic activity which is closely related to the labor force is the number of jobs available within the Region. Since jobs are enumerated at their location, they are often referred to as "place-of-work" data. It should be noted that the enumeration of jobs does not distinguish between full- or part-time jobs, or indicate whether or not the job is held by a resident of the jurisdiction in which the job is enumerated. Therefore, "place-of-residence" data and "place-of-work" data for a particular geographic area will often differ in absolute values, but generally exhibit similar trends.

Table 16 sets forth changes in the number of jobs available in the Nation, State, and Region for the period from 1950 to 1985. Since 1970, the rate of increase in the creation of new jobs in the

Map 4

MEDIAN HOUSEHOLD INCOME IN THE REGION: 1963 AND 1980



The maps above show the distribution of median household income in the Region for 1963 and 1980. The income ranges for each year, while different in actual dollar value, are equivalent in constant dollar value. A household income of $8,000 in 1963, for example, was equivalent to a household income of $22,000 in 1980. Comparison of the above maps indicates significant increases in household income, measured in constant dollars, throughout most of the Southeastern Wisconsin Region.

Source: U. S. Bureau of the Census and SEWRPC.

Table 16

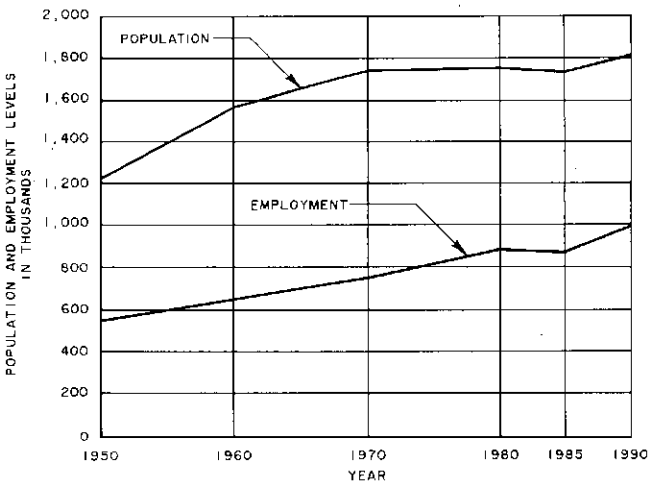
NUMBER OF JOBS AVAILABLE IN THE UNITED STATES, WISCONSIN, AND THE REGION: 1950-1985

Geographic Area	Year				
	1950	1960	1970	1980	1985
United States	58,911,000	68,798,500	83,888,000	103,961,300	123,175,600
Wisconsin	1,348,100	1,582,800	1,837,700	2,256,300	2,491,314
Southeastern Wisconsin Region	552,700	647,900	753,700	884,200	871,900
	Percent Change from Previous Time Period				
United States	--	16.8	21.9	23.9	18.5
Wisconsin	--	17.4	16.1	22.8	10.4
Southeastern Wisconsin Region	--	17.2	16.3	17.3	-1.4

Source: U. S. Bureau of Labor Statistics; U. S. Bureau of Economic Analysis; Wisconsin Department of Industry, Labor and Human Relations; and SEWRPC.

Figure 9

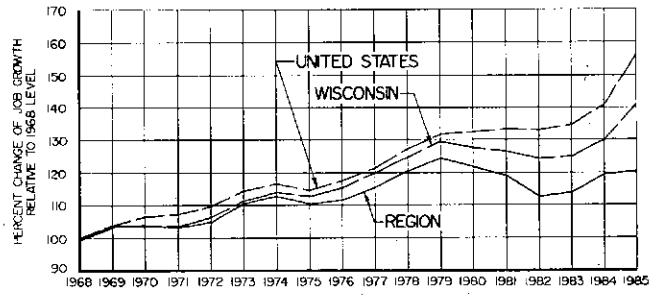
POPULATION AND EMPLOYMENT TRENDS IN THE REGION: 1950-1980



Source: U. S. Bureau of the Census; Wisconsin Department of Industry, Labor and Human Relations; and SEWRPC.

Figure 10

RELATIVE JOB GROWTH IN THE UNITED STATES, WISCONSIN, AND THE REGION: 1968-1985



Source: U. S. Department of Labor; Wisconsin Department of Industry, Labor and Human Relations; and SEWRPC.

Region has dropped behind such rates for both the State and the Nation, in spite of the fact that the absolute increase in the number of jobs in the Region was greater since 1970 than it was during either of the two preceding decades.

These disparate rates of growth are shown in Figure 10 for the period from 1968 to 1985. This time span includes the four most recent economic expansions and the three intervening recessions. As shown, the amount of economic activity in the Region as measured by the number of available jobs has changed at varying rates in recent years.

Changes in Distribution of Economic Activity

Significant changes in the distribution of economic activity within the Region have occurred in the past 40 years. These changes are indicated in Table 17 in terms of job trends during the past four decades. The employment data available indicate a general shift in economic activity toward counties in the Region other than Mil-

waukee County. Between 1950 and 1990, Milwaukee County's share of total regional jobs decreased from about 79 percent to about 58 percent. The number of regional jobs in all the remaining counties except Kenosha County increased. The distribution of jobs within the Region in 1963 and 1985 is shown on Map 5.

Structure of the Economy

For planning purposes, the character of the regional economy can probably best be described in terms of its industrial structure, because the number and type of industries directly affect land use and public facility requirements.

The gains and losses of employment in each industry type from 1970 to 1990 have resulted in a change in regional employment distribution (see Table 18). Like the State and the Nation, the Region has experienced a decrease in total manufacturing employment and an increase in the proportion of service employment.[4]

LAND USE

Information regarding historic and existing land use and land use development patterns is essential to any sound natural areas protection planning effort. An inventory of land use in the Region was first conducted in 1963 to facilitate the preparation of the first-generation regional land use plan formally adopted by the Commission in 1966. The land use inventory was subsequently updated in 1975, 1980, and 1985 under the continuing regional planning program. These inventories of land use provide important benchmark information concerning existing land use in Southeastern Wisconsin.

In 1963, definitive existing land use information was not available on a uniform, areawide basis for the Region. Consequently, an extensive survey of existing land use was undertaken. A land use classification system was developed for use in the inventory. The U. S. Public Land Survey quarter section was chosen as the basic geographic data collection unit and the land uses were identified in terms of the actual activities taking place on the land without regard to ownership. Each subsequent land use inventory, that is, the inventories for 1970, 1975, 1980, and 1985, was accomplished by comparing aerial photographs for the year concerned with aerial photographs for the previous inventory and delineating changes.[5]

This section describes and analyzes the land use information most relevant to the regional natural areas protection planning effort. It includes a description of the types, intensity, and spatial distribution of 1985 land use in the Region and summarizes changes in the amount and location of the major land uses over time.

Historic Growth Patterns

Over the 100-year period from 1850 to 1950, urban development in Southeastern Wisconsin occurred in more or less concentric rings around existing urban centers, resulting in a relatively compact regional settlement pattern. After 1950, there was a significant change in the pattern of urban development in the Region. While substantial amounts of development continued to occur adjacent to established urban centers, considerable development occurred in isolated enclaves in outlying areas of the Region. This pattern of scattered development, descriptively referred to as "urban sprawl," resulted in a dramatic increase in the amount of urban development in the Region starting in 1950. From 1850 to 1950, the conversion of land from rural to urban use in the Region occurred at a rate of about 1.4 square miles per year. The conversion of land from rural to urban use in the Region occurred at a rate of 10.5 square miles per year between 1950 and 1963 and at a rate of 8.0 square miles per year between 1963 and 1970. From 1970 to 1985, the conversion of land to urban uses occurred at the rate of about 9.3 square miles per year. Between 1950 and 1985, the urban population of the Region increased by 47 percent but land devoted to urban development increased by about 227 percent. At present, the resident population of the Region comprises

[4] *Includes self-employed.*

[5] *New Commission aerial photographs for the Region taken in the spring of 1990 were not available for use in the current natural areas protection planning program.*

Table 17

DISTRIBUTION OF JOBS IN THE REGION BY COUNTY: SELECTED YEARS, 1950-1990

County	1950		1960		1970		1980		1985		1990	
	Jobs	Percent	Jobs	Percent	Jobs	Percent	Jobs	Percent	Jobs	Percent	Jobs	Percent
Kenosha	27,700	5.0	40,100	6.2	40,000	5.3	50,100	5.7	42,500	4.9	46,500	4.7
Milwaukee	438,100	79.3	486,200	75.0	507,100	67.3	542,300	61.3	527,300	60.5	578,200	58.4
Ozaukee	6,200	1.1	9,500	1.5	19,800	2.6	25,600	2.9	26,900	3.1	32,200	3.3
Racine	43,200	7.8	48,500	7.5	62,700	8.3	76,100	8.6	74,500	8.5	82,200	8.3
Walworth	12,300	2.2	18,300	2.8	24,500	3.3	31,100	3.5	28,100	3.2	37,100	3.7
Washington	9,700	1.8	14,500	2.2	23,100	3.1	31,400	3.6	31,300	3.6	41,800	4.2
Waukesha	15,500	2.8	30,800	4.8	76,500	10.1	127,600	14.4	141,300	16.2	172,300	17.4
Region	552,700	100.0	647,900	100.0	753,700	100.0	884,200	100.0	871,900	100.0	990,300	100.0

County	1950-1960 Change		1960-1970 Change		1970-1980 Change		1980-1985 Change		1985-1990 Change		1950-1990 Change	
	Jobs	Percent	Jobs	Percent	Jobs	Percent	Jobs	Percent	Jobs	Percent	Jobs	Percent
Kenosha	12,400	44.8	-100	-0.2	10,100	25.3	-7,600	-15.2	4,000	9.4	18,800	67.9
Milwaukee	48,100	11.0	20,900	4.3	35,200	6.9	-15,000	-2.8	50,900	9.7	140,100	32.0
Ozaukee	3,300	53.2	10,300	108.4	5,800	29.3	1,300	5.1	5,300	19.7	26,000	419.4
Racine	5,300	12.3	14,200	29.3	13,400	21.4	-1,600	-2.1	7,700	10.3	39,000	90.3
Walworth	6,000	48.8	6,200	33.9	6,600	26.9	-3,000	-9.6	9,000	32.0	24,800	201.6
Washington	4,800	49.5	8,600	59.3	8,300	35.9	-100	-0.3	10,500	33.5	32,100	330.9
Waukesha	15,300	98.7	45,700	148.4	51,100	66.8	13,700	10.7	31,000	21.9	156,800	1,011.6
Region	95,200	17.2	105,800	16.3	130,500	17.3	-12,300	-1.4	118,400	13.6	437,600	79.2

Source: Wisconsin Department of Industry, Labor and Human Relations and SEWRPC

Table 18

REGIONAL EMPLOYMENT BY CATEGORY: 1970, 1980, 1983, 1985, AND 1990

Employment Category	Jobs					
	1970	1980	1982	1983	1985	1990
	Number	Number	Number	Number	Number	Number
Agricultural	11,900	12,800	12,100	12,200	11,000	9,800
Construction and Mining	28,900	28,300	21,000	20,700	25,100	34,800
Manufacturing	287,600	305,300	261,700	250,200	265,400	278,000
Transportation, Communication, and Utilities	36,700	39,600	38,200	36,100	39,000	40,900
Retail Trade	115,700	131,900	119,300	125,000	133,300	155,700
Finance, Insurance, and Real Estate	32,800	41,200	43,300	43,700	51,200	49,900
Services[a]	156,600	204,400	204,200	214,300	217,700	281,700
Government[b]	83,300	120,700	118,900	123,900	129,200	139,500
Total Jobs	753,700	884,200	818,700	826,100	871,900	990,300

Employment Category	1970-1980 Change		1980-1982 Change		1982-1983 Change		1983-1985 Change		1985-1990 Change		1970-1990 Change	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Agricultural	900	7.6	-700	-5.5	100	0.8	-1,200	-9.8	-1,200	-10.9	-2,100	-17.6
Construction and Mining	-600	-2.1	-7,300	-25.8	-300	-1.4	4,400	21.3	9,700	38.6	5,900	20.4
Manufacturing	17,700	6.2	-43,600	-14.3	-11,500	-4.4	15,200	6.1	12,600	4.7	-9,600	-3.3
Transportation, Communication, and Utilitiss	2,900	7.9	-1,400	-3.5	-2,100	-5.5	2,900	8.0	1,900	4.9	4,200	11.4
Retail Trade	16,200	14.0	-12,600	-9.6	5,700	4.8	8,300	6.6	22,400	16.8	40,000	34.6
Finance, Insurance, and Real Estate	8,400	25.6	2,100	5.1	400	0.9	7,500	17.2	-1,300	-2.5	17,100	52.1
Services[a]	47,600	30.4	-200	-0.1	10,100	4.9	3,400	1.6	64,000	29.4	124,900	79.7
Government[b]	37,400	44.9	-1,800	-1.5	5,000	4.2	5,300	4.3	10,300	8.0	56,200	67.5
Total Jobs	130,500	17.3	-65,500	-7.4	7,400	0.9	45,800	5.5	118,400	13.6	236,600	31.4

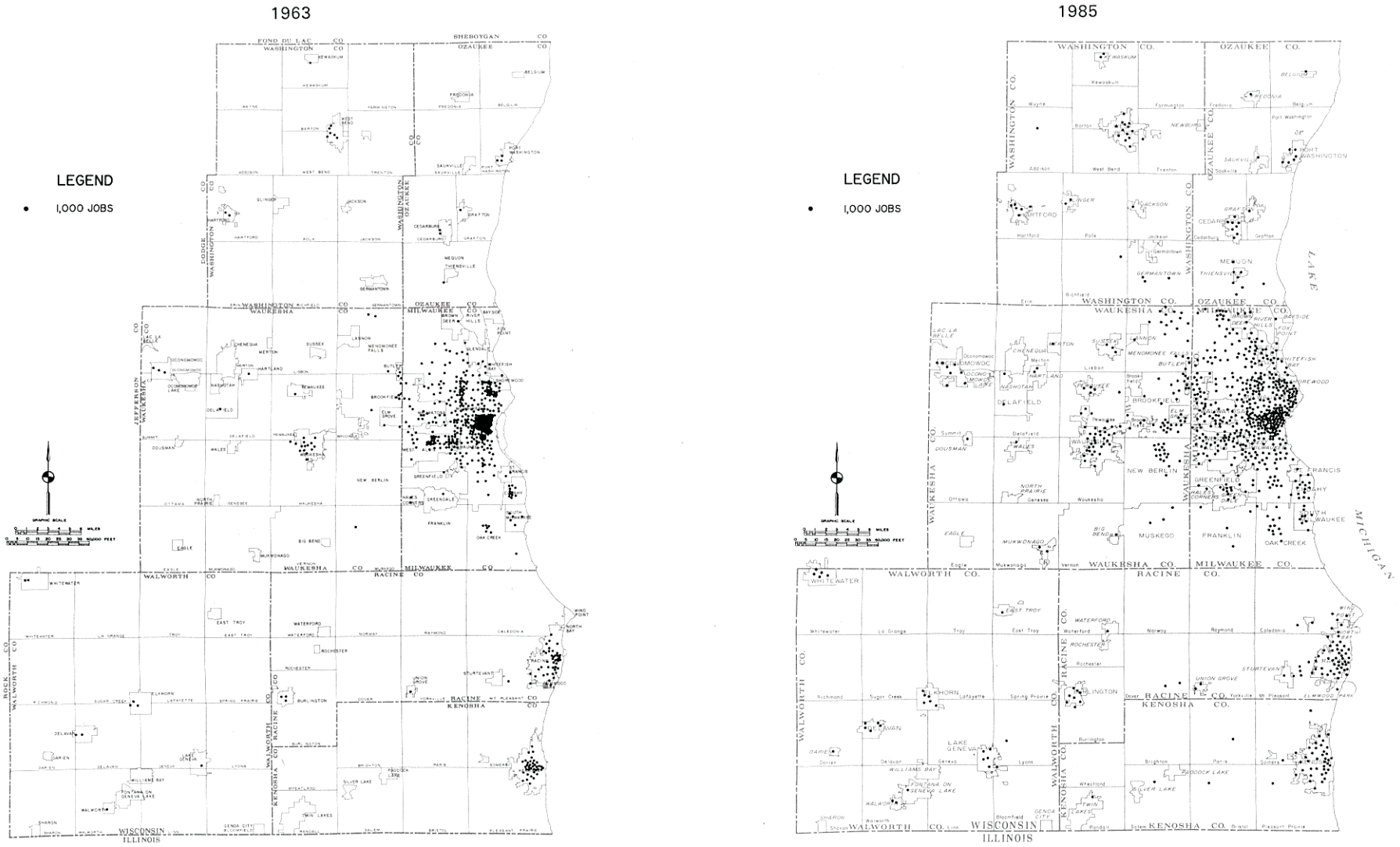
[a] *Includes self-employed.*

[b] *Includes education.*

Source: Wisconsin Department of Industry, Labor and Human Relations and SEWRPC.

Map 5

DISTRIBUTION OF JOBS IN THE REGION: 1963 AND 1985



Total employment in the Region increased by 38 percent from about 631,000 jobs in 1963 to about 872,000 jobs in 1985. In 1963 nearly 90 percent of all jobs were located in the three largely urban counties, Kenosha, Milwaukee, and Racine. By 1985 the proportion of jobs in these three counties had declined to about 74 percent, reflecting continued decentralization of employment in the Region. Employment growth was especially rapid in Waukesha County between 1963 and 1985, and as a result, that County's share of the total regional employment increased from about 5 percent to about 16 percent during this time.

Source: Wisconsin Department of Industry, Labor and Human Relations and SEWRPC.

about 37 percent of the total population of the State, but the seven-county Region comprises only about 5 percent of the land area of the State. Time series data developed under past regional land use inventories are presented for the major categories of land use for the years 1963, 1970, 1975, 1980, and 1985.[6]

Although Southeastern Wisconsin is an urban region, less than one-quarter of its total area is currently devoted to urban land uses. These urban uses are so diffused throughout the Region, however, that they have not only created an impression of widespread urbanization, but have also created many serious areawide environmental and developmental problems. The area devoted to major land use categories in the Region is presented in Table 19. The spatial distribution of urban land uses in the Region in 1985 is shown in a generalized manner on Map 6.

For regional planning purposes, urban land is defined as land devoted to residential, commercial, industrial, governmental and institutional, transportation, and recreational uses, and adjacent unused lands. As indicated in Table 19, urban lands encompassed about 606 square miles, or just under 23 percent of the Region, in 1985.

Nonurban areas, agricultural land, surface water and wetlands, woodlands, and unused rural and other open land, accounted for about 2,083 square miles, or 77 percent of the total area of the Region.

The conversion of land from rural to urban uses in the Region since 1963 is summarized in Table 20 and in Figure 11. Between 1963 and 1970, urban lands in the Region increased by about 62 square miles, or 14 percent, an average annual increase of almost nine square miles. Between 1970 and 1985, urban lands in the Region increased by an additional 100 square miles, or 20 percent, an average annual increase of 6.7 square miles.

Although much new urban development in Southeastern Wisconsin between 1970 and 1985 was located in close proximity to existing urban development, a substantial portion of all new urban development occurred in a dispersed pattern in outlying areas of the Region, continuing the trend which first became apparent in the Region after 1950. The diffused nature of urban land development in the Region is evident on Map 7, which depicts the urban development which occurred within each U. S. Public Land Survey quarter section between 1970 and 1985 in relation to the extent of existing 1985 public sanitary sewer service areas in the Region.

PUBLIC UTILITY BASE

Public utility systems are among the most important and permanent elements of urban growth and development. Urban development today is highly dependent upon these utility systems, which provide the individual land uses with power, light, communication, heat, water, and sewerage. Water supply and sanitary sewerage utilities have a particularly important interrelationship. Water supply facilities bring potable water from its sources to the user, while sanitary sewerage facilities collect the used water, convey it to a treatment plant, and after treatment return it to the natural environment from which it came.

Sanitary Sewer Service

Areas served by public sanitary sewers encompassed about 377 square miles, or about 14 percent of the total area of the Region, in 1985 (see Map 8). About 1.5 million persons, or about 87 percent of the total resident population of the Region, were served by sanitary sewers.

The area served by sanitary sewers increased by about 68 square miles, or 22 percent, between 1970 and 1985. Increases occurred around the periphery of the Kenosha, Milwaukee, and Racine metropolitan areas and around smaller outlying urban centers. Sanitary sewer service was also extended to existing urban development around a number of major lakes in the Region.

The resident population served by sanitary sewers increased by about 19,000 persons, or by about 1 percent, between 1970 and 1985. This

[6] *The land use data presented in this chapter appear in greater detail in the Commission's third-generation regional land use plan, adopted in September 1992 and documented in SEWRPC Planning Report No. 40, A Regional Land Use Plan for Southeastern Wisconsin—2010, January 1992.*

Table 19

LAND USE IN THE REGION: 1963, 1970, 1975, 1980, AND 1985

Land Use Category	Actual Land Use									
	1963		1970		1975		1980		1985	
	Acres	Percent of Total	Acres	Percent of Total	Acres	Percent of Total	Acres	Percent of Total	Acres	Percent of Total
Urban										
Residential	122,539	7.1	142,691	8.3	163,732	9.5	179,831	10.4	184,603	10.7
Commercial	5,610	0.3	6,734	0.4	7,570	0.4	8,162	0.5	8,714	0.5
Industrial	7,319	0.4	9,161	0.5	10,274	0.6	11,171	0.6	12,080	0.7
Transportation, Communication, and Utilities[a]	91,628	5.3	103,694	6.0	112,046	6.5	117,706	6.8	120,279	7.0
Governmental and Institutional	13,082	0.8	15,877	0.9	16,664	1.0	17,033	1.0	17,240	1.0
Recreational	16,796	1.0	21,270	1.2	23,636	1.4	24,309	1.4	25,564	1.5
Unused Urban	26,710	1.6	24,027	1.4	20,615	1.2	19,935	1.2	19,215	1.1
Subtotal	283,684	16.5	323,454	18.7	354,537	20.6	378,147	21.9	387,695	22.5
Nonurban										
Agricultural	1,047,740	60.9	1,001,398	58.2	970,639	56.4	944,232	54.9	931,956	54.1
Water and Wetlands	221,358	12.9	220,335	12.8	221,198	12.8	219,394	12.7	217,804	12.7
Woodlands	119,583	6.9	117,978	6.9	118,592	6.9	116,395	6.8	116,228	6.8
Unused Rural and Other Open Land	48,817	2.8	57,886	3.4	56,117	3.3	62,948	3.7	67,430	3.9
Subtotal	1,437,498	83.5	1,397,597	81.3	1,366,546	79.4	1,342,969	78.1	1,333,418	77.5
Total	1,721,182	100.0	1,721,051	100.0	1,721,083	100.0	1,721,116	100.0	1,721,113	100.0

Land Use Category	Change in Land Use									
	1963-1970		1970-1975		1975-1980		1980-1985		1970-1985	
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Urban										
Residential	20,152	16.4	21,041	14.7	16,099	9.8	4,772	2.7	41,912	29.4
Commercial	1,124	20.0	836	12.4	592	7.8	552	6.8	1,980	29.4
Industrial	1,842	25.2	1,113	12.1	897	8.7	909	8.1	2,919	31.9
Transportation, Communication, and Utilities	12,066	13.2	8,352	8.1	5,660	5.1	2,573	2.2	16,585	16.0
Governmental and Institutional	2,795	21.4	787	5.0	369	2.2	207	1.2	1,363	8.6
Recreational	4,474	26.6	2,366	11.1	673	2.8	1,255	5.2	4,294	20.2
Unused Urban	-2,683	-10.0	-3,412	-14.2	-680	-3.3	-720	-3.6	-4,812	-20.0
Subtotal	39,770	14.0	31,083	9.6	23,610	6.7	9,548	2.5	64,241	19.9
Nonurban										
Agricultural	-46,342	-4.4	-30,759	-3.1	-26,407	-2.7	-12,278	-1.3	-69,442	-6.9
Water and Wetlands	-1,023	-0.5	863	0.4	-1,804	-0.8	-1,590	-0.7	-2,531	-1.1
Woodlands	-1,605	-1.3	614	0.5	-2,197	-1.9	-167	-0.1	-1,750	-1.5
Unused Rural and Other Open Land	9,069	18.6	-1,769	-3.1	6,831	12.2	4,482	7.1	9,544	16.5
Subtotal	-39,901	-2.8	-31,051	-2.2	-23,577	-1.7	-9,551	-0.7	-64,179	-4.6
Total	-131	--	32	--	33	--	-3	--	62	--

NOTE: The change in the total area of the Region is the net effect of Lake Michigan shoreline erosion and accretion and of landfill ativities.

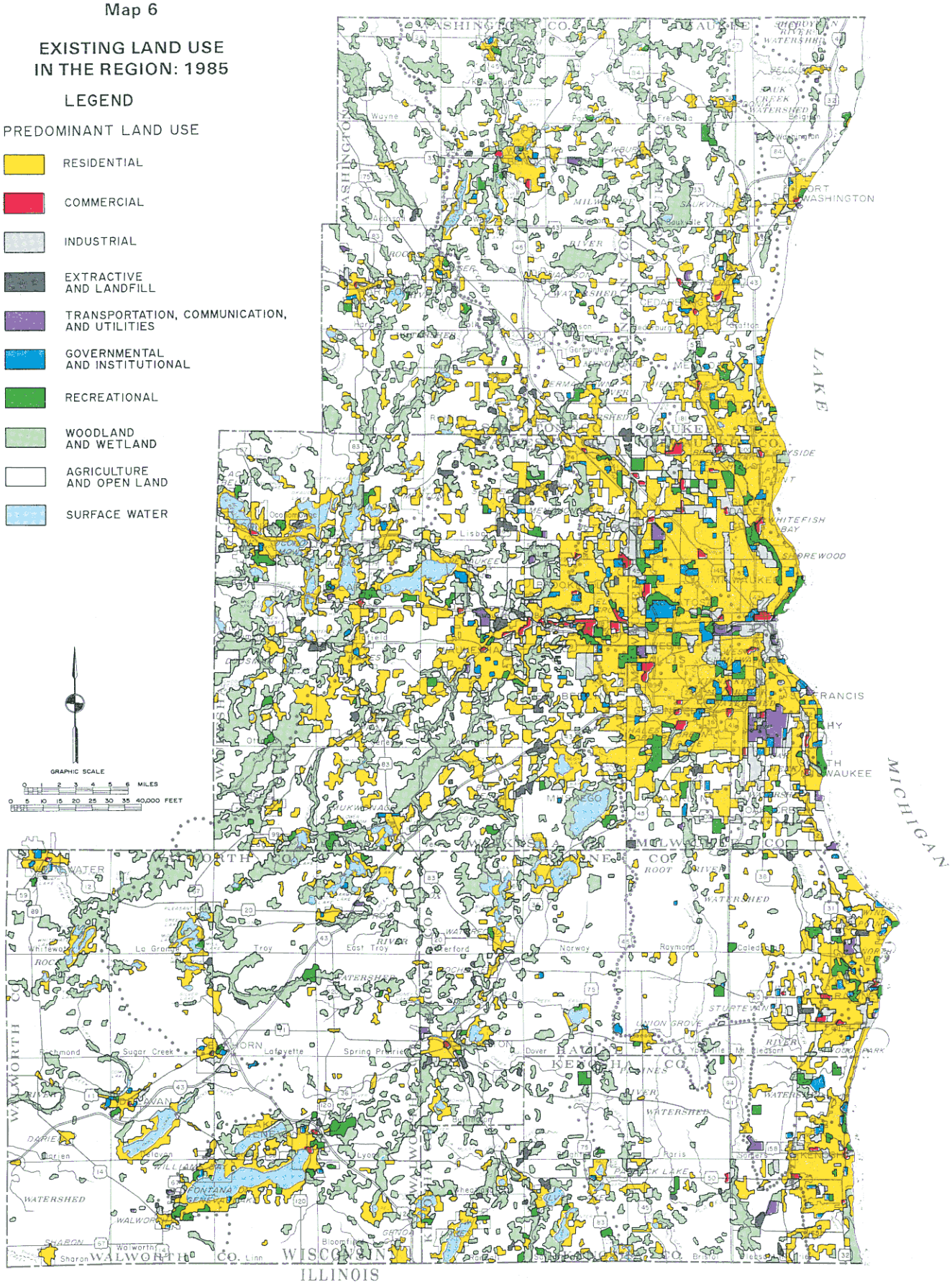
[a] *Includes off-street parking areas of more than 10 spaces.*

Source: SEWRPC.

relatively modest increase in population served is the net result of a significant decrease in the number of persons served in Milwaukee County and significant increases in the number of persons served in each of the other six counties of the Region. In Milwaukee County, the number of persons served by sanitary sewers decreased by almost 102,000 persons between 1970 and 1985, while the overall county population decreased by an estimated 114,700 persons.

Map 6

EXISTING LAND USE IN THE REGION: 1985



This map summarizes the spatial distribution of the various land uses existing within the Region in 1985. Urban land uses, consisting of lands devoted to residential, commercial, industrial, governmental and institutional, transportation, and recreational uses, occupied a total area of about 606 square miles, or just under 23 percent of the area of the Region in 1985. Nonurban land uses, consisting of agricultural lands, wetlands, woodlands, surface water, and lands in extractive use, totaled 2,083 square miles, or about 77 percent of the Region. While less than one-quarter of the Region was devoted to urban land uses, those uses were so diffused throughout the Region as to create an impression of widespread urbanization; many serious areawide environmental and developmental problems have also been created.

Source: SEWRPC.

Table 20

URBAN AND NONURBAN LAND USES IN THE REGION BY COUNTY: 1963, 1970, AND 1985

County	1963				1970				1985			
	Urban		Nonurban		Urban		Nonurban		Urban		Nonurban	
	Acres	Percent of Region	Acres	Percent of Region	Acres	Percent of Region	Acres	Percent of Region	Acres	Percent of Region	Acres	Percent of Region
Kenosha	23,919	8.4	154,310	10.7	26,536	8.2	151,635	10.8	31,971	8.3	146,203	11.0
Milwaukee	104,757	36.9	50,320	3.5	110,465	34.1	44,671	3.2	116,795	30.1	38,395	2.9
Ozaukee	16,579	5.9	133,963	9.3	20,987	6.5	129,468	9.3	27,292	7.0	123,164	9.2
Racine	29,578	10.4	188,376	13.1	34,945	10.8	182,964	13.1	40,340	10.4	177,573	13.3
Walworth	27,587	9.7	341,369	23.8	31,267	9.7	337,689	24.2	38,082	9.8	330,874	24.8
Washington	20,387	7.2	258,446	18.0	24,611	7.6	254,222	18.2	33,670	8.7	245,163	18.4
Waukesha	60,877	21.5	310,714	21.6	74,643	23.1	296,948	21.2	99,545	25.7	272,046	20.4
Region	283,684	100.0	1,437,498	100.0	323,454	100.0	1,397,597	100.0	387,695	100.0	1,333,418	100.0

County	Change: 1963-1970				Change: 1970-1985			
	Urban		Nonurban		Urban		Nonurban	
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Kenosha	2,617	10.9	-2,675	-1.7	5,435	20.5	-5,432	-3.6
Milwaukee	5,708	5.4	-5,649	-11.2	6,330	5.7	-6,276	-14.0
Ozaukee	4,408	26.6	-4,495	-3.4	6,305	30.0	-6,304	-4.9
Racine	5,367	18.1	-5,412	-2.9	5,395	15.4	-5,391	-2.9
Walworth	3,680	13.3	-3,680	-1.1	6,815	21.8	-6,815	-2.0
Washington	4,224	20.7	-4,224	-1.6	9,059	36.8	-9,059	-3.6
Waukesha	13,766	22.6	-13,766	-4.4	24,902	33.4	-24,902	-8.4
Region	39,770	14.0	-39,901	-2.8	64,241	19.9	-64,179	-4.6

NOTE: Urban lands include residential; commercial; industrial; transportation, communication, and utility; governmental and institutional; and recreational land uses and unused urban lands. Nonurban lands include agricultural, water and wetlands, woodlands, and unused rural and other open lands.

Source: SEWRPC.

Between 1970 and 1985, however, the percentage of the total population served by sanitary sewers increased in each county of the Region, including Milwaukee County.

As already noted, in 1985 centralized sanitary sewerage systems in the Region served a total resident population of about 1.5 million persons, or nearly 87 percent of the total population of the Region. The remaining 13 percent of the total Region population, or almost 235,000 persons, relied on onsite sewage disposal systems for domestic sewage disposal. An estimated 12,200 of these persons lived on farms. The remaining 222,800 persons constituted urban dwellers generally living in scattered locations throughout the rural and rural-fringe areas of the Region.

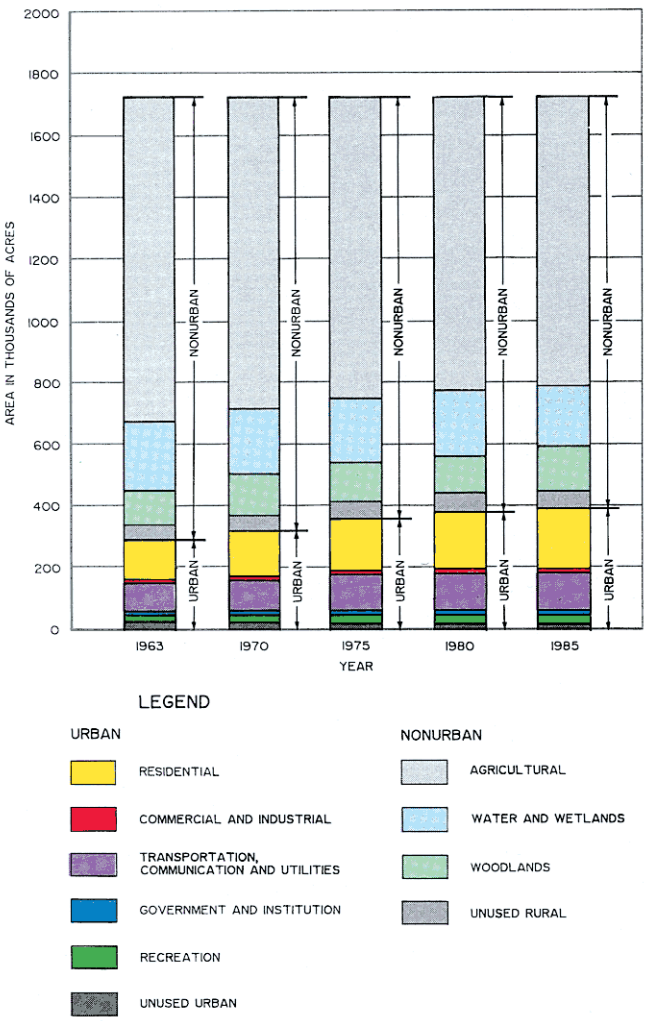
Much has been accomplished in terms of future sanitary sewer service area planning in the Region, particularly since the adoption of the regional water quality management plan in 1979. That plan, as refined through 1989, envisions the extension of sanitary sewer service to an additional 391 square miles of land, or an additional 15 percent of the total area of the Region (see Map 9), to bring the total service area to about 768 square miles, or about 29 percent of the total area of the Region. It is estimated that this proposed additional sewer service area would be able to accommodate 287,000 housing units at medium densities, with an average of four housing units per net residential acre, and a resident population of about 688,000 persons.

Water Supply Service

In 1985, public water supply service was provided to areas encompassing a total of 293 square miles, or about 11 percent of the total area of the Region (see Map 10). A total of about 1.4 million persons, representing nearly 80 percent of the resident population of the Region, was served by these public water supply systems.

Figure 11

LAND USE IN THE REGION: 1963, 1970, 1975, 1980, AND 1985



Source: SEWRPC.

Between 1970 and 1985, the area of the Region served by public water supply increased by almost 34 square miles, or about 13 percent. The total number of persons in the Region served by public water supply did not change significantly, however, since population increases in outlying counties were offset by substantial population decreases in Milwaukee County.

All water supplied by public utilities in the Region is drawn either from Lake Michigan or from wells. Lake Michigan was the source of water for about 1.1 million persons, or 80 percent of the total population served by public water supply, in 1985. The remaining 20 percent of the population served by public water utilities, or 279,700 persons, was provided with water from wells.

In addition to the publicly owned water utilities, there were in 1985 numerous private or cooperatively owned water supply systems in operation within Southeastern Wisconsin. More specifically, there were 246 privately owned "community" water supply systems in the Region, defined as those systems which have at least 15 service connections used by year-round residents or which regularly serve at least 25 year-round residents. Typically, such systems serve residential subdivisions, apartment and condominium developments, mobile home parks, and institutions. It is estimated that these 246 systems served a total population of 32,600 persons, or about 2 percent of the total population of the Region, in 1985.

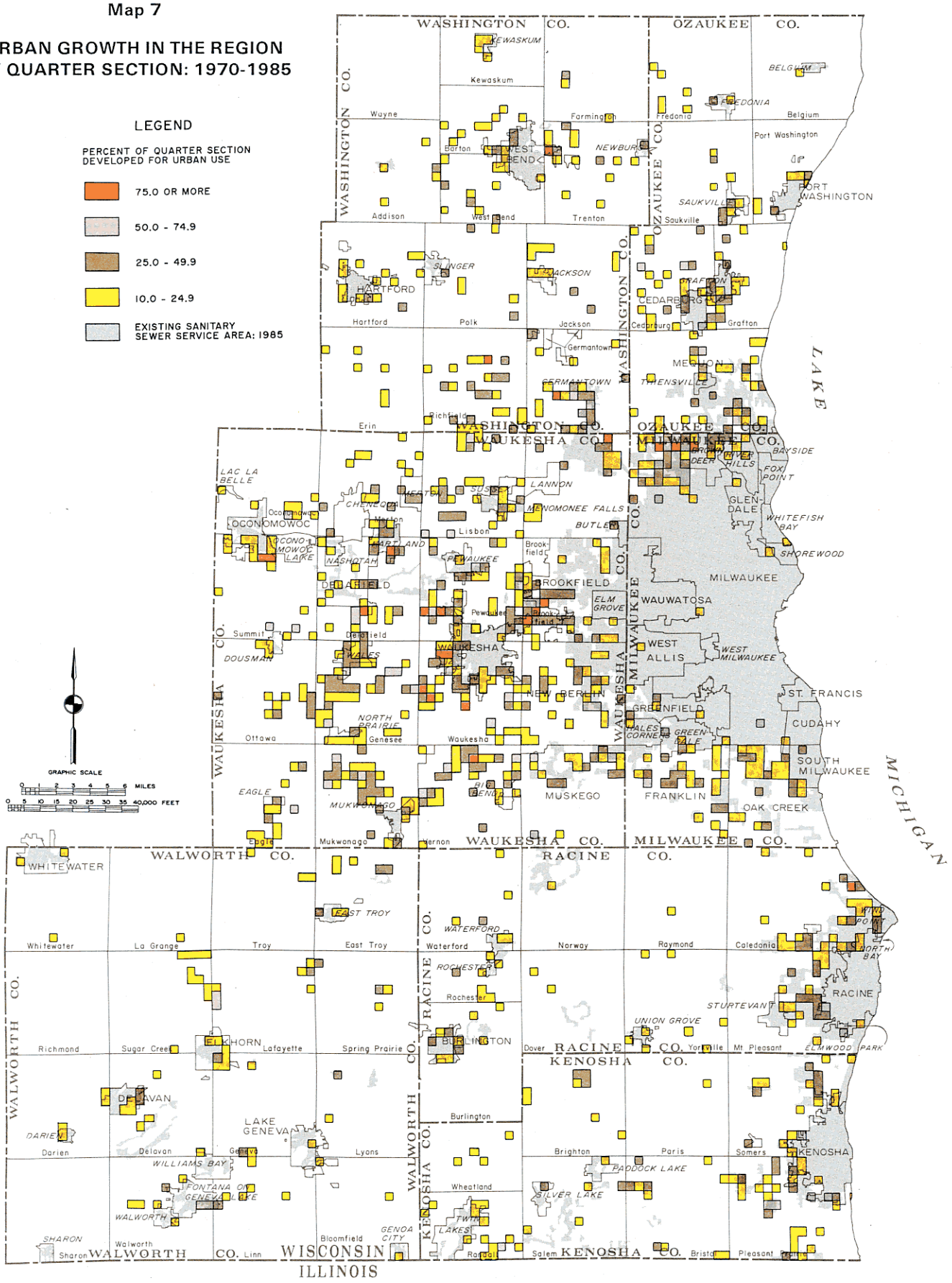
It should be recognized that a subcontinental divide which traverses the Region in a northwesterly-southeasterly direction has important implications on the use of Lake Michigan as a source of potable water within the Region. In general, water from Lake Michigan, which is part of the Great Lakes-St. Lawrence River drainage basin, may be piped to areas west of the divide, which are in the Mississippi River drainage basin, only if provision is made for the return of the spent water to Lake Michigan. The diversion of water from Lake Michigan without provision for the return of the spent water is subject to severe legal restrictions involving the states, the United States, and Canada. In view of the complex legal structure governing the diversion of water from the Great Lakes basin, it is not surprising that such diversions are in fact rare. Generally, areas west of the divide will continue to be served by groundwater, with use of Lake Michigan water limited to those situations where provisions are made for the treatment and return of spent water to the Lake.

Stormwater Drainage

Inventories of stormwater drainage facilities conducted as part of ongoing areawide planning programs indicate that virtually all developed urban areas in the Region are provided with some form of engineered stormwater management system. A key aspect of sound stormwater management is the maintenance of natural drainageways and streams and their associated floodlands and wetland areas, thereby preserv-

Map 7

URBAN GROWTH IN THE REGION BY QUARTER SECTION: 1970-1985

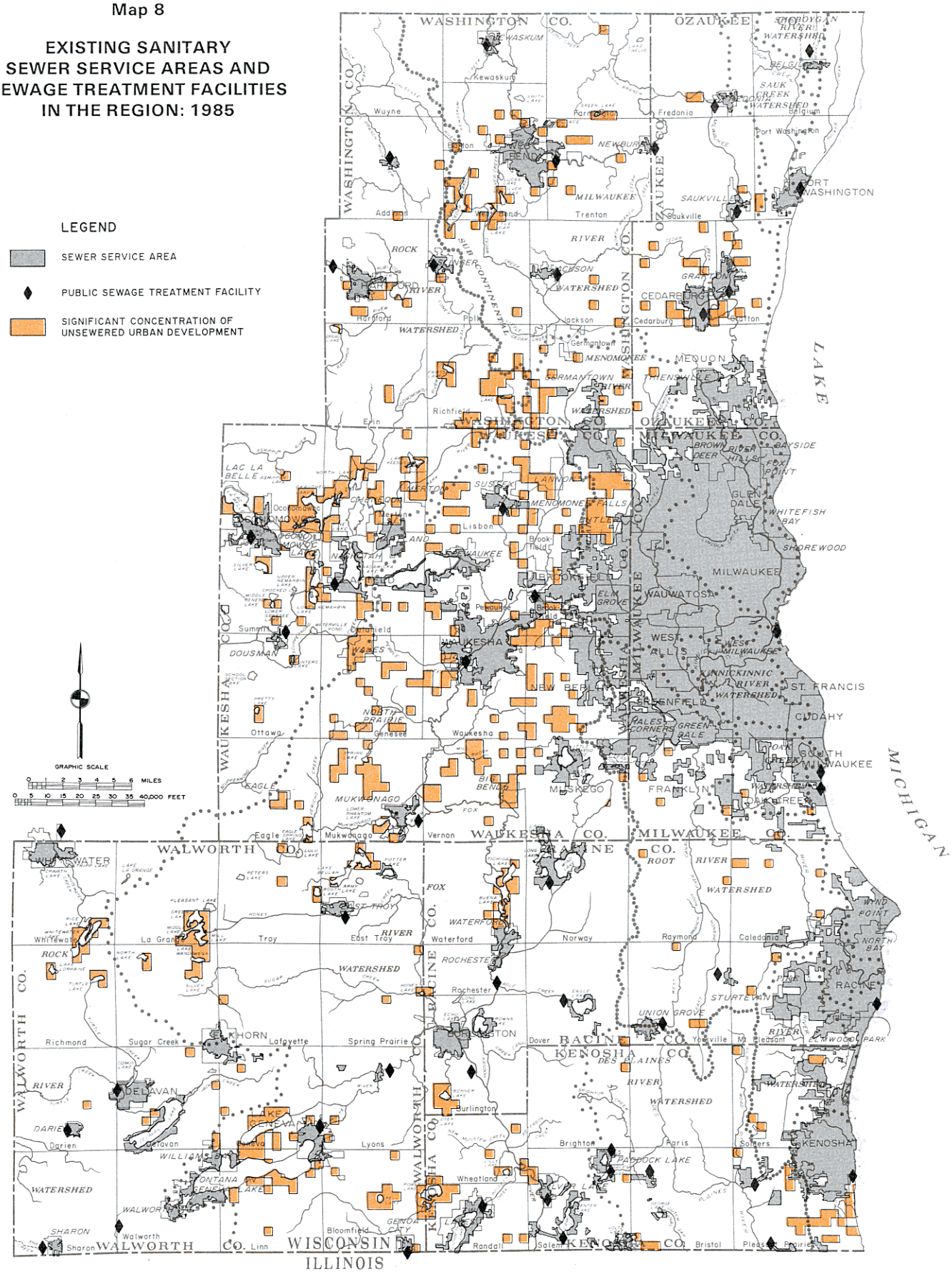


This map indicates the extent of urban development excluding arterial streets and freeways which occurred within the Region between 1970 and 1985 in relation to existing 1985 public sanitary sewer service areas.

Source: SEWRPC.

Map 8

EXISTING SANITARY SEWER SERVICE AREAS AND SEWAGE TREATMENT FACILITIES IN THE REGION: 1985

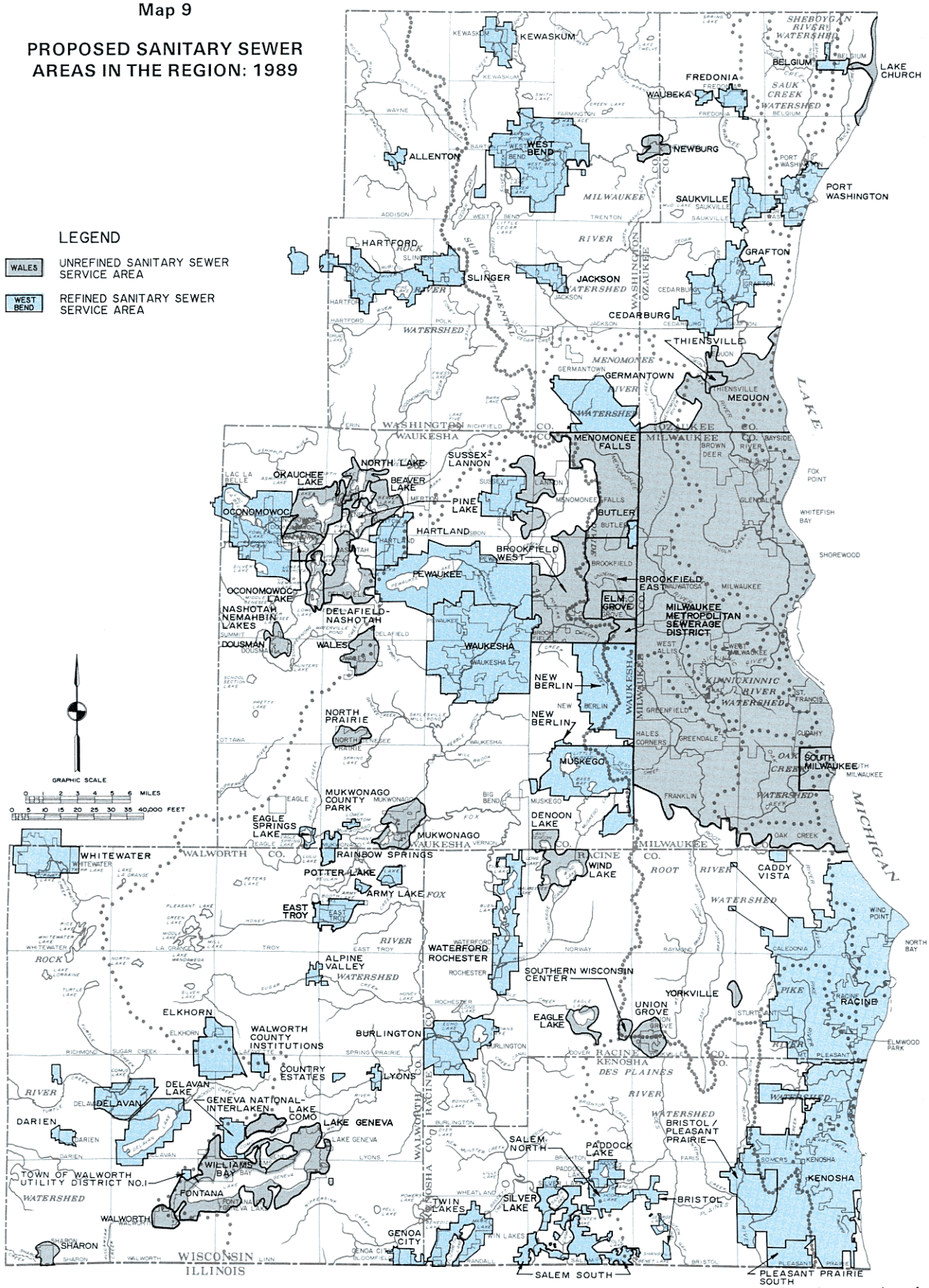


Centralized public sanitary sewer service in the Region was provided to an area of about 377 square miles, or about 14 percent of the total area of the Region, in 1985. About 1,507,800 persons, or about 87 percent of the total resident population of the Region, were served by sanitary sewers. The remaining 13 percent of the resident population, or almost 235,000 persons, relied on private onsite sewage disposal. A relatively small portion of these, about 12,200 persons, lived on farms. The remaining 222,800 persons consisted of urban dwellers generally living in scattered fashion throughout the rural and rural-fringe areas of the Region. Of these 222,800 persons, about 110,200 resided in significant concentrations of urban development shown on this map.

Source: SEWRPC.

Map 9

PROPOSED SANITARY SEWER AREAS IN THE REGION: 1989

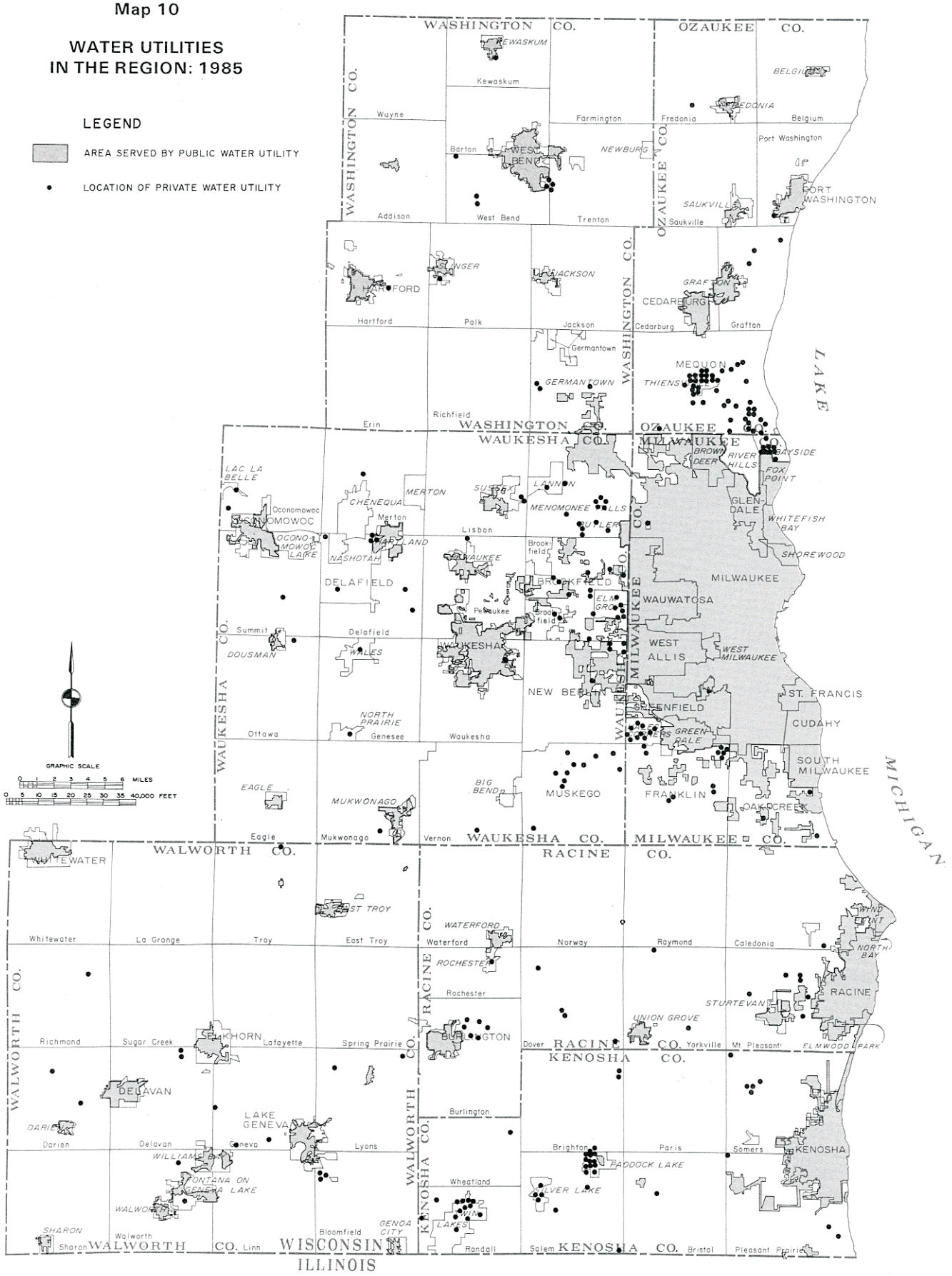


The regional water quality management plan, as amended through local sanitary sewer service area refinement studies, envisions the extension of sanitary sewer service to an additional 391 square miles of land, bringing the total sanitary sewer service area to 768 square miles. The proposed additional service area would be able to accommodate about 287,000 housing units at medium densities of development, thereby serving an additional 688,000 persons.

Source: SEWRPC.

Map 10

WATER UTILITIES IN THE REGION: 1985



Public water supply service was provided to an area of about 293 square miles, or about 11 percent of the total area of the Region in 1985. About 1,389,700 persons, or nearly 80 percent of the resident population of the Region, was served by public water supply systems. Lake Michigan was the source of water for about 80 percent of the population served by public water supply in 1985, with the remaining 20 percent provided by water from wells. In addition to publicly owned water utilities, there were 246 privately owned "community" water supply systems in the Region, which typically serve residential subdivisions, apartment and condominium developments, mobile home parks, and institutions. These private systems served an estimated 32,600 persons, or about 2 percent of the total regional population, in 1985.

Source: SEWRPC.

ing their inherent natural storage and conveyance capacities. The adopted regional land use plan recommends that all new urban development should be located in areas suitable for urban land uses and that urban development not be allowed to intrude into natural drainageways, floodlands, and wetlands.

Natural Gas and Electric Power Utilities

Natural gas and electric power service may be considered to be virtually ubiquitous throughout Southeastern Wisconsin, and the lack of such service therefore cannot be considered to be a major constraint on the location and intensity of urban development in the Region.

AIR QUALITY

In 1974, the Commission, in cooperation with the Wisconsin Department of Natural Resources, undertook an extensive air quality management planning effort. The findings and recommendations of this effort are set forth in SEWRPC Planning Report No. 28, A Regional Air Quality Attainment and Maintenance Plan for Southeastern Wisconsin: 2000, June 1980. The air quality management plan resulting from this effort was adopted by the Commission in June 1980. Since that adoption, considerable progress has been made in implementing the plan.

There has been a general improvement in air quality conditions in Southeastern Wisconsin since 1980, with a reduction in most major pollutants over the past decade. Ozone pollution is the only remaining significant air pollution problem within the Region. It is believed that ozone problems in the Region are attributable in large measure to precursor emissions from the large urban areas located to the south and southeast of the Region. The ozone problem thus remains largely beyond the control of the Region and State and can be effectively addressed only through a multi-state abatement effort.

PARK, OPEN SPACE, AND HISTORIC SITES

Park and related outdoor recreation sites and historic sites, while not strictly defined as part of the underlying natural resource base, are closely linked to it. Park and related outdoor recreation sites and historic sites may be enhanced by the presence of natural resource features; conversely, the commitment of land to park and open space use contributes to the preservation of existing resource features. The park and related outdoor recreation sites and historic sites existing within the Region in 1985 are described in this section. Also described are open space sites with particular scientific or cultural value which have been specifically identified as "State natural areas" in recognition of the importance of the plant and animal communities present.

Park and Related Outdoor Recreation Sites

There was a total of 2,608 publicly and privately owned park and related outdoor recreation sites in the Region in 1985. In combination, these sites encompassed a total of about 178 square miles, or about 7 percent of the total area of the Region.

Publicly owned sites accounted for 1,696 sites, or about 65 percent of all park and related outdoor recreation sites, and encompassed about 132 square miles, or about 74 percent of the total recreation site area within the Region. Publicly owned sites include, among others, large State-owned parks, recreation areas, and hunting grounds; county, city, village, and town parks; public school outdoor recreation areas; special-use sites such as zoos, fairgrounds, and botanical gardens; and urban green spaces. The largest publicly owned sites, sites at least 100 acres in area, are shown on Map 11.

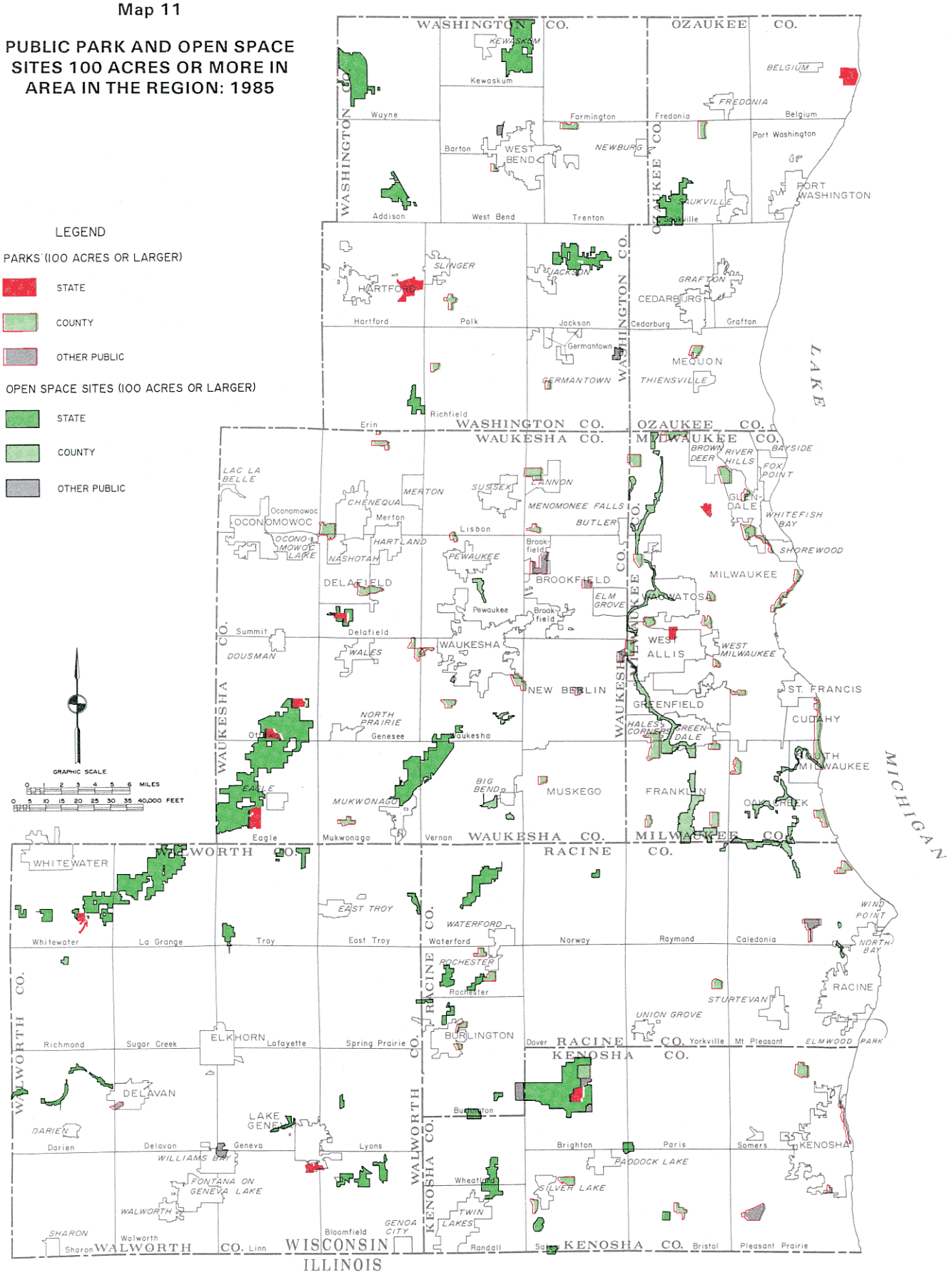
Privately owned sites accounted for 912 sites, or about 35 percent of all park and related outdoor recreation sites in the Region, and encompassed about 46 square miles, or about 26 percent of the Region's total outdoor recreation site area. These sites include a wide range of outdoor recreation areas, including sites providing opportunities for camping, golf, picnicking, and swimming; hunting grounds; nature preserves; and recreation areas associated with private schools. Many of the privately owned outdoor recreation areas in the Region are water-oriented sites clustered along the shores of inland lakes and rivers.

Historic Sites

A variety of inventories and surveys of historic sites have been conducted by various units and agencies of government in the Region. The results of these inventories and surveys, on file at such agencies as the State Historical Society of Wisconsin, indicate that there are more than 14,000 historic sites in Southeastern Wisconsin. Particularly significant historic sites are listed

Map 11

PUBLIC PARK AND OPEN SPACE SITES 100 ACRES OR MORE IN AREA IN THE REGION: 1985



There were about 1,700 publicly owned park and open space sites in the Region in 1985. Shown above are the largest of these publicly owned sites, those which are 100 acres or greater in area. Most of the park sites shown above provide opportunities for a variety of resource oriented outdoor recreational activities. Also shown as park sites are large special use outdoor recreation sites, such as the Milwaukee County Zoo and Wisconsin State Fair Park. The open space sites shown above include large tracts of land which have been publicly acquired for resource preservation purposes, with facility development generally limited to that necessary to allow public access to, and enjoyment of, those areas.

Source: SEWRPC.

on the National Register of Historic Places. As of 1985, a total of 254 sites and 20 districts in Southeastern Wisconsin were listed on the National Register (see Map 12). The 20 historic districts together encompassed a total of just under 800 acres. Properties listed on the National Register receive limited protection from encroachment by Federally licensed or assisted projects and State facilities. Moreover, listed properties may receive Federal matching grants for restoration or rehabilitation as well as certain tax benefits. Careful consideration should be given in any natural areas protection and management planning program to preserve and protect the historic cultural as well as the natural heritage of the Region.

State Natural Areas

Natural areas, as defined by the Wisconsin Natural Areas Preservation Council, are tracts of land or water so little modified by human activity, or sufficiently recovered from the effects of such activity, that they contain intact native plant and animal communities believed to be representative of the pre-European-settlement landscape. Natural areas are classified into one of the following four categories: Designated State Natural Areas, Natural Areas of Statewide or Greater Significance, Natural Areas of Countywide or Regional Significance, and Natural Areas of Local Significance. Classification of an area into one of these four categories is based upon consideration of the diversity of plant and animal species and community types present, the structure and integrity of the native plant or animal community, and the extent of disturbance by human activity, such as logging, grazing, water-level changes, and pollution.

Prior to the comprehensive inventory of natural area sites in Southeastern Wisconsin undertaken under the regional natural areas protection and management planning program and set forth in Chapter VI of this report, several studies were conducted in various parts of the Region by public agencies and by area naturalists. As of 1989, 312 natural areas were thus identified in Southeastern Wisconsin through these ad hoc studies (see Map 13). Forty-seven sites, or 15 percent of this total, are Natural Areas of Statewide or Greater Significance; the remaining 265 sites, or 85 percent of the total, are Natural Areas of Countywide or Regional Significance or Natural Areas of Local Significance. About one-half of the identified natural areas are in public or other protective ownership and properly managed. However, only about one-third of the total area of about 39 square miles of the identified natural areas are in public or other protective ownership and properly managed. The regional natural areas protection and management planning program is intended to systematically identify all remaining high-quality natural areas and critical species habitats, as well as significant archaeological and geological sites, and to develop a plan for the protection and management of those areas and habitats.

PHYSIOGRAPHY

Southeastern Wisconsin lies entirely within the Eastern Ridges and Lowland Physiographic Province. The glacial landflows of the Region are of natural significance. The Region contains outstanding examples of such features as kames, eskers, crevasse fills, kettle holes, and glacial spillways. These features have intrinsic scientific, instructional, educational, and aesthetic values. By providing landscape diversity, these features provide a variety of wildlife and plant community habitats, and contribute to the biodiversity of the Region.[7]

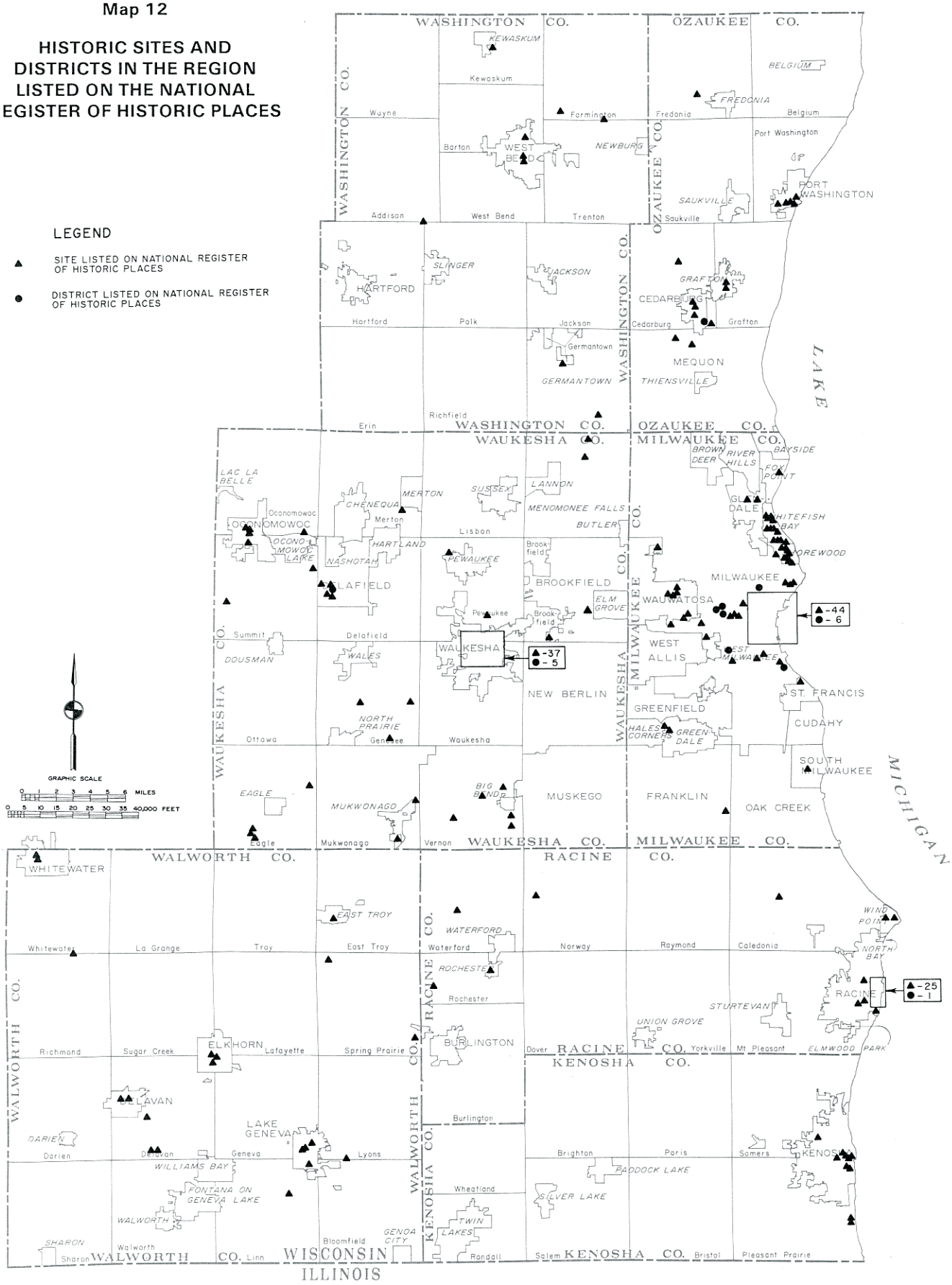
Such landforms and physical features of the Region as the topography and drainage pattern are important determinants of regional growth and development. The physiography of an area not only must be considered in sound planning and development efforts, but also in terms of how it contributes directly to the natural beauty and overall quality of life in that area.

The Southeastern Wisconsin Region is located in the Upper Midwest between Lake Michigan on the east, the Green Bay-Lake Winnebago lowlands on the north, the Rock River basin on the west, and the low dunes and swampland at the headwaters of the Illinois River on the south. The seven-county Region extends for approximately 52 miles from east to west at its widest point and approximately 72 miles from north to

[7]*Rachel Krebs Paull and Richard A. Paull, Geology of Wisconsin and Upper Michigan, Kendall/Hunt Publishing Co., Dubuque, Iowa, 1977.*

Map 12

HISTORIC SITES AND DISTRICTS IN THE REGION LISTED ON THE NATIONAL REGISTER OF HISTORIC PLACES

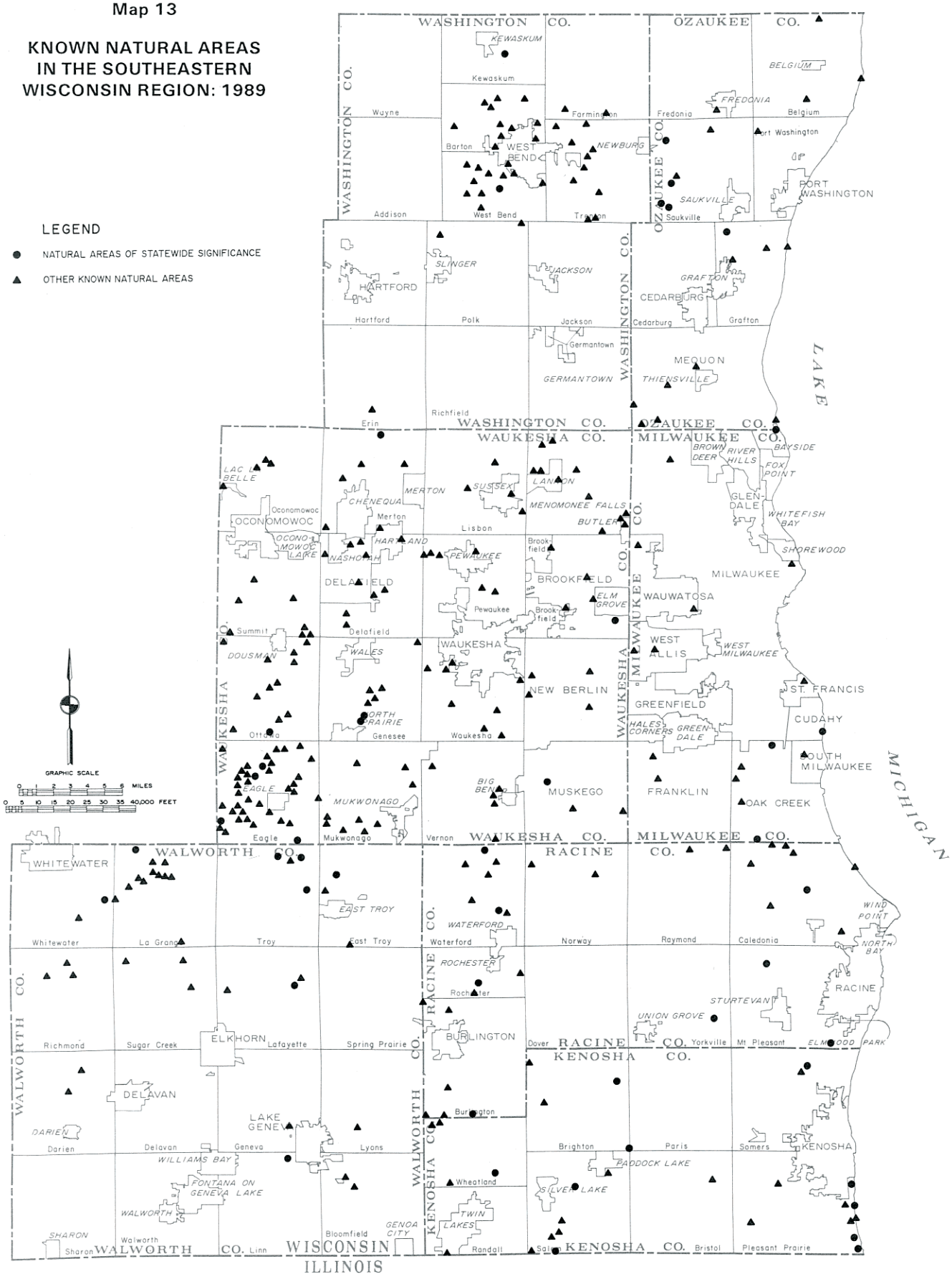


The history and cultural heritage of southeastern Wisconsin is reflected in an abundance of historic sites. Various units and agencies of government have identified more than 14,000 historic sites in the Region. The most significant of these sites are listed on the National Register of Historic Places. The locations of the 254 sites and 20 districts in the Region listed on the National Register of Historic Places are shown on this map.

Source: The State Historical Society of Wisconsin and SEWRPC.

Map 13

KNOWN NATURAL AREAS IN THE SOUTHEASTERN WISCONSIN REGION: 1989



This map identifies the location of more than 300 natural areas which have been identified in the Region. Such areas consist of tracts of land and water so little modified by human activity, or sufficiently recovered from the effects of such activity, that they contain intact native plant and animal communities believed to be representative of the pre-European-settlement landscape. The sites shown on this map were identified on the basis of studies conducted for various parts of the Region by public agencies and area naturalists. The regional natural area protection and management planning program is intended to systematically identify all remaining high-quality natural areas and critical species habitats, as well as significant archaeological and geolocial sites, and to develop a plan for the protection and management of those areas and habitats.

Source: SEWRPC.

south. The Region encompasses approximately 2,613 square miles of land area and 76 square miles of inland water area, exclusive of Lake Michigan, or a total gross land and water area of approximately 2,689 square miles. Topographic elevations range from approximately 580 feet above sea level at the Lake Michigan shore to about 1,320 feet at Holy Hill in southwestern Washington County. The Region lies astride a major subcontinental divide between the upper Mississippi River and the Great Lakes-St. Lawrence River drainage basins.

Physiographic and Topographic Features

Glaciation has largely determined the physiography and topography as well as the soils of the Region. The physiographic features, that is, surficial land forms of Southeastern Wisconsin, are shown on Map 14. The variation in elevation within the Region is shown in a generalized manner on Map 15. There is evidence of four major stages of glaciation in the Region. The last and most influential in terms of present physiography and topography was the later Wisconsinan stage, which is believed to have ended in the State about 11,000 years ago.

The dominant physiographic and topographic feature is the Kettle Moraine, an interlobate glacial deposit, or moraine, formed between the Green Bay and Lake Michigan tongues, or lobes, of the continental glacier which moved in a generally southerly direction from its origin in what is now Canada. Because of its still predominantly rural character and its exceptional natural beauty, the Kettle Moraine and the surrounding area is, and may be expected to continue to be, subjected to increasing pressure for urban development.

The remainder of the Region is covered by a variety of glacial landforms and features, including rolling landscapes of heterogeneous material deposited beneath the ice; end moraines, consisting of material deposited at the forward margins of the ice sheet; lacustrine basins, or former lake sites; outwash plains, formed by the action of flowing glacial meltwater; drumlins, or elongated mounds of glacial deposits streamlined parallel to the flow of the glacier; and eskers, which are long, narrow, sinuous ridges of sand and gravel deposited by a stream flowing on, within, or beneath a stagnant glacier.

Glacial landforms are of economic significance because some are prime sources of sand and gravel for highway and other construction purposes. Many of the larger topographic depressions of the Region, including the kettle holes, have developed into the numerous lakes which dot large areas of western Washington, Waukesha, and Walworth Counties and which are popular both as recreational areas and as residential centers.

Surface Drainage

Surface drainage is poorly developed but highly diverse within the Region because of the relatively recent glaciation. The land surface is complex as a result of being covered by glacial drift, containing thousands of closed depressions that range in size from mere potholes to large areas. Significant areas of the Region are covered by wetlands, and many streams are mere threads of water through these wetlands. The 11 major watersheds of Southeastern Wisconsin are depicted on Map 16, along with the surface drainage pattern of the major perennial stream system.

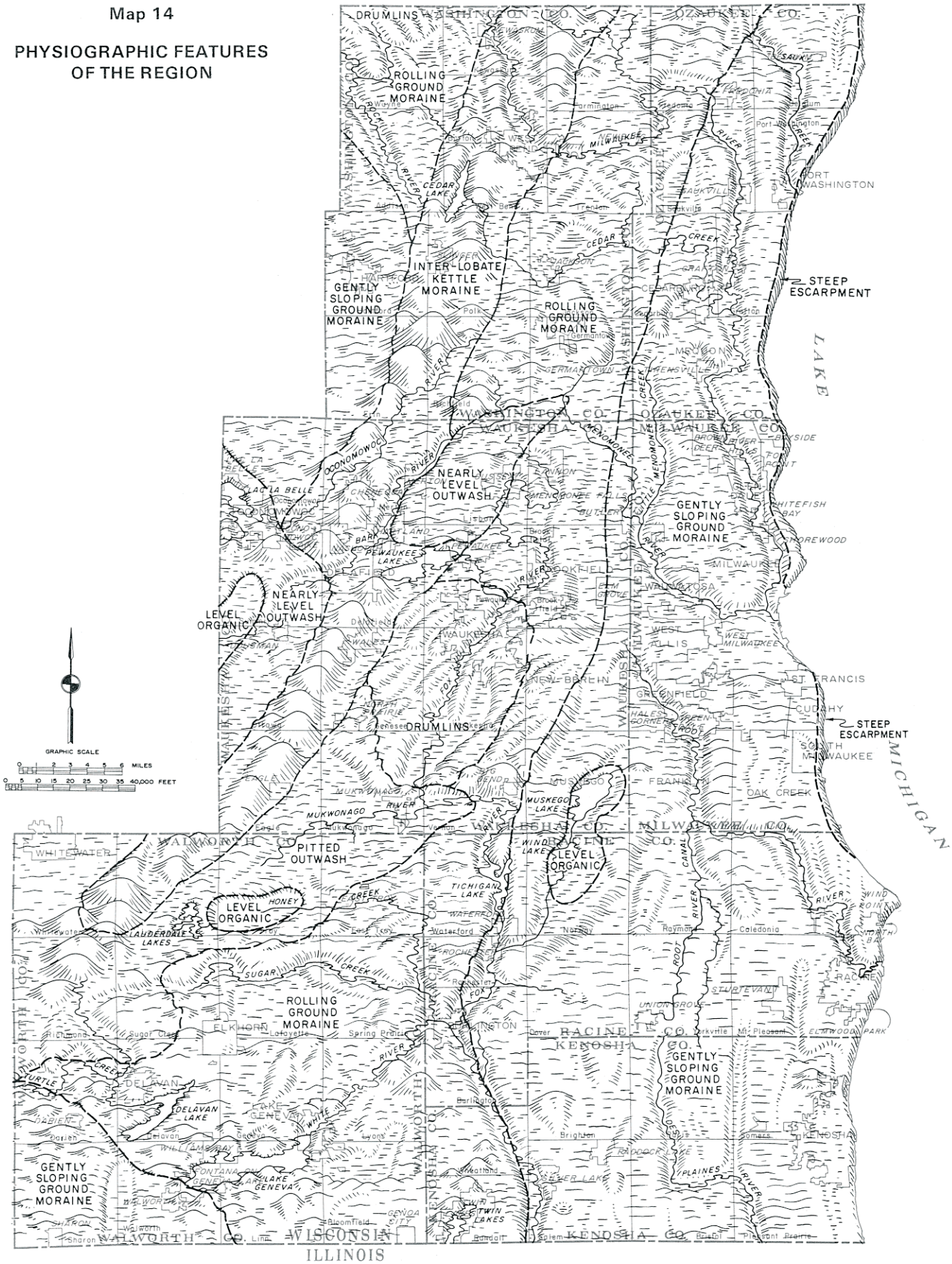
A major subcontinental divide, oriented in a generally northwesterly-southeasterly direction, approximately bisects the Region; about 1,680 square miles west of the divide, or 62 percent of the Region, drain to the Mississippi River, while the remaining 1,009 square miles, or 38 percent, are tributary to the Great Lakes-St. Lawrence River drainage basin. The subcontinental divide not only exerts a major physical influence on the gross drainage pattern of the Region, but, as noted above, also carries with it certain legal constraints on the diversion of water across the divide.

GEOLOGY

The physical landscape of Southeastern Wisconsin and its natural areas are directly related to the geologic history of the Region. Knowledge of bedrock and of the surficial deposits overlying the bedrock is important to natural areas protection and management planning. Bedrock conditions and the overlying surficial deposits directly affect the construction costs of such urban development projects and supporting public works facilities as streets and highways and public utilities, particularly those involving extensive trenching or tunneling. Moreover, the placement of urban improvements in relation to the bedrock and surficial deposits may directly or indirectly affect the quality and quantity of the groundwater resources of the Region.

Map 14

PHYSIOGRAPHIC FEATURES OF THE REGION

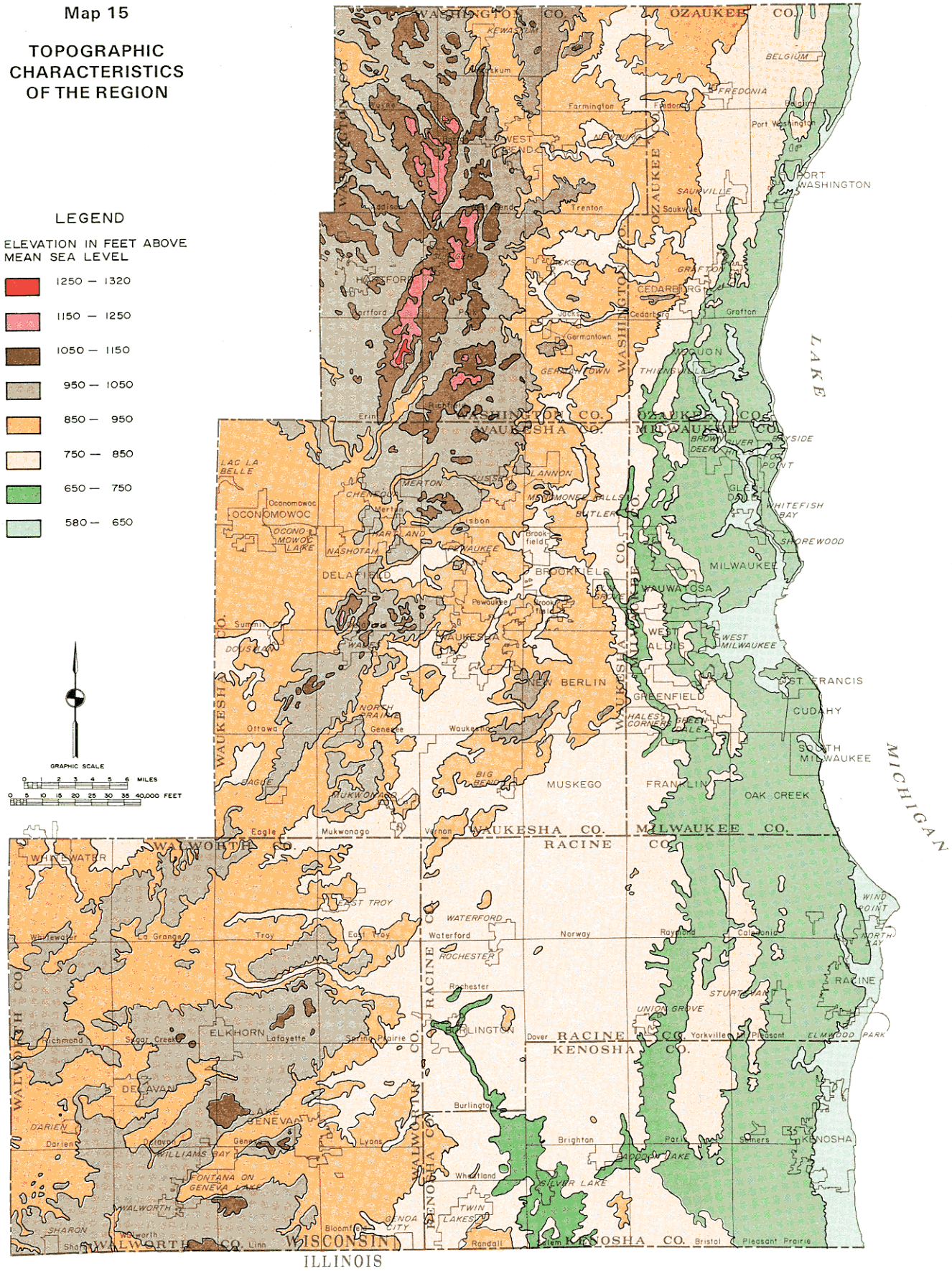


Physiographic features, or surficial land forms, throughout southeastern Wisconsin, were largely determined by repeated stages of glaciation, the last of which, the Wisconsin stage, is believed to have ended in the State about 11,000 years ago. Included in the great variety of interesting and attractive glacial landforms covering the Region are ground and end moraines, abandoned lake basins, outwash plains, kames, eskers, and drumlins. The dominant feature is the Kettle Moraine, an interlobate moraine along a northeast-to-southwest diagonal across the western part of the Region formed by and between the Green Bay and Lake Michigan lobes of the continental glacier.

Source: SEWRPC.

Map 15

TOPOGRAPHIC CHARACTERISTICS OF THE REGION

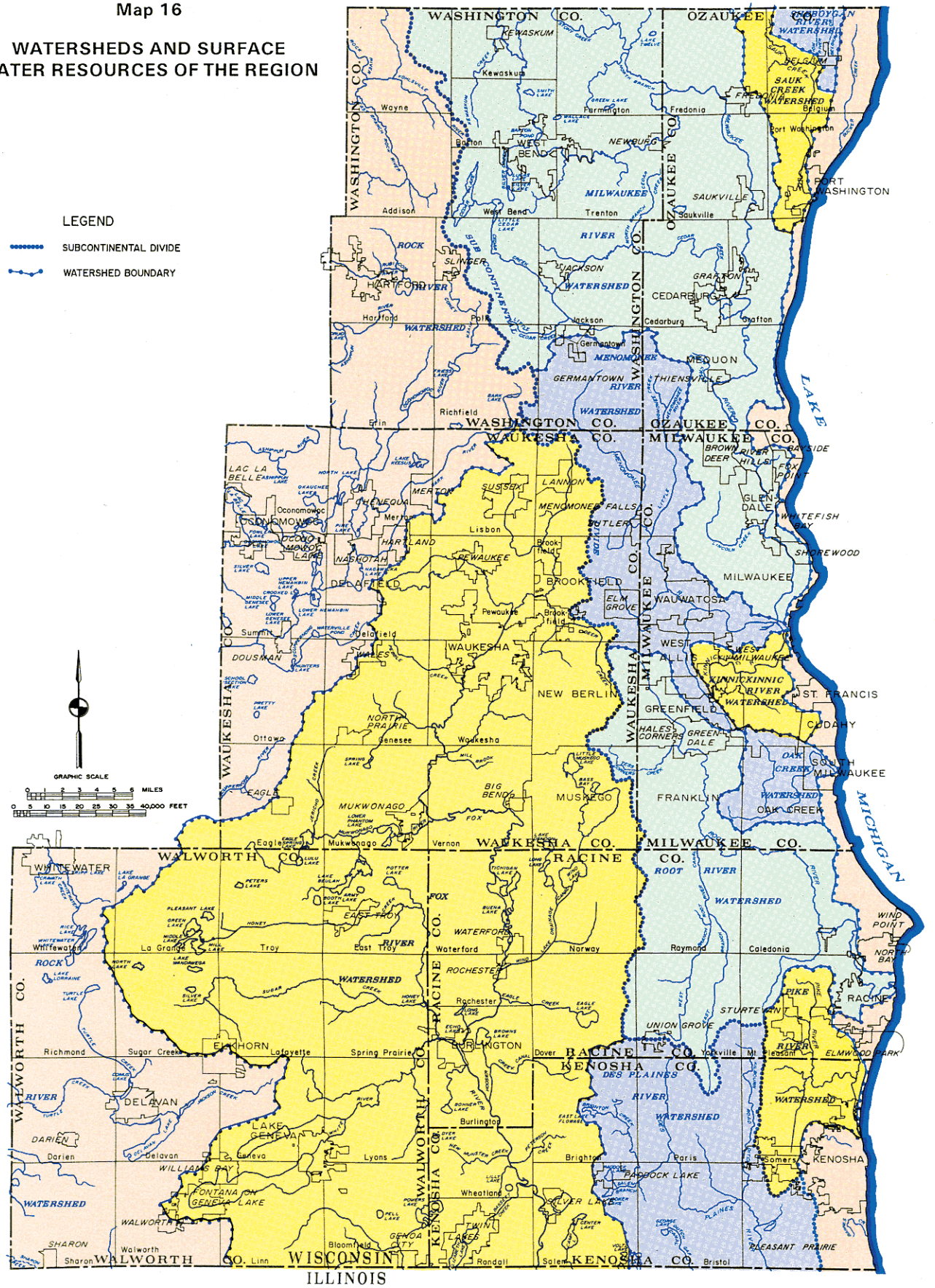


The topography, or relative elevation, of the land surface throughout the Region is determined by the configuration of the bedrock geology combined with overlying glacial deposits. Elevations within southeastern Wisconsin range from a low of about 580 feet above sea level on the Lake Michigan shore to a high of 1,320 feet at Holy Hill in southwestern Washington County. Topographic highs and some of the most attractive landscapes and scenic views in the Region are coincident with the interlobate Kettle Moraine area in the western portion of the Region.

Source: SEWRPC.

Map 16

WATERSHEDS AND SURFACE WATER RESOURCES OF THE REGION

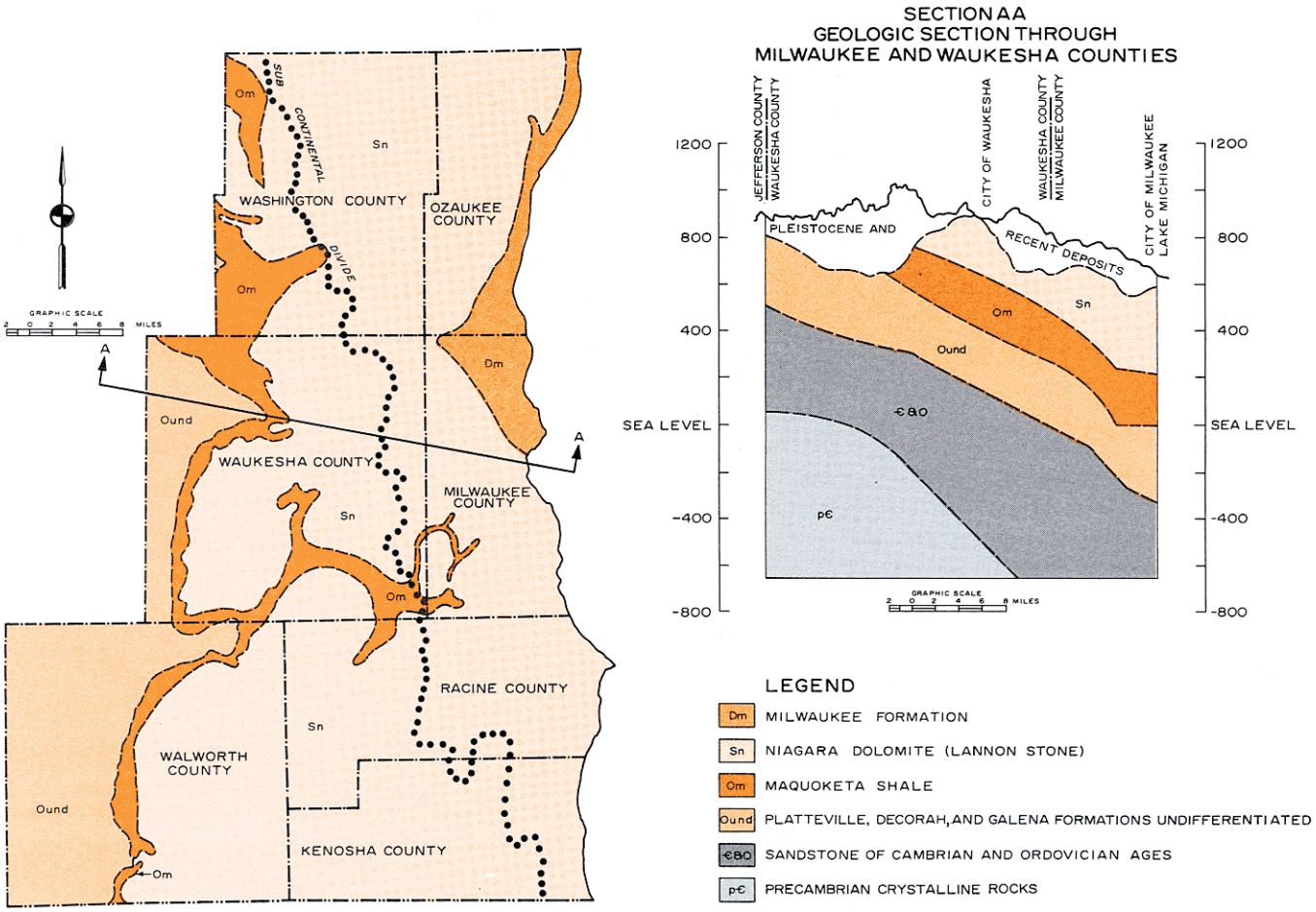


A subcontinental divide traverses the Southeastern Wisconsin Region. That part of the Region lying east of this divide is tributary to the Great Lakes-St. Lawrence River drainage system, while that part of the Region lying west of this divide is tributary to the Mississippi River drainage system. This subcontinental divide has certain important implications for water resources planning and management, since major diversions of water across this divide are restricted by law and by interstate and international charter. The generally dendritic surface water drainage pattern of the Region, which is the result of the glacial land forms and features, divides the Region into 11 individual watersheds, three of which, the Des Plaines, Fox, and Rock River watersheds, lie west of the subcontinental divide. In addition to the 11 watersheds, there are numerous small catchment areas along the Lake Michigan shoreline that drain directly to the lake, which areas together may be considered to comprise a twelfth watershed.

Source: SEWRPC.

Figure 12

MAP AND CROSS-SECTION OF BEDROCK GEOLOGY IN THE REGION



Source: SEWRPC.

Bedrock

The bedrock formations underlying the unconsolidated surficial deposits of Southeastern Wisconsin consist of Cambrian, Ordovician, Silurian, and Devonian Period rocks of the Paleozoic Era that attain a thickness in excess of 1,500 feet along the eastern limits of the Region; these are in turn underlain by older, predominantly crystalline rocks of the Precambrian Era. The bedrock geology of the Region is shown in Figure 12 by means of a map of the surface of the bedrock supplemented by a representative vertical section.

Bedrock formations in the Region dip gently down toward the east at an average slope of about 20 feet per mile, with the result that the bedrock lying immediately beneath the unconsolidated surficial deposits in the western extremities of the Region includes older rocks of the Ordovician Period, whereas in the east, along Lake Michigan, younger rocks of the Silurian and Devonian Periods lie immediately beneath the surficial deposits.

Surficial Deposits

The bedrock of the Region is, for the most part, covered by deep, unconsolidated glacial deposits, attaining a thickness in excess of 500 feet in some buried preglacial valleys. Bedrock lies within 20 feet of the ground surface in areas of the Region which together total only about 150 square miles in extent. In a few localized areas, the bedrock is actually exposed at the surface. These shallow drift areas and rock outcrops tend to occur in Washington and Waukesha Counties along a northeasterly-southwesterly alignment generally paralleling the interlobate Kettle Moraine, reflecting the presence of a preglacial ridge known as the Niagaran escarpment. These rock outcrops represent the only "cliffs" in the Region, supporting a unique shaded and exposed

cliff biota. Map 17 depicts the spatial variation of the thickness of surficial deposits overlying the bedrock which may be generally expected within the Region.

MINERAL AND ORGANIC RESOURCES

Sand and gravel, building stone, and organic material are the three principal mineral and organic resources in the Region with significant commercial value. The commercial utilization of the Region's mineral resources, which is limited to the mining of nonmetal deposits, is primarily directed toward supplying the construction materials needed for the continuing development of Southeastern Wisconsin. Planning in the Region should take into consideration the location of mineral and organic resources, since urbanization of lands overlying these resources may make it economically impossible to utilize these resources efficiently in the future. Failure to recognize these resources in the planning process may eventually result in severe shortages and concomitant increases in the cost of those materials, which would ultimately be reflected in both consumer prices and the community tax structure.

Sand and Gravel

The Region has an abundant supply of sand and gravel deposits as a result of its glacial history. The deposits of highest quality are found in glacial outwash areas, particularly near the Kettle Moraine, where the washing action of flowing meltwaters has sorted the unconsolidated material to form more or less homogeneous, and therefore commercially attractive, deposits.

Deposits of sand and gravel are scattered throughout the Region. The greatest concentration of commercial surface mining activity, however, occurs in Waukesha County, because sand and gravel deposits in that area have the most favorable quantity and quality characteristics. Sand and gravel deposits are important sources of concrete aggregate, gravel for road subgrade and surfacing, sand for mortar, and molding sand.

Stone Quarries

Niagaran dolomite, which lies immediately below the glacial deposits throughout most of the Region (see Figure 12), has commercial value where it is found relatively close to the ground surface, both as a dimensional building stone and, when crushed, as an aggregate for construction or as an agricultural soil conditioner. The dolomite is mined in open quarries, with all the major commercial operations within the Region that produce stone for building purposes are located in Waukesha County, concentrated in rock outcrop areas (see Map 17) in the northeastern portion of that County. Waukesha County quarries yield thinly bedded, compact, and fine-grained dolomite well suited for use as dimensional building stone. Although it is in fact dolomite, the high-quality dimensional building stone commercially mined and produced in Waukesha County is commonly known or referred to as Lannon stone or limestone, that is, primarily calcium carbonate. Crushed limestone is produced not only in Waukesha County but also at other quarries throughout the Region.

Organic Deposits

Organic deposits are widely distributed throughout Southeastern Wisconsin in small, scattered, low-lying, poorly drained areas. At these locations, excessive moisture inhibits oxidation and decay of the plant residues, thus producing organic peat deposits and muck soils with significant fertilization potential. These organic deposits overlie the glacial drift of the Region and exhibit variable depths ranging from less than a foot to many feet.

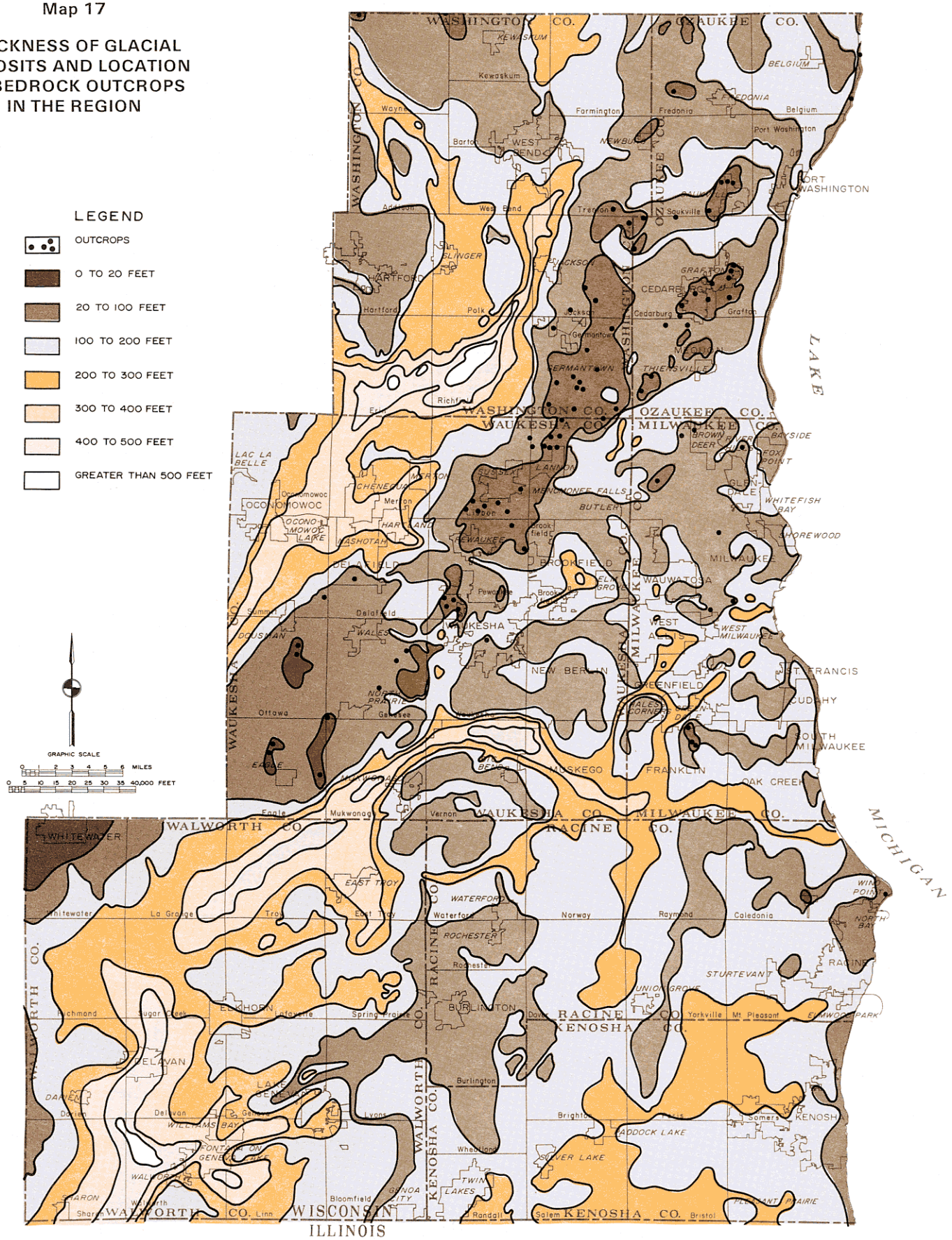
Organic deposits have environmental value, often covering areas suitable for certain kinds of wildlife habitat and recreation areas and have commercial value in their ability to support field crops like corn or soybeans, specialized crops such as vegetables and sod. Peat is excavated from open pits and marketed as an additive to improve soils for potted plants, gardens, and greenhouse nurseries. Agricultural use of organic deposits is contingent upon bed depth sufficient for the development and maintenance of artificial drainage.

SOILS

In a region such as Southeastern Wisconsin, with its wide range of land uses, soil properties exert a strong influence on the use of land, and especially on the impacts of changes in land use. This is true because soil forms the boundary layer between the solid earth and the atmosphere, where maximum activity by humans, plants, and animals occurs. Thus, any comprehensive planning effort needs to examine not

Map 17

THICKNESS OF GLACIAL DEPOSITS AND LOCATION OF BEDROCK OUTCROPS IN THE REGION



Most of the Region is covered by unconsolidated glacial drift deposited by continental glaciers. This drift attains a thickness in excess of 500 feet in some preglacial valleys. Dolomitic bedrock lies within 20 feet of the surface or is actually exposed as outcrops in areas totaling about 150 square miles. The northeasterly-southwesterly alignment of the rock outcrops indicates the presence of a buried preglacial bedrock ridge, an important consideration in planning for, and construction of, septic tank systems, public sewerage systems, and other public works projects involving extensive trenching and excavation.

Source: T. O. Friz, Man and the Materials of Construction, How They Interrelate in the Seven Counties of Southeastern Wisconsin, Ph.D. Dissertation, The University of Wisconsin-Madison, 1969.

only how soils and land are currently used, but also how they can best be used and managed over time.

A detailed areawide soil survey was carried out under the aegis of the Regional Planning Commission to gather, compile, and publish the information needed about the soils of Southeastern Wisconsin for preparation of a variety of land-related plans. The results of the soil survey were published in SEWRPC Planning Report No. 8 and in five soil survey reports with maps published by the U. S. Department of Agriculture, Soil Conservation Service.[8]

Soil surveys lend themselves to planning applications because the properties and qualities of soils which are recorded in making a detailed soil survey can be interpreted to assist in the development and selection of desirable spatial distribution patterns for residential, commercial, industrial, recreational, and agricultural land use development and in the selection of transportation facility locations. Soil survey information can also assist in the selection and development of wildlife habitat and other environmentally oriented land uses.

General Soil Groups in the Region

Map 18 shows the location and spatial extent of seven broad groups of soils in Southeastern Wisconsin. The map is useful for gaining a broad perspective on the patterns of the soils in the Region and the implications of those patterns for regional development. For any specific application of the soils data, however, it is imperative that the detailed soil survey maps and reports noted above be referred to.

The soils designated as Group A on Map 18 cover about 29 percent of the Region and occupy gently rolling and rolling glaciated uplands. Predominant soils are of medium texture, permeable to water and air, easily penetrated by plant roots, and often contain appreciable amounts of carbonate minerals in the subsoil. Stones, cobbles, and gravels are common in and on many soils. This group of soils occurs in broad belts on either side of the Kettle Moraine. The belt east of the Kettle Moraine often abuts soils in Group D, which have formed from finer textured glacial deposits on more gently undulating landscapes. The major soils in Group A have been responsive to good management when farmed for crops common to the Region, can be protected from excessive erosion by readily available practices, have good internal and surface drainage, and possess characteristics which make them well suited for all types of urban development. Most soils in Group A developed under a vegetative cover of deciduous forest or prairie savanna. These soils can support a wide variety of native introduced plant species.

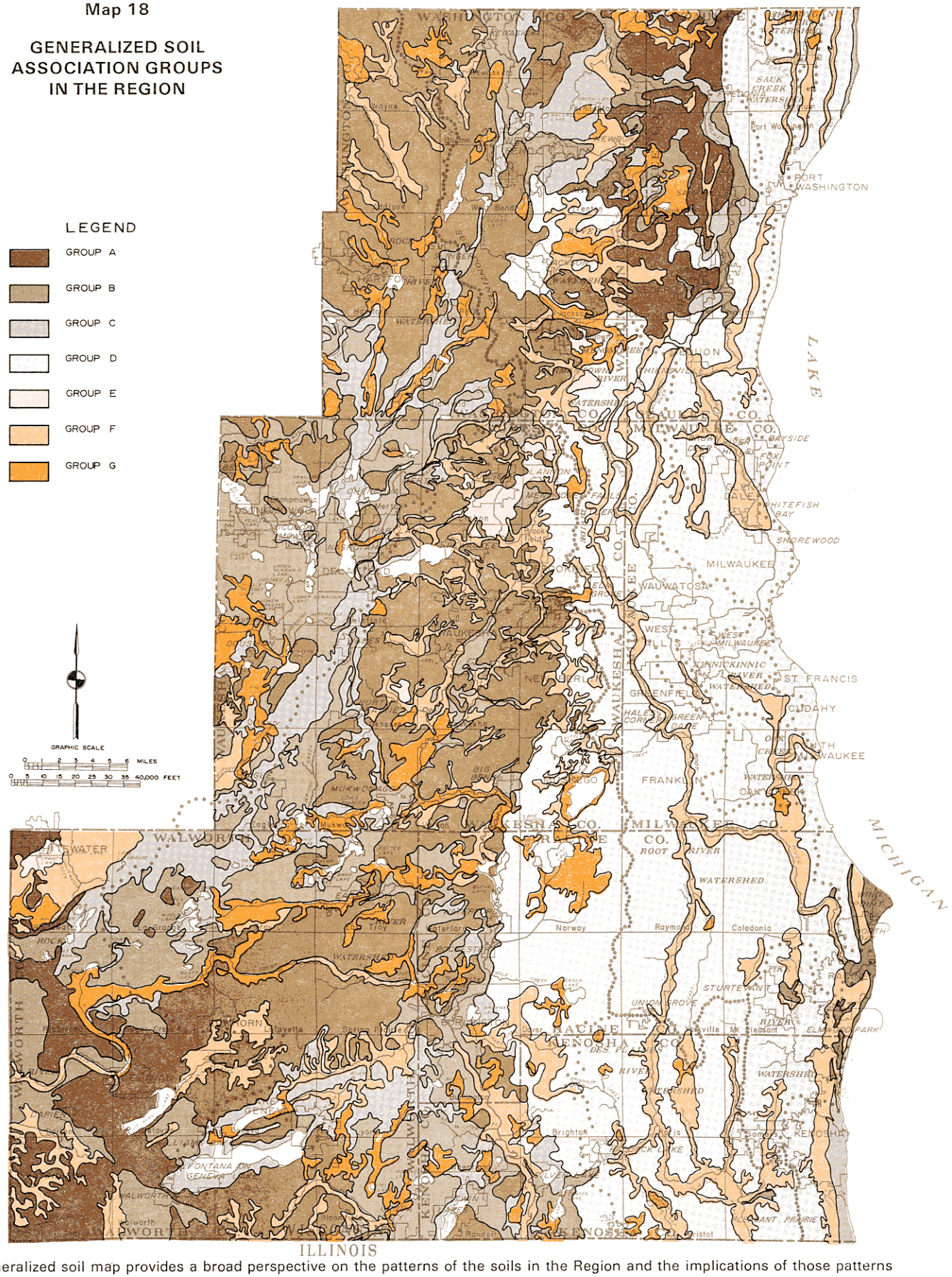
The predominant soils in Group B are loamy to somewhat sandy, occupy broad plains of sand and gravel washed out from the Kettle Moraine and also occur along major stream valleys which carried meltwater of the glacial ice sheets. Smaller bodies of these soils are also common in the Kettle Moraine and along parts of the Lake Michigan shore. This group of soils covers approximately 14 percent of the Region. The major soils are suited for farming, although crops may suffer from lack of water during dry weather unless irrigated. The soils, landforms, and underlying sandy-gravelly outwash in this group have few limitations for urban land uses. These soils developed under a vegetative cover of deciduous hardwood forests.

The heart of the Kettle Moraine is included in Group C. Pronounced changes in topography, soils, and underlying glacial materials occur within short distances. Short, steep slopes and pits or kettles with no surface drainage outlets are common, and shallow, gravelly soils formed from the glacial deposits predominate. Some closed depressions contain wet soils or glacial lakes. This group of soils covers approximately 8 percent of the Region. Limitations for both

[8] *SEWRPC Planning Report No. 8, Soils of Southeastern Wisconsin, June 1966; U. S. Department of Agriculture, Soil Conservation Service, Soil Survey of Kenosha and Racine Counties, Wisconsin, 1970; U. S. Department of Agriculture, Soil Conservation Service, Soil Survey of Milwaukee and Waukesha Counties, Wisconsin, 1971; U. S. Department of Agriculture, Soil Conservation Service, Soil Survey of Ozaukee County, Wisconsin, 1970; U. S. Department of Agriculture, Soil Conservation Service, Soil Survey of Walworth County, Wisconsin, 1971; U. S. Department of Agriculture, Soil Conservation Service, Soil Survey of Washington County, Wisconsin, 1971.*

Map 18

GENERALIZED SOIL ASSOCIATION GROUPS IN THE REGION



This generalized soil map provides a broad perspective on the patterns of the soils in the Region and the implications of those patterns for regional development. For example, about one-half of the 2,689-square-mile Region is covered by soils in groups D, E, F, or G, which are generally poorly suited for development with conventional onsite soil absorption sewage disposal systems. The detailed soil survey completed for the Region in 1966 provides more definitive soils data for use in local, as well as regional, planning and development.

Source: U. S. Soil Conservation Service and SEWRPC.

rural and urban land uses are highly dependent on local soil, slope, and topographic conditions. The Kettle Moraine State Forest occupies large parts of this map unit. Dispersed residential development on large, estate-type lots is a growing land use. Original vegetation consisted primarily of a mixture of sparse deciduous hardwoods, especially bur oaks and hickories, and dry prairie grassland.

The soils included in Group D have characteristics which reflect their origins as glacial deposits that were moved by ice from what is now Lake Michigan. These soils are clayey in texture, generally slow to drain, sticky and plastic when wet, and many of the constituent soils have high water tables. Slopes are gentle and broad; poorly drained depressions are extensive. Urban development on these soils generally requires a high level of supporting improvements, including careful attention to stormwater drainage. Basements commonly need footing drains and sump pumps to remove groundwater. Cultivated plants grow well in many of these soils if careful attention is given to avoid tillage or compaction from vehicular or foot traffic when soils are wet. Native vegetation on these soils included both deciduous forests and tall grass prairies. This group of soils covers nearly 31 percent of the Region.

The distinctive characteristic of soils in Group E is their shallow depth over bedrock. Dolomitic limestone bedrock commonly occurs within four feet of the land surface. This limits the use for plant growth, urban development, and safe onsite disposal of sewage. Commercial production of building stone and crushed stone for construction are extensive in areas covered by these soils. This group of soils occurs in small units, which in the aggregate occupy 1 percent of the Region. Original vegetation consisted of a mixture of deciduous hardwoods, primarily oaks and maples, and water-tolerant grasses and shrubs.

The soils of Group F are predominantly wet; loamy, silty or clayey in texture; and occur along drainageways of streams, lake basins, or low stream terraces. Many are subject to flooding. The soils of this group predominate in the environmental corridors which follow the stream drainage systems. This group of soils occupies approximately 11 percent of the Region. The characteristics of the soils in this group limit their successful use for nearly all forms of development. Many areas can provide excellent wildlife habitat, urban greenways, and similar open land uses. These soils developed under a vegetative cover consisting of a mixture of water-tolerant grasses and shrubs, prairie grasses, hardwood forest, and scattered elms and oaks.

The soils designated as Group G are organic deposits of peat and muck of various depths which occur throughout the Region and which occupy the basins of former lakes and glacial kettles. While some areas are used for specialized crop and sod production, many lack the artificial drainage systems needed to control water levels for such land uses. In their natural state these soils support excellent wetland wildlife habitat, but are unsuited for urban development. Approximately 6 percent of the Region is occupied by soils in this group. The original vegetation was composed of water-tolerant grasses, sedges, reeds, forbs, and shrubs.

General descriptions and small-scale maps of major groups of soils such as those given above provide a valuable overview of areawide soil distribution patterns. Such descriptions and maps are, however, too small and generalized to be used for planning the uses of any specific tract of land. The detailed soil surveys and related interpretations are the data needed for more detailed and definitive planning.

WATER RESOURCES

Surface water resources, consisting of lakes, streams, and associated floodlands, form the most important single element of the natural resource base of the Region. Their contribution to the economic development, recreational activity, and aesthetic quality of the Region is immeasurable. The groundwater resources of Southeastern Wisconsin are closely interrelated with the surface water resources inasmuch as they sustain lake levels and provide the base flow of streams. The groundwater resources, along with Lake Michigan, constitute the major sources of supply for domestic, municipal, and industrial water users.

Surface Water Resources

Lakes and streams constitute an extremely valuable part of the natural resource base of Southeastern Wisconsin. Inasmuch as they are focal points for water-related recreational activities popular with the inhabitants of the Region, they provide extremely attractive sites for properly planned residential development, and, when viewed in the context of open space areas, they greatly enhance the aesthetic aspects of the environment. While highly valued by the urban and rural populations of the Region, lakes and streams are extremely susceptible to deterioration through the activities of those very populations. The regional surface water resources must be properly managed and land uses carefully adjusted to achieve a reasonable balance between public and private use and enjoyment of those surface water resources.

Lakes: Major inland lakes are defined herein as those having 50 acres or more of surface water area, a size capable of supporting reasonable recreational use with relatively little degradation of the resource. There are 101 such major inland lakes within the Region, the locations and relative sizes of which are shown on Map 16. The major lakes in the Region have a combined surface water area of about 57 square miles, or about 2 percent of the area of the Region. The number of major inland lakes per county ranges from none in Milwaukee County to 33 in Waukesha County; the combined surface water areas of the major lakes per county ranges from none in Milwaukee County to about 22 square miles in Waukesha County.

In addition to the major lakes, there are numerous "minor" lakes and ponds in the Region encompassing less than 50 acres of surface water area. These smaller lakes generally have few riparian owners and only marginal fisheries. In most cases, the primary values of the minor lakes are aesthetic. Minor lakes are fragile, and their ecological and aesthetic values may be lost with any degree of improper shoreland development.

The value of lakes for recreational purposes, as desirable locations for lake-oriented development, and as aesthetic assets is dependent, in part, upon the water quality and upon the biological communities which reside in the lakes. Historically, lake areas in the Region have attracted urban development, providing a desirable setting for residential development in particular. Because of human activities, however, many lakes in Southeastern Wisconsin face water quality-related problems which limit the use of the lakes by humans and which prevent the establishment of certain desirable fishes and other forms of aquatic life. Essentially all major lakes in Southeastern Wisconsin show some signs of accelerated eutrophication, or nutrient enrichment. Since the completion of the regional water quality management plan in 1979, the water quality of some lakes has declined further, usually because of the effects of urban development. The water quality of other lakes has improved, however, due to the implementation of nonpoint source water pollution control measures in some areas and to the elimination of malfunctioning septic tank systems through the provision of sanitary sewer service.

Streams: As already noted and as shown on Map 16, the surface drainage system of Southeastern Wisconsin may be viewed as existing within 11 individual watersheds. Five of these, the Root River, Menomonee River, Kinnickinnic River, Oak Creek, and Pike River watersheds, are contained entirely within the Region. In addition to the 11 watersheds, numerous small catchment areas immediately adjacent to the Lake Michigan shoreline drain directly to the Lake via local natural streams and artificial drainageways; these tributary areas together may be considered to comprise a twelfth watershed. The Region contains only a very small part of the Wisconsin portion of the large Rock River watershed; the streams of that watershed within the Region are limited to the headwater portions of such tributaries to the Rock as the Bark and Oconomowoc Rivers and Turtle Creek.

Three of the 12 watersheds contained wholly or partly in Southeastern Wisconsin, the Fox, Rock, and Des Plaines River watersheds, with a combined area of 1,680 square miles, or 62 percent of the area of the Region, lie west of the subcontinental divide. As a result, the rivers and streams within these catchment areas flow in a generally southerly and southwesterly direction and are a part of the Mississippi River drainage system. The rivers and streams in the nine watersheds comprising the remainder of Southeastern Wisconsin, with a combined area of 1,009 square miles, or 38 percent of the area of the Region, flow in a generally southerly and easterly direction and discharge into Lake Michigan and are a part of the Great Lakes-St. Lawrence River drainage system.

Some of the most interesting, variable, and occasionally unpredictable features of each watershed include the ever-changing, sometimes widely fluctuating, discharges and stages of its stream system. The stream systems of the Region generally receive a relatively uniform flow of groundwater from the shallow aquifer underlying the Region. This groundwater discharge constitutes the base flow of the streams. The streams also periodically intercept surface water runoff from rainfall and snowmelt, which is superimposed on the base flow and sometimes causes the streams to leave their channels and occupy the adjacent floodlands. The volume of water drained annually from Southeastern Wisconsin by the stream system is equivalent to seven to eight inches of water spread over the seven-county Region, and amounts to about one-fourth of the average annual precipitation.

Major streams are defined herein as perennial streams which maintain, at a minimum, a small, continuous flow throughout the year except under unusual drought conditions. Within the Region, there are approximately 1,148 miles of such major streams. The length of major streams per county ranges from a low of 101 lineal miles in Racine County to a high of 333 lineal miles in Waukesha County. The latter county also has the largest number of major lakes, and is therefore particularly well endowed with surface water resources.

Riverine areas of Southeastern Wisconsin, like the lacustrine areas, have historically attracted intensive urban development. Such intensive development, along with certain unsound urban and rural land management practices, has resulted in deteriorated water quality, limiting the use of many stream reaches and constraining further development activity. A number of important steps have been taken to address existing water quality problems, including the preparation of a regional water quality management plan, the preparation of a management plan for the Milwaukee harbor estuary, and the preparation of nonpoint source pollution abatement plans for the Milwaukee River watershed and certain other watersheds in the Region. Implementation of these plans may be expected to result in a gradual improvement of water quality in many stream reaches. Improvements in water quality may, in turn, be expected to enhance fishery and related wildlife, aquatic vegetation, overall ecological diversity, and aesthetic values, and to increase the recreational use of streams in both urban and rural areas of the Region.

Floodlands: The floodlands of a river or stream are the wide, gently sloping areas contiguous with, and usually lying on both sides of, a river or stream channel. Rivers and streams occupy their channels most of the time. However, during even minor flood events, stream discharges increase so markedly that the channel is not able to convey all the flow. As a result, stages increase and the river or stream spreads laterally over the floodlands. The periodic flow of a river onto its floodlands is a normal phenomenon, and in the absence of major, costly structural flood control works, will occur regardless of whether or not urban development occurs on the floodlands. The frequency and extent of such flooding is, however, increased when urban development is permitted to intrude into the natural floodplains. Such development and the attendant filling eliminates floodwater storage and conveyance capacity and thereby increases downstream flood flows and stages and increases upstream flood stages. This creates serious and costly problems of flood damage and may endanger the public health and safety.

For planning and regulatory purposes, floodlands are normally defined as the areas, excluding stream channels and lake beds, subject to inundation by the 100-year recurrence interval flood event. This is the event that would be reached or exceeded in severity once on the average of every 100 years. Stated another way, there is a 1 percent chance that this event will be reached or exceeded in severity in any given year. Commission studies indicate that about 6 to 10 percent of the total land area of any given watershed will be within the 100-year floodlands of the Region's rivers and streams. Obviously, the 100-year recurrence interval floodland contains within its boundaries the areas inundated by floods of less severe but more frequent occurrence, such as the 50-, 10-, and five-year recurrence interval events.

Flood hazard data for the numerous streams of the Southeastern Wisconsin Region, and particularly data on the limits of the natural floodlands of the streams for a flood of a specified recurrence interval, are important inputs to the regional planning process. Due to the importance of floodland data, the Commission, as an integral part of its comprehensive watershed

studies, provides definitive data, including a delineation of the limits of the floodplains on the 10- and 100-year recurrence interval floods for most of the perennial streams in each watershed.

In addition to data developed by the Commission, flood hazard data have also been developed within the Region by the Federal Emergency Management Agency (FEMA). In areas where no flood hazard data exist, FEMA studies develop the data necessary for the delineation of flood hazard areas. The Commission supports FEMA floodlands studies through the sharing of basic floodland data already developed by the Commission under its comprehensive watershed studies.

The Commission has completed comprehensive watershed studies for the Fox, Kinnickinnic, Menomonee, Milwaukee, Pike, and Root River and Oak Creek watersheds, resulting in the delineation of floodlands for about 699 miles of major stream channel, not including stream channels in the Milwaukee River watershed lying outside the Region in Sheboygan and Fond du Lac Counties. In addition, special Commission floodland management studies have resulted in the development of flood hazard data for about 56 additional miles of stream channel. The stream segments for which floodlands have been delineated by the Commission or by the Federal Emergency Management Agency are shown on Map 19. The 100-year recurrence interval floodlands thus identified by the Commission or by FEMA encompass a total area of about 250 square miles, or about 9 percent of the total area of the Region. Throughout the Region, the use of floodlands for crops and pasture land, the filling and conversion of floodlands to urban uses, and the construction of bridges and dams have changed the natural flood cycles necessary to maintain some wetland conditions. In particular, urban development increases flood frequencies, discharges, and stages.

Groundwater Resources

Groundwater resources constitute an extremely valuable element of the natural resource base of Southeastern Wisconsin. The groundwater reservoir not only sustains lake levels and provides the base flow of the streams in the Region, but comprises a major source of water supply for domestic, municipal, and industrial water users. Like surface water, groundwater is susceptible to depletion in quantity and to deterioration in quality. An important consideration in natural areas protection planning, therefore, is the protection of the quantity and quality of this valuable resource.

The rock units within the Region differ widely in the yield of stored water. Rock units that supply water in usable amounts to pumping wells and important amounts to lakes and streams are called aquifers. The aquifers of Southeastern Wisconsin extend to great depths, attaining a thickness in excess of 1,500 feet in the eastern portions of the Region. An enormous reservoir of groundwater, therefore, lies beneath the Region. Three major aquifers exist within the seven-county Region. From land's surface downward, they are: 1) the sand and gravel deposits in the glacial drift, 2) the shallow dolomite strata in the underlying bedrock, and 3) the deeper sandstone, dolomite, siltstone, and shale strata.

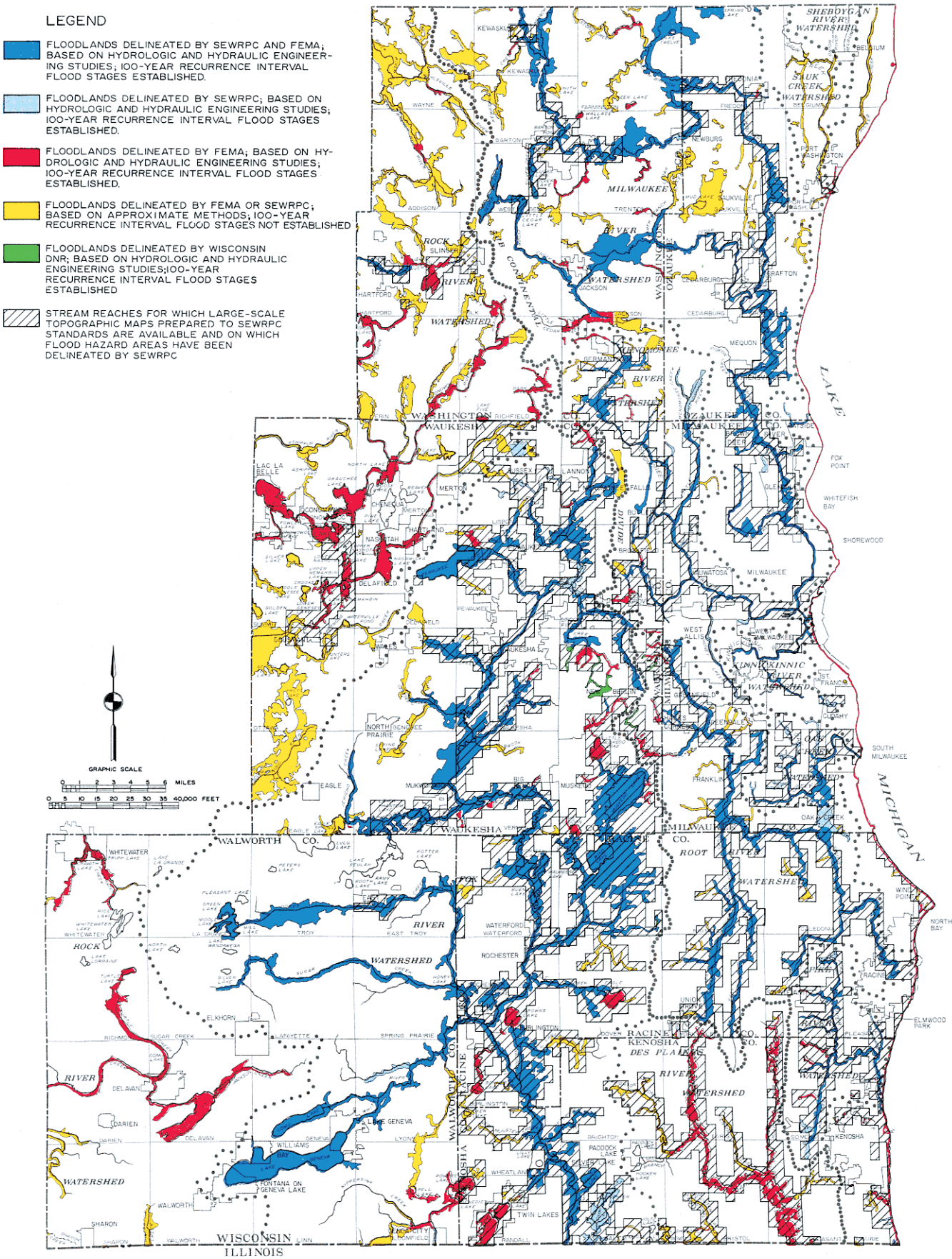
Because of relative proximity to the surface and because of their hydraulic interconnection, the first two aquifers are commonly referred to collectively as the "shallow aquifer," while the last is referred to as the "deep aquifer." Wells tapping these aquifers are referred to as shallow or deep wells, respectively. The shallow and deep aquifers are separated by Maquoketa shale, which forms a relatively impermeable barrier between the two aquifers.

While the primary source of recharge for the deep sandstone aquifer is located partly outside of Southeastern Wisconsin, the shallow aquifer, composed of the glacial drift and interconnected dolomitic bedrock, is recharged locally by downward percolation of precipitation and surface water. In contrast to the deep aquifer, where water enters in a long, narrow zone in the western portion of the Region and generally flows east, the direction of water movement in the shallow aquifer is much more variable and complex. Movement occurs from local recharge areas toward multiple points of discharge such as streams, lakes, marshes, and wells. Compared to the deep aquifer, the shallow aquifer is more susceptible to pollution by wastewater because it is nearer, both in terms of distance and time, to potential pollution sources, thus minimizing the potential for dilution, filtration, and other natural processes that tend to reduce the potential detrimental effects of pollutants.

The current quality of groundwater in both the shallow and deep aquifers throughout the Region is generally good, although localized

Map 19

DELINEATION OF FLOODLANDS IN THE REGION: 1992



Delineation of the floodlands of southeastern Wisconsin is extremely important for sound local, as well as regional, planning and development. The above map summarizes the status of floodland data in the Region as of the end of 1992. The 100-year recurrence interval floodlands shown on this map encompass a total of nearly 250 square miles, or about 9 percent of the total area of the Region. The Commission itself, as an integral part of its comprehensive watershed studies, provides definitive data on the 10- and 100-year recurrence interval floods for most of the perennial streams in each watershed studied. Flood hazard data have also been developed within the Region by the Federal Emergency Management Agency. Under the National Flood Insurance Act of 1968, the Agency is charged with the responsibility of conducting studies to determine the location and extent of floodlands and the monetary risks related to the insurance of urban development in floodland areas. In addition to identifying the stream reaches for which existing flood hazard data in the Region are available, the above map shows those stream reaches for which detailed, large-scale flood hazard maps are available from the Commission. These maps are available at scales of 1 inch equals 100 feet with 2 foot contour intervals, or 1 inch equals 200 feet with 2 foot contour intervals, and enable precise delineations of the floodplains.

Source: SEWRPC.

water quality problems affect some areas. Groundwater throughout the Region may be characterized as hard, containing high concentrations of calcium, magnesium, sulfates, and other dissolved solids; therefore, softening is required for almost all water uses. Localized water quality problems include hardness, expressed as calcium carbonate, in excess of 500 milligrams per liter in the deep sandstone aquifer along much of the eastern edge of the Region. In addition, isolated groundwater problems have been encountered in the Region relating to several types of groundwater quality problems and issues.

The first groundwater quality concern relates to radium concentrations. Certain formations within the Cambrian sandstones in Southeastern Wisconsin are known to produce relatively high concentrations of naturally occurring radium. This radium has been found to exceed the State standard for radium in a number of municipal wells using the sandstone aquifer as a source. Evaluations are being undertaken to consider alternative means of reducing the radium level in these wells. In addition, the U. S. Environmental Protection Agency and the Wisconsin Department of Natural Resources are continuing to evaluate the standard for radium in order to assess the suitability of the current standards.

Another groundwater quality problem found in Southeastern Wisconsin is the presence at certain locations of volatile organic materials. These volatile organic materials enter the groundwater system primarily through commercial, industrial, and municipal waste disposal systems or spills. The Wisconsin Department of Natural Resources has tested all municipal water supplies in the State and a large number of private wells for volatile organic materials. An isolated number of municipal wells in Southeastern Wisconsin have been found to contain detectable levels of volatile organic materials. The areas where these materials have been encountered are relatively limited; in most cases remedial actions are under way to resolve the problems. In addition, the increased awareness and monitoring activity is expected to resolve these isolated problems over time.

Isolated cases of bacterial and nitrogen contamination have also been identified in Southeastern Wisconsin. These problems can often be traced to nonpoint pollution sources and septic system discharges. Public awareness of these problems is increasing and improved monitoring is under way. The continued installation of public centralized sewerage systems will help to resolve many of these isolated problems over time.

VEGETATION

Pre-Settlement Vegetation

Historically, vegetational patterns in the Region were influenced by such factors as climate, soils, fire, topography, and natural drainage patterns. Historical records, particularly the records of the U. S. Public Land Survey carried out within the Region in 1835 and 1836, indicate that large portions of Southeastern Wisconsin consisted of open, level plains containing orchard-like stands of oak, or prairies dominated by big bluestem grass and colorful prairie forbs. Other portions of the Region were covered by mixed hardwood forest. The upland timber for the most part consisted of such deciduous hardwood species as sugar maple, oak, elm, ash, hickory, beech, basswood, walnut, and ironwood, and one coniferous species, white pine. The lowland timber consisted of such species as black and green ash, elm, willow, cedar, tamarack, aspen, and red and silver maple. A more detailed description of the pre-settlement vegetation of the Region is presented in Chapter V of this report.

Prairies

Prairies are treeless or generally treeless areas dominated by perennial native grasses. Prairies, which have important ecological and scientific value, consist of five basic types: low prairie, mesic or moderately moist prairie, dry-mesic prairie, dry prairie, and savanna. Prairies, which once covered extensive areas of Southeastern Wisconsin, have been reduced to scattered remnants, primarily in the southern and western portions of the Region. The chief causes of the loss of prairie is conversion to urban and agricultural use and the suppression of wildfires, which had served to constrain the advancing shrubs and trees which shade out the prairie plants.

Woodlands

Woodlands in the Region have much value beyond monetary return for forest products. Under good management, woodlands can serve a variety of uses and provide multiple benefits.

The quality of life within an area is influenced by the overall quality of the environment, as measured in terms of clean air, clean water, scenic beauty, and diversity. In addition to contributing to clean air and water, the maintenance of woodlands within the Region can contribute to the maintenance of a diversity of plant and animal life in association with human life. The existing woodlands of the Region, which required a century or more to develop, can, however, be destroyed through mismanagement within a comparatively short time. The deforestation of hillsides contributes to the siltation of lakes and streams and the destruction of wildlife habitat. Woodlands can and should be maintained within the Region for their total values: scenic, wildlife, open space, educational, recreational, and watershed protection, as well as for their forest products. Under balanced use and sustained yield management, woodlands can serve many of these values at the same time.

Located primarily on ridges and slopes, along lakes and streams, and in wetlands, woodlands provide an attractive natural resource of immeasurable value. Not only is the beauty of lakes, streams, and glacial land forms of the Region accentuated by woodlands, but they are essential to the maintenance of the overall environmental quality of Southeastern Wisconsin.

Six woodland types are recognized within the Region: northern upland hardwoods, southern upland hardwoods, northern lowland hardwoods, southern lowland hardwoods, northern lowland conifers, and northern upland conifers. The northern and southern upland hardwood types are the most common in the Region. The two upland hardwood types are often utilized for production of commercial forest products.

The remaining natural stands of trees within the Region consist largely of even-aged mature, or nearly mature, specimens lacking sufficient seedlings and saplings to maintain the stands when the old trees are harvested or die of disease or age. This lack of young growth is not a natural condition, but was brought about by mismanagement, most often associated with many years of excessive grazing by livestock.

Upland woodlands in 1985 encompassed a total of about 182 square miles, or about 7 percent of the total area of the Region.[9] This distribution of upland woodlands in the Region is shown on Map 20. Concentrations of woodlands are evident in the Kettle Moraine area and in certain major stream valleys in outlying areas of the Region.

Wetlands

Wetlands are areas in which the water table is at, near, or above the land surface. These areas are characterized by both hydric soils and by the growth of sedges, cattails, and other wetland vegetation. Wetlands generally occur in depressions and near the bottom of slopes, particularly along lakeshores and stream banks, and on large, poorly drained land areas. Wetlands may, however, under certain conditions, occur on slopes and even on hilltops.

Wetlands perform an important set of natural functions which include support of a wide variety of desirable, and sometimes rare, forms of plant and animal life; stabilization of lake levels and streamflows; entrapment and storage of plant nutrients in runoff, thus reducing the rate of enrichment of surface waters and noxious weed and algae growth; contribution to the atmospheric oxygen and water supplies; reduction in stormwater runoff by providing areas for floodwater impoundment and storage; protection of shorelines from erosion; entrapment of soil particles suspended in runoff and reduction in stream sedimentation; provision of groundwater recharge and discharge areas; and provision of the population with opportunities for certain scientific, educational, and recreational pursuits.

Wetlands have severe limitations for residential, commercial, and industrial development. Generally, these limitations are due to the erosive character, high compressibility and instability, low bearing capacity, and high shrink-swell potential of wetland soils, as well as the associated high water table. In addition, the use of metal conduits in some wetland soil types is constrained because of high corrosion potential. If ignored in land use planning and development, these limitations may result in flooding, wet basements, unstable foundations, failing

[9] *Lowland wooded areas, such as tamarack swamps, are classified as wetlands in the regional land use inventory.*

pavements, excessive infiltration of clear water into sanitary sewers, and broken sewer and water lines. In addition, there are significant onsite preparation and maintenance costs associated with the development of wetland soils, particularly as they relate to roads, foundations, and public utilities.

In 1985, wetlands encompassed a total of about 264 square miles, representing about 10 percent of the total area of the Region. Concentrations of wetlands include the Cedarburg Bog in Ozaukee County, the Jackson and Theresa Marshes in Washington County, and the Menomonee Falls Swamp and Vernon Marsh in Waukesha County (see Map 21).

The Commission wetland inventory as shown on Map 21 is maintained as part of the Commission regional land use inventory, which is updated every five years. The Commission wetland inventory is based upon the Wisconsin Wetlands Inventory, responsibility for which rests with the Wisconsin Department of Natural Resources. In Southeastern Wisconsin, the basic inventory work for the Wisconsin Wetlands Inventory was completed by the Commission within the guidelines set forth by the Department. The inventory has been relied on in the administration of key State and Federal wetland regulatory programs. It should be noted that the U. S. Soil Conservation Service in 1991 completed an inventory of wetlands for purposes of implementing the wetland regulatory provisions of the Federal Food Security Act. The areal extent of wetlands identified under the Soil Conservation Service inventory is somewhat greater than that identified above. The difference is largely due to the inclusion in the Soil Conservation Service wetland inventory of all noncropland areas covered by hydric soils and certain cropland areas which perennially exhibit signs of wetness, while the Commission wetland inventory is limited to areas of hydric soils that are covered by hydrophytic vegetation.

It should also be noted that wetlands are constantly changing in response to changes in drainage patterns and climatic conditions and that, while wetland inventory maps provide a sound basis for areawide planning, they should be viewed as providing a point of departure for regulatory purposes. In view of the dynamic nature of wetlands, detailed field investigations are often necessary to precisely identify wetland boundaries for individual tracts of land at a given point in time.

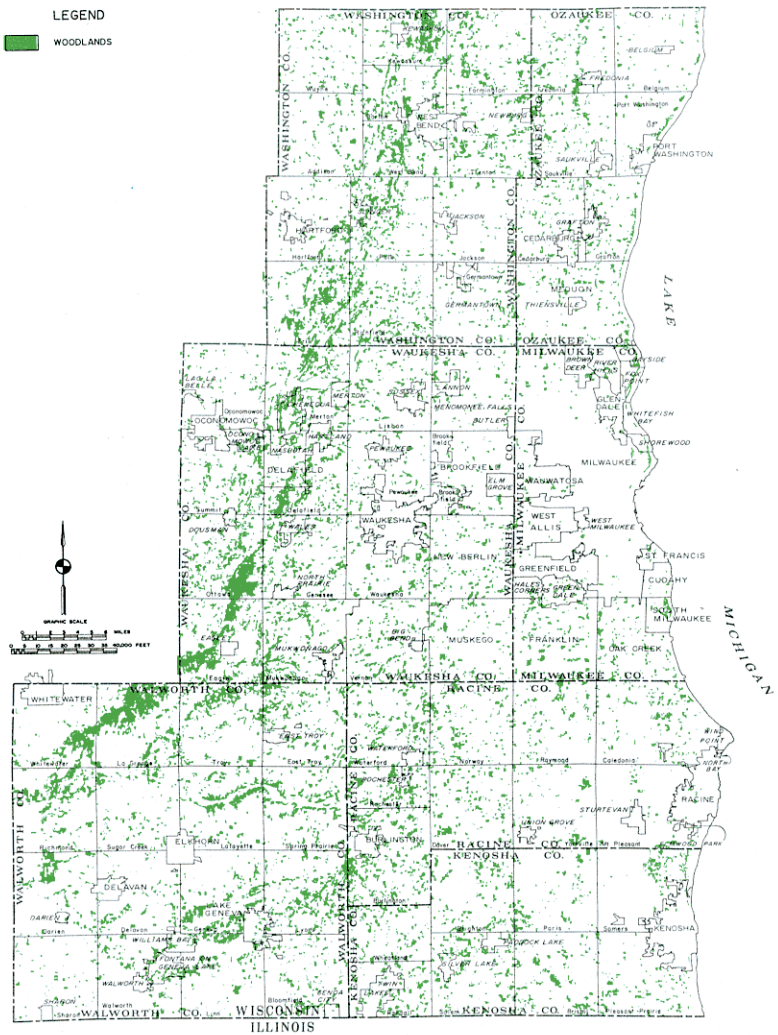
The Tension Zone

Southeastern Wisconsin contains a diversity of plant community types, due in part to the presence of a climatic tension zone that divides the Region, and the State, into two distinct areas: the northern hardwoods-conifer forest floristic province and the southern prairie-oak forest floristic province, each with their associated soils. Although numerous common species may be found, in suitable habitats, throughout the State, there are many southern species that are found only rarely in the northern province and many northern species that only rarely occur in the southern province. The area where these species, and the two floristic provinces, overlap is the tension zone. Within the tension zone there is a mixture of both northern and southern communities and species. This transition area, or ecotone, is oriented in a southeast-northwest direction, dividing Wisconsin roughly in half. It extends westward into Minnesota and eastward across Michigan. A large number of species reach their range limits within the tension zone. Northern vegetation types and their component species become rare southward and westward and tend to be found only in restricted habitats, while southern communities and their species likewise become infrequent in the north and east.

In Southeastern Wisconsin, the proximity of Lake Michigan allows a cooler climate and the associated soils, plants, and plant communities to extend southward and westward for a considerable distance. Within the Region, the tension zone extends from the southeastern corner of Milwaukee County to northwestern Washington County, so that natural areas and critical species habitats may be found south and west of, north and east of, or within the tension zone. For example, bogs are much more frequently found in the northeastern portion of the Region, while being rare to the southwest. On the other hand, prairies were originally widespread to the south and west, but were essentially absent from the north and east. Species with northern affinities found within Southeastern Wisconsin primarily north and east of the tension zone include yellow birch, white cedar, bunchberry, wintergreen, and ram's-head lady's-slipper; typical southern species include bur oak, shagbark hickory, and

Map 20

WOODLANDS IN THE REGION: 1985

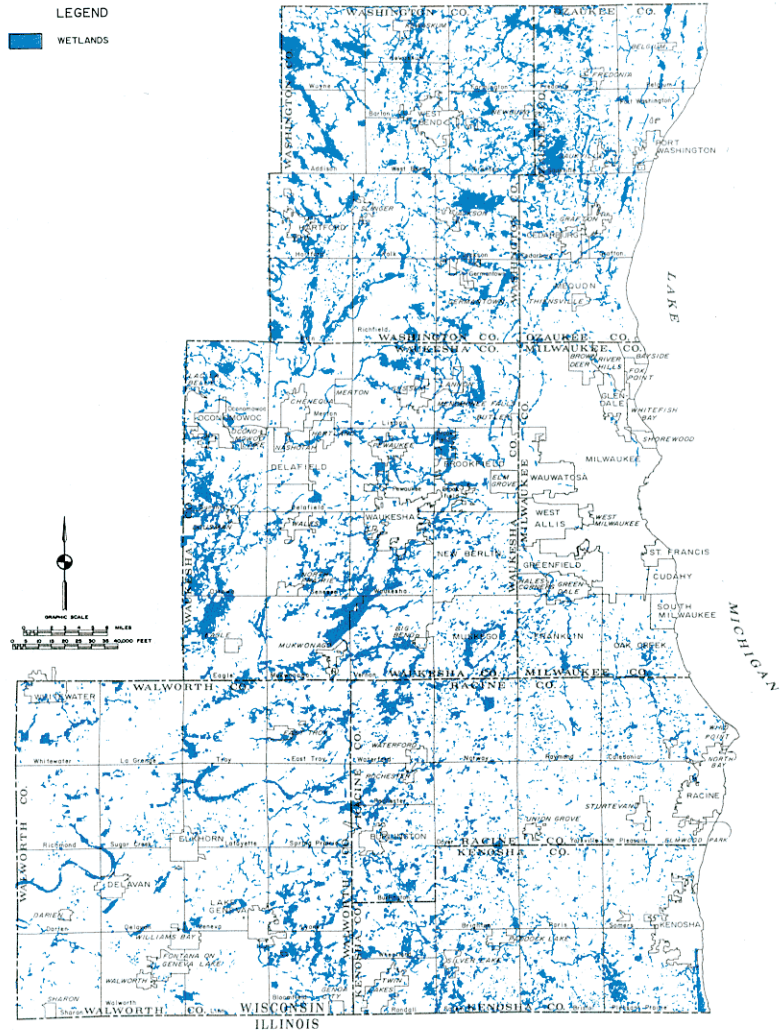


In 1985, woodlands occupied about 182 square miles, or about 7 percent of the Region. Woodlands have much value beyond monetary return for forest products. The maintenance of woodlands contributes to clean air and water and to the maintenance of a diversity of plant and animal life. Woodlands provide an attractive natural resource of immeasurable value. As shown on this map, significant concentrations of woodlands are located in the Kettle Moraine area and in major stream valleys in outlying areas of the Region.

Source: SEWRPC.

Map 21

WETLANDS IN THE REGION: 1985



Wetlands encompassed a total of about 264 square miles, or about 10 percent of the total area of the Region, in 1985. Wetlands perform a set of important natural functions, including support of a wide variety of desirable, and sometimes unique, forms of plant and animal life; stabilization of lake levels and streamflows; entrapment and storage of plant nutrients in runoff; contribution to atmospheric oxygen and water supplies; reduction in stormwater runoff; and protection of shorelines from erosion. Wetlands are inherently unsuitable for virtually all forms of urban development. Although they are scattered throughout the Region, concentrations of wetlands are particularly evident in the Cedarburg Bog in Ozaukee County, the Jackson and Theresa Marshes in Washington County, and the Tamarack Swamp and the Vernon Marsh in Waukesha County.

Source: SEWRPC.

numerous prairie grasses and such forbs as leadplant, purple prairie-clover, and small white lady's-slipper.

Types of Natural Communities in Southeastern Wisconsin

Following are descriptions of the types of natural communities, based primarily on vegetation, that are indicated in Table 2 as being found in Southeastern Wisconsin. It should be realized that while these descriptions treat these communities as distinct entities, intermediate types exist, so that vegetation in nature forms a continuum. In addition, natural communities are not static; indeed, change through time, or succession, is the rule, though this varies considerably from one community type to another. Knowledge of plant succession is important when considering management of natural areas and critical species habitats. The following list of natural community types is taken from the Natural Community Working List of the Wisconsin Natural Heritage Program of the Wisconsin Department of Natural Resources. Much of the vegetative description is based on the work of John Curtis.[10]

1. Alder Thicket: The alder thicket is a wetland shrub community found primarily within or north of the tension zone. It is similar to shrub-carr, but is dominated by tag alder, whose denser canopy reduces light penetration and allows for sparser undergrowth. It is commonly found where soil water is in movement, such as in narrow bands bordering streams and lakes, or in more extensive tracts following destruction of bog forests by logging or fire. Soils are organic, with neutral to acidic pH and high water tables and are subject to occasional flooding. Alder thickets tolerate disturbance moderately well; they resprout vigorously after cutting or light fire and are not browsed. However, prolonged flooding will eliminate them. Eventually, tree species such as white cedar, red maple, and black ash become established in gaps in the alder canopy and, in time, overtop the shrubs.

2. Beach: Beach communities in Southeastern Wisconsin are confined to the shores of Lake Michigan and the larger inland lakes. They are in a constant state of flux because of wave action and changing water levels. The lower beach is bare of vegetation, consisting only of sand and rock. Soils of the middle beach are mostly loose sands and gravel, deficient in nutrients and organic matter and extremely dry. The summer surface is subject to great extremes in temperature, resulting in sparse plant cover. The species that persist are specialists able to grow under extreme environmental conditions. Plants of the middle beach are usually low annuals, frequently succulent, including sea rocket and seaside spurge. The soils of the upper beach are somewhat more stable, but vegetation is still sparse. There is frequently a loose mat of low shrubby junipers accompanied by such species as sand reed grass, Canada wild rye grass, silverweed, wormwood, and sand cherry.

3. Calcareous Fen: Calcareous fens are a rare type of wet grassland and low shrub community located on springy sites that have an internal flow of groundwater rich in magnesium and calcium bicarbonates. The distribution of calcareous fens seems to be limited to regions where dolomitic limestone, from which the fens' alkaline waters are derived, occurs in bedrock. Soils are alkaline organic peats and mucks. Typical plants are calcium-tolerant, such as beaked spike-rush, fen muhly grass, shrubby cinquefoil, grass-of-Parnassus, and Ohio goldenrod. Fens are closely related to wet prairies and sedge meadows.

4. Cedar Glade: The cedar glade is an open, savanna-like community, and is a rare vegetation type in Southeastern Wisconsin. The cedar glade is essentially a grassland with scattered red cedars. It is usually found on steep hillsides of thin loess over limestone bedrock or on gravelly glacial moraines. The ground layer is very similar to that of dry prairies. Some sort of fire protection is required, as red cedar is extremely fire-sensitive; yet there must still be an occasional fire to provide the sparse cedar grove with a prairie herb layer.

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[10] *John T. Curtis, Vegetation of Wisconsin University of Wisconsin Press, Madison, Wisconsin, 1959.*

5. Dry Prairie: The dry prairie is a xeric grassland frequently found on southwest-facing slopes of steep hills with thin soils derived from limestone. Water is a limiting factor. Consequently, plant growth is patchy and not nearly as luxuriant as in mesic prairies. These prairies are stable; even after fire ceases they are only slowly invaded by woody species. Typical plant species include little bluestem grass, side-oats grama grass, stiff sandwort, pasque-flower, birdsfoot violet, and leadplant.

6. Dry Sand Prairie: Dry sand prairie communities are similar to dry prairies, but occur on well-drained sandy soil. Characteristic species include little bluestem grass, pasqueflower, birdsfoot violet, Hill's thistle, stiff aster, Venus's looking-glass, partridge-pea, beardtongue, and sand cherry. Some sites even support cacti.

7. Dry-Mesic Prairie: The dry-mesic prairie is a grassland community type which is intermediate between dry and moderately moist, or mesic, prairies. With occasional fire, the dry-mesic prairie can be a stable community, but without periodic burning it is typically invaded by oak forest. Dominant plants include such grasses as big and little bluestem, prairie dropseed, side-oats grama, and needlegrass; flowering spurge; leadplant; and gray goldenrod.

8. Emergent Aquatic: Emergent aquatic habitats include deep and shallow marshes and are dominated by such emergent species as lake sedges, bulrushes, and spike-rushes; cattails; arrowhead; smartweeds; and bur-reed. Floating and submerged species such as the pondweeds and water lilies are important elements in deep marshes. These areas are extremely important as habitat for a wide variety of fish, mammals, and waterfowl.

9. Ephemeral Pond: This category includes shallow, intermittent or temporary ponds that are usually shaded. Typically, ephemeral ponds are less than one acre in surface area.

10. Floodplain Forest (riverine forest): Floodplain forests are found in river floodplains. These forests are wooded wetlands consisting of generally wet to wet-mesic hardwoods, in which seasonal floods bring frequent additions of silt. Overall tree density is low, but the typically large size of individual trees produces a closed canopy. The dominant tree species are green ash, silver maple, American elm, black willow, and cottonwood, many of which are multi-trunked. Most tree reproduction is vegetative, rarely by seed. Shrubs are uncommon, but vines, especially poison ivy and riverbank grape, are numerous. There are few spring-flowering herbs, the ground layer reaching its maximum growth in midsummer. Especially prevalent are jewelweed, clearweed, and wood nettle.

11. Interdunal Wetland: Interdunal wetlands occur in low depressions, or swales, between a set of dune series. In Southeastern Wisconsin, interdunal wetlands are generally restricted to the Chiwaukee Prairie, where, being underlain by calcareous clays, they retain rainwater, spring runoff, and groundwater discharge. The resulting wet swales in turn support marsh and luxuriant wet prairie vegetation.

12. Lake Dune: The lake dune community is an upper beach community, found infrequently along Lake Michigan, in which blowing sand forms dunes. The dunes may eventually be stabilized by plant colonizers, the vegetation changing with succession from grasses and forbs to shrubs and, finally, to forests on older dunes. However, breaks in plant cover may create blowouts, beginning the process anew. In Southeastern Wisconsin, lake dunes range from the low dunes with primarily herbaceous vegetation in the Carol Beach area of Kenosha County, to the higher dunes, also with herbaceous vegetation, at the Kenosha Dunes just south of the City of Kenosha, to the older, more stabilized dunes with a significant degree of tree cover in the area of Port Washington in Ozaukee County.

Lakes in general are considered to be bodies of water with at least 10 acres of surface area. In Southeastern Wisconsin, they may be divided into seven categories based on depth, alkalinity, and water source.

13. Deep, Hard, Drainage Lake: Deep, hard, drainage lakes are those lakes that stratify

thermally, have a total alkalinity of greater than 50 parts per million (ppm), and are fed by streams.

14. Deep, Hard, Seepage Lake: Deep, hard, seepage lakes are those lakes that stratify thermally, have a total alkalinity of greater than 50 ppm, and are fed by overland seepage with no inlet stream.

15. Hard, Bog Lake: Hardwater bog lakes are generally small, shallow lakes with little drainage, in which cold temperatures and high acidity produce dystrophic conditions where production greatly exceeds decomposition. Both oxygen and nutrient levels are low in these lakes. Bog lakes are surrounded by floating bog mats, which gradually expand and cover the water surface with time. Plant species such as water lilies are common in these lakes.

16. Oxbow Lake: These are typically shallow, surface-water lakes formed from a separated river meander.

17. Shallow, Hard, Drainage Lake: Shallow, hard, drainage lakes are those lakes that do not stratify thermally, have a total alkalinity of greater than 50 ppm, and are fed by streams.

18. Shallow, Hard, Seepage Lake: Shallow, hard, seepage lakes are those lakes that do not stratify thermally, have a total alkalinity of greater than 50 ppm, and are fed by overland seepage with no inlet stream.

19. Shallow, Soft, Seepage Lake: Shallow, soft, seepage lakes are those lakes that do not stratify thermally, have a total alkalinity of less than 50 ppm, and are fed by overland seepage with no inlet stream.

20. Mesic Prairie: The mesic prairie is a diverse, luxuriant, highly productive native grassland complex dominated by such tall grasses as big bluestem and Indian grass; nitrogen-fixing legumes, including wild indigo, veiny wild pea, and purple prairie-clover; and an array of composites, including compass plant, asters, goldenrods, and blazing-stars. Most species bloom in middle and late summer. Soils are deep and dark, rich in nutrients, high in organic matter, and of neutral pH. The deep root systems enable the plants to resist drought, but the community is dependent upon occasional fire to inhibit establishment of woody species. Formerly widespread in Kenosha and Racine Counties, mesic prairies are now extremely rare because the high quality of the soils and the flat or rolling terrain make these areas outstanding for cultivation.

21. Northern Hardwood Swamp: The northern hardwood swamp is a lowland forest type found in lake beds and river floodplains north of the tension zone, and dominated by such wet to wet-mesic hardwoods as yellow birch and black ash.

22. Northern Wet Forest (relict): Northern wet forests are dominated by tamaracks and, occasionally, black spruce, with herbs and shrubs typical of northern bogs, lowland forests, and mesic forests. These wetland communities are assumed to be relict outliers from the earlier postglacial period. Frequently, northern wet forest will surround open bogs. Soils are continually wet, highly acidic, well-solidified peats. Succession may be slow, so these conifer swamps may persist for centuries. Windfall may be common because of the shallow root systems of the conifers and fire can be a major factor during extended droughts. Severe disturbances may result in reversion to a treeless sedge-bog. Changing water levels, as often occur with highway construction, may also seriously affect the survival of the conifers.

23. Northern Wet-Mesic Forest: The northern wet-mesic forest is dominated by a variety of tree species, including white cedar, black ash, yellow birch, American elm, red maple, and sugar maple, but without hemlock and balsam fir, which are outside their ranges in Southeastern Wisconsin. Soils are less acid and somewhat drier and better aerated than in wet forests, and plant growth is more rapid. Generally, the ground layer tends to be diverse and abundant, with many ferns, shrubs, and herbs with more northern affinities. Over time, these stands may be replaced by mesic forests. White cedar often forms dense, nearly pure stands, whose complete canopy produces an extremely dark interior. These communities have traditionally

provided winter habitat for white-tailed deer, whose recently increased populations have put tremendous browsing pressure on these sites. Vegetational diversity has decreased, cedar reproduction has been impaired, and at least one species, Canada yew, has been nearly extirpated from the Region.

24. Oak Opening (oak savanna): Oak openings are transitional habitats between forest and grassland, consisting of prairie grasses and forbs beneath widely spaced trees, primarily bur oaks. Curtis's arbitrary criterion for distinguishing savanna from oak forest was a density of one to 17 trees per acre and a canopy not exceeding 50 percent cover. While typical savannas are located on fertile, loamy uplands with bur oaks and mesic prairie species, others occur in lowlands where swamp white oaks coexist with wet-mesic prairie species, or on infertile sands which support communities of Hill's or black oak and dry to dry-mesic prairie species. The continued existence of oak openings, except on the drier, sandier sites, depended on periodic fire. Bur oak itself is highly fire-resistant, but other woody species of oak forests are killed by high heat. Fire suppression has allowed woody species to invade, so that where savannas were once one of the most widespread vegetation types in Southeastern Wisconsin, an oak opening with its intact prairie ground flora is now extremely rare. Today, most stands resembling oak openings owe their existence to continued grazing, albeit with an entirely different herbaceous species complement. The Nature Conservancy considers oak openings to be critically globally imperiled.

25. Open Bog:[11] The open bog community is a soil-vegetation complex in which a specialized group of herbs and low shrubs grows on a wet, acid peat soil. A floating mat of vegetation, with a nearly continuous carpet of sphagnum moss, grows outward from the shore of a lake or pond, in time completely covering the open water. Located in kettle depressions or pitted outwash, bogs are closely related to northern wet forests, which typically surround the open bog. Common plant species include tamarack, leatherleaf, cranberries, orchids, and such insectivorous species as pitcher-plant and sundews.

26. Patterned Bog (string bog): The patterned bog is a rare type of bog community in which slightly elevated ridges and islands with white cedar, tamarack, and shrubs alternate with flat, wet sedge-mat areas. These bands develop perpendicular to surface water movement. The Cedarburg Bog National Natural Landmark is the only patterned bog in the State and the southernmost string bog in the Northern Hemisphere.

27. Sand Barrens: Sand barrens are communities closely related to, and often associated with, dry and dry-mesic prairies. They are found south of the tension zone on windblown sandy soils, where the microclimate is hot, dry, and sterile. Peak flowering time is midsummer. Prevalent species include little bluestem grass, junegrass, flowering spurge, round-headed bushclover, and frostweed, and certain nonflowering plants such as hairycap moss, earthstars, British soldiers lichens, and blue-green algae. Because of the harsh conditions, sand barrens are invaded by woody species (e.g., oaks and black cherry) only very slowly.

28. Shaded Cliff: The shaded cliff is a community in which complete shade is provided either by the presence of a continuous forest cover or a north-facing exposure. A number of specialized plant species, particularly ferns like smooth cliffbrake, bulblet fern, and walking fern, may be present.

29. Shrub-Carr: Shrub-carrs are seasonally flooded wetland plant communities with saturated soils, found primarily in and south of the tension zone. Shrub-carrs are dominated by tall shrubs (three to 12 feet high) such as red-osier dogwood and shrub willows. The thick shrub growth may produce a relatively dense canopy, yet one with enough light gaps to permit a rather lush layer of ferns, herbs, sedges, grasses, and low shrubs. Soils range from acid

[11] *"Bog relicts" are included within this type of natural community.*

organic peats and mucks to moderately alkaline mineral soils. Shrub-carrs are a moderately stable plant community type, being essentially a long-lived transition stage between sedge meadow and lowland forest. They are often found as a narrow band between marsh and forest and are able to persist because of the tolerance of the component species to the wet, poorly aerated soils and cool temperatures which effectively inhibit tree establishment. Heavy grazing will result in open stands and infrequent, moderate fires lead to dense sprouts. More intensive fires may kill off the shrub component, thereby causing a reversion to sedge meadow, low prairie, or other related wet meadow stage. Shrub-carrs are probably more common today than before European settlement, apparently responding to water level changes in sedge meadows resulting from attempts to drain land for agricultural purposes.

30. Southern Dry Forest: The southern dry forest community type includes xeric upland forests on well-drained soils, such as coarse sands and gravels, usually on dry southern and western topographic exposures. The dominant trees are black, white, and bur oaks, black cherry, and, to a lesser degree, shagbark hickory. The relative openness of the canopy permits high light penetration, often resulting in a thick shrub understory of various combinations of gray dogwood, hazel, viburnums, currants, prickly-ash, and, today, European buckthorn and Eurasian honeysuckle. The herbaceous species occurring on these sites are primarily late-blooming species such as the asters and goldenrods. In contrast to oak openings, the southern dry forest exhibits a tree density exceeding 17 stems per acre and a canopy of over 50 percent cover. In the absence of fire, these stands are invaded by more mesic species. With grazing, many former oak forests resemble savannas with a bluegrass sod. As grazing pressure declines, these stands tend to become shrubby. In addition, oak wilt fungus is a serious cause of oak mortality, resulting in openings in the canopy.

31. Southern Dry-Mesic Forest: These woods are dominated by oaks (white and red), with an admixture of more mesic species, such as basswood, white ash, and/or sugar maple, which are especially present in protected ravines or on north-facing slopes. These are essentially one-generation forests, with the oaks eventually being succeeded by the mesic trees. But, because of the long life spans of the oaks, this community type may persist for extended periods of time.

32. Southern Hardwood Swamp (lacustrine forest): The southern hardwood swamp is a tree-dominated, seasonally flooded wetland, similar to floodplain forests but found on lake borders or in ancient lake basins where water levels are more constant. Consequently, higher amounts of organic matter occur in the soil. Typical species include such wet to wet-mesic trees as red maple, black ash, black willow, and American elm.

33. Southern Mesic Forest: The southern mesic forest community is characterized by the dominance of such mesic tree species as sugar maple, basswood, slippery elm, and American beech, the latter tree being at its western range limit in Southeastern Wisconsin. This forest type is similar to the northern mesic forest, but lacks such prominent tree species as hemlock, white pine, or yellow birch, the latter being predominantly a tree of lowland forests in Southeastern Wisconsin. The dense canopy produced by the trees results in low interior light levels. As a consequence, the understory vegetation is sparse, and the ground flora reaches its peak growth in spring before the canopy closes. These ground-layer herbs, referred to as spring ephemerals, are particularly showy and can be very diverse in good-quality stands. Soils are loams and silty clay loams with high water-holding capacities. Drainage of the fine-particled clay soils is typically poor; in fact, they often hold water so tightly that water is not available for plant growth. Historically, fires were not common in areas dominated by the mesic forest, although when they did occur damage was particularly severe to the thin-barked trees. More frequent was damage caused by drought, wind, and ice.

34. Southern Sedge Meadow: The southern sedge meadows are open, grasslike wetland plant communities. Sedge meadows are characterized by having more than 50 percent of their cover made up of sedges. Sedge meadows occur on peat or muck soils that may be seasonally wet in spring and dry in fall, and tend to be deficient in oxygen. Because the soil moisture inhibits soil warming in spring, most plants flower later in the year. These communities are common in poorly drained sites that previously may have supported lowland forest. They are relatively stable, but, in the absence of periodic fire, may be invaded by woody shrubs, eventually converting to shrub-carr. Those sedge meadows dominated by tussock sedge are also known as "tussock meadows." Sedge meadows often gradate into wetter cattail marshes or drier shrub-carr, alder thickets, or swamp forest.

35. Spring Lake: Spring lakes are a lake type whose water sources are predominantly contributed by spring waters high in mineral content. Spring lakes are often associated with calcareous fens.

36. Spring Pond: Similar to the spring lake, but with less than 10 acres of surface area.

37. Hard Springs and Spring Runs: Hard-water springs and spring runs are groundwater-fed surface waters. They and their associated runs support waters that are high in mineral content.

38. Fast, Hard, Cold Stream: Fast, hard, cold-water streams include those undeveloped and unpolluted hard-water stream reaches which have a stream fall of at least 20 feet per mile, total alkalinity of at least 50 ppm, and temperatures that never rise above 75°F.

39. Fast, Hard, Warm Stream: Fast, hard, warm-water streams include those undeveloped and unpolluted hard-water stream reaches which have a stream fall of at least 20 feet per mile, total alkalinity of at least 50 ppm, and temperatures that exceed 75°F at some point in the year.

40. Slow, Hard, Cold Stream: Slow, hard, cold-water streams include those undeveloped and unpolluted hard-water stream reaches which have a stream fall of less than 20 feet per mile, total alkalinity of at least 50 ppm, and temperatures that never rise above 75°F.

41. Slow, Hard, Warm Stream: Slow, hard, warm-water streams include those undeveloped and unpolluted hard-water stream reaches which have a stream fall of less than 20 feet per mile, total alkalinity of at least 50 ppm, and temperatures that exceed 75°F at some point in the year.

42. Wet Prairie: The wet prairie is an open-meadow wetland type typically dominated by such lowland prairie grasses as prairie cordgrass, big bluestem, and Canada bluejoint. Typical herbaceous plants include gayfeather, Culver's-root, New England aster, sawtooth and/or giant sunflower, tall meadow-rue, and mountain-mint. Wet prairies are frequently found on poorly drained clayey ground moraines and in low interdunal swales such as those bordering Lake Michigan in Kenosha County. Minor variations in topography and the associated differences in water supply result in a patchy species distribution. These prairies are closely related to fens in species composition and also include many typical sedge meadow species, but they are dominated by lowland grasses instead of sedges or calciphiles. Soils are rich in organic matter and high in water-holding capacity. The tight, poorly aerated subsoil, with its gley layer, contributes to spring flooding, but the soils tend to become droughty by late summer. Dry autumns typically allowed for fires which eliminated woody species. Recently, however, humans have suppressed fires and changed drainage patterns, thereby allowing trees, shrubs, sedges, and such nonnative lowland grasses as reed canary grass to invade.

43. Wet-Mesic Prairie: The wet-mesic prairie is a grassland community intermediate between the wet and mesic prairie. As with the wet prairie, a poorly drained clay or

gley layer may impede internal drainage. Typical plant species in the wet-mesic prairie include prairie cordgrass, Canada bluejoint grass, big bluestem grass, Canada wild rye, compass plant, prairie dock, sawtooth sunflower, gray-headed coneflower, stiff goldenrod, azure aster, and wild onion. Historically, the wet-mesic prairies have been replaced by southern lowland forests with the cessation of periodic fire.

In addition to the types of natural areas above, there are certain types of specialized animal communities that deserve attention and are also listed in Table 2.

1. Bird Rookery: Bird rookeries include the breeding grounds of gregarious birds; for example, a colony of great blue herons and their nests.

2. Herptile Hibernaculum: Herptile hibernacula provide the winter shelter for dormant or hibernating amphibians and reptiles.

3. Migratory Bird Concentration Site: Migratory bird concentration sites are stopover areas, commonly wetlands, that provide food and protection for large numbers of migratory birds. An example is the Caledonia Wildlife Area in Racine County, which attracts whistling swans, snow geese, golden plovers, and willets.

4. Mussel Beds: Mussel beds occur on the beds of lakes and streams and provide suitable substrates for, and support, a concentration of mussels.

FISH AND WILDLIFE RESOURCES

Lake and Stream Fisheries

Although game fish have been the primary focus of management efforts in Southeastern Wisconsin, nongame fish, that is, those native fish species that are not of direct economic importance, constitute a significant portion of the Region's fishery resources. Nongame fish are important as members of functioning, intact aquatic communities. In large part because of the diversity and quality of aquatic habitats, Southeastern Wisconsin originally supported a rich and varied fish fauna in its lakes and streams. The deterioration of the environment that has accompanied development, plus the intentional and unintentional introductions of nonnative species, have diminished the populations of most native species, causing some to become locally extinct and others to be faced with the threat of local extirpation. Typically, fish species that are in trouble are sensitive to even the slightest alterations of their habitats. For example, the three fish species listed as Wisconsin-endangered that occur in Southeastern Wisconsin, starhead topminnow, striped shiner, and slender madtom, require clean, unpolluted water for survival. Within the Region, many of the more disturbance-intolerant native fish species can now be found only in those restricted stream reaches where natural conditions prevail. It is a goal of the natural areas protection planning program to identify and protect the best remaining aquatic habitats in the Region to ensure the survival of the Region's native fish fauna.

On the other hand, game fish have a direct economic impact on the Region. Sport fishing is one of the most popular uses of surface water resources in Southeastern Wisconsin. The Wisconsin Department of Natural Resources attempts to sustain fish populations in waters where environmental deterioration has reduced the numbers of desirable fish and where fish have been over-harvested. Commonly used fish management techniques include stocking of desirable fish species, fishing restrictions, the use of fish toxicants to remove undesirable fish, and habitat manipulation. Southeastern Wisconsin, because of its population base, has a long history of fish management activities, dating back over 100 years. Currently, the Department of Natural Resources distributes fish from its own hatcheries and from cooperative ponds, Federal hatcheries, and private hatcheries.

Many lakes and streams in the Region contain degraded populations of fish, invertebrates, and other aquatic organisms. Sedimentation, eutrophication, low dissolved oxygen levels, increased water temperature fluctuations, toxic pollutants, and habitat destruction can limit the diversity and health of fish communities. Common fishery resource problems include fish kills, stunted panfish, and excessive rough fish populations.

On some water bodies, fish kills occur annually, but in most cases they are an occasional problem. While some fish kills are traceable to fish diseases or to contributions of toxic pollutants, most are caused in late winter and late summer by dissolved oxygen depletion in shallow, heavily vegetated waters. At least 18 major lakes in Southeastern Wisconsin experience at least occasional fish kills. Fish kills are sometimes prevented by using artificial aeration techniques to maintain a critical dissolved oxygen level. The stunting of panfish is caused primarily by inadequate predation and short food supplies. The treatment for stunting, usually involving chemical treatments to remove some of the stunted fish or the addition of predators, is seldom successful. Most rough fish problems are caused by carp. These bottom-dwelling fish stir bottom sediments, reducing water clarity and covering valuable fish habitat and fish eggs with sediment. This exotic species is particularly suited for warm, silty, eutrophic waters. Carp control is generally through removal by netting or the use of fish toxicants. Fish barriers are sometimes installed to prevent the migration of these rough fish to an adjoining waterway.

Despite these problems, many water bodies in Southeastern Wisconsin, especially lakes, still support excellent sport fish populations. Table 21 lists the primary sport fish species present in the major lakes in the Region. Fish species were not listed for two major lakes, East Lake Flowage in the Town of Brighton, Kenosha County, and an unnamed lake recently created from an abandoned quarry in the Village of Pleasant Prairie. As indicated in Table 21, bass and panfish were present in almost all of the major lakes, while northern pike and walleye were present in 86 and 46 lakes, respectively. Cisco, trout, and muskellunge were less common, present in seven, six, and three lakes, respectively.

While all major lakes in the Region support populations of warm-water fish, the fish communities of many streams are severely limited by hydraulic and physical constraints, such as flow, water depth, substrate, and water temperature; by channelization impacts; and by water quality conditions. Most small intermittent streams are capable of supporting only forage fish, such as shiners and minnows, along with aquatic invertebrates, such as insects, clams, and crayfish. These small streams, however, may constitute important spawning sites during spring and early summer for warm-water fish species which reside in connected perennial streams.

The Wisconsin Administrative Code lists those streams which have been determined to be unable to support full warm-water fish communities. These streams are designated for special-variance use, for intermediate aquatic life, or for marginal use. The variance designations for streams in the Region are presented in Table 22. Special variance classifications have been assigned to 11 stream reaches in the Region. These streams have undergone extreme cultural alterations or have severe physical limitations. This category also includes the Milwaukee inner harbor. Sixteen stream reaches have been classified for intermediate aquatic life. These streams are capable of supporting only forage fish and aquatic invertebrates which are tolerant of pollution. Twenty-five stream reaches have been classified for marginal use. Marginal-use streams are capable of supporting only aquatic invertebrates, or an occasional fish species, which are very tolerant of pollution. Some marginal-use streams support almost no aquatic life.

About 31 miles of stream, or less than 3 percent of the total perennial stream miles in the Region, possess water quality and habitat conditions which are suitable to support brown, brook, and rainbow trout and other salmonid fish species which are intolerant of pollution.

Those stream reaches which have not been designated for special-variance use, for intermediate aquatic life, or for marginal use are considered capable of supporting warm-water sport fish or forage fish intolerant of pollution. In many of these streams, however, the fish communities are threatened by high pollutant loadings, by habitat destruction, by channel modifications, and by changes in the streamflow regime often caused by urbanization. Stream habitat restoration projects can complement water pollution abatement efforts to help maintain or enhance desired fish communities. Channelization projects, which often involve straightening, deepening, widening, or lining a natural or previously modified channel to help control flooding and drainage problems, may incorporate rehabilitation structures or procedures to maintain a viable fishery within the improved channel.

Table 21

PRIMARY SPORT FISH SPECIES PRESENT IN SOUTHEASTERN WISCONSIN LAKES

County	Lake	Primary Fish Species Present						
		Muskellunge	Northern Pike	Walleye	Largemouth Bass	Panfish	Trout	Cisco
Kenosha	Benedict	- -	X	X	X	X	- -	- -
Kenosha	Benet-Shangrila	- -	X	- -	X	X	- -	- -
Kenosha	Camp	- -	X	X	X	X	- -	- -
Kenosha	Center	- -	X	- -	X	X	- -	- -
Kenosha	Cross	- -	X	- -	X	X	- -	- -
Kenosha	Dyer	- -	X	- -	X	X	- -	- -
Kenosha	Elizabeth	- -	X	X	X	X	- -	- -
Kenosha	George	- -	X	- -	X	X	- -	- -
Kenosha	Hooker	- -	X	X	X	X	- -	- -
Kenosha	Lilly	- -	X	- -	X	X	- -	- -
Kenosha	Mary	- -	X	X	X	X	- -	- -
Kenosha	Paddock	- -	X	- -	X	X	- -	- -
Kenosha	Powers	- -	X	X	X	X	- -	- -
Kenosha	Silver	- -	X	X	X	X	- -	- -
Kenosha	Voltz	- -	X	X	X	X	- -	- -
Ozaukee	Lac Du Cours	- -	- -	- -	X	X	- -	- -
Ozaukee	Mud	- -	- -	- -	- -	- -	- -	- -
Ozaukee	Spring	- -	X	- -	X	X	- -	- -
Racine	Bohner	- -	X	- -	X	X	- -	- -
Racine	Browns	- -	- -	X	X	X	- -	- -
Racine	Buena	- -	X	X	X	X	- -	- -
Racine	Eagle	X	X	X	X	X	- -	- -
Racine	Echo	- -	X	- -	X	X	- -	- -
Racine	Kee Nong Go Mong	- -	X	- -	X	X	- -	- -
Racine	Long	- -	X	- -	X	X	- -	- -
Racine	Tichigan	- -	X	X	X	X	- -	- -
Racine	Waubeesee	- -	X	- -	X	X	- -	- -
Racine	Wind	- -	X	X	X	X	- -	- -
Walworth	Army	- -	- -	- -	X	X	- -	- -
Walworth	Beulah	- -	X	- -	X	X	X	X
Walworth	Booth	- -	X	X	X	X	- -	- -
Walworth	Como	- -	X	- -	X	X	- -	- -
Walworth	Comus	- -	X	- -	X	X	- -	- -
Walworth	Cravath	- -	- -	- -	X	X	- -	- -
Walworth	Delavan	- -	X	X	X	X	- -	- -
Walworth	Geneva	- -	X	X	X	X	X	X
Walworth	Green	- -	X	X	X	X	- -	- -
Walworth	LaGrange	- -	- -	- -	- -	- -	- -	- -
Walworth	Loraine	- -	- -	- -	X	X	- -	- -
Walworth	Lulu	- -	X	- -	X	X	- -	- -
Walworth	Middle	- -	X	X	X	X	- -	- -
Walworth	Mill	- -	X	X	X	X	- -	- -
Walworth	North	- -	- -	- -	X	X	- -	- -
Walworth	Pell	- -	X	- -	X	X	- -	- -
Walworth	Peters	- -	- -	- -	X	X	- -	- -
Walworth	Pleasant	- -	X	- -	X	X	- -	- -
Walworth	Potters	X	X	- -	X	X	- -	- -
Walworth	Rice	- -	X	- -	X	X	- -	- -
Walworth	Silver	- -	- -	- -	- -	X	- -	- -
Walworth	Tripp	- -	X	- -	X	X	- -	- -
Walworth	Turtle	- -	X	- -	X	X	- -	- -
Walworth	Wandawega	- -	X	- -	X	X	- -	- -
Walworth	Whitewater	- -	X	- -	X	X	- -	- -

Table 21 (continued)

County	Lake	Primary Fish Species Present						
		Muskellunge	Northern Pike	Walleye	Largemouth Bass	Panfish	Trout	Cisco
Washington	Bark	- -	X	- -	X	X	- -	- -
Washington	Barton	- -	X	- -	X	X	- -	- -
Washington	Big Cedar	- -	X	X	X	X	- -	X
Washington	Druid	- -	X	X	X	X	- -	- -
Washington	Five	- -	X	- -	X	X	- -	- -
Washington	Friess	- -	X	X	X	X	X	- -
Washington	Green	- -	X	X	X	X	- -	- -
Washington	Little Cedar	- -	X	X	X	X	- -	- -
Washington	Lucas	- -	X	- -	X	X	- -	- -
Washington	Pike	- -	X	X	X	X	- -	- -
Washington	Silver	- -	X	X	X	X	- -	- -
Washington	Smith	- -	X	- -	X	X	- -	- -
Washington	Twelve	- -	X	- -	X	X	- -	- -
Washington	Wallace	- -	X	- -	X	X	- -	- -
Waukesha	Ashippun	- -	X	- -	X	X	- -	- -
Waukesha	Beaver	- -	X	- -	X	X	- -	- -
Waukesha	Big Muskego	- -	X	X	X	X	- -	- -
Waukesha	Crooked	- -	X	X	X	X	- -	- -
Waukesha	Denoon	- -	X	- -	X	X	- -	- -
Waukesha	Eagle Spring	- -	X	- -	X	X	- -	- -
Waukesha	Fowler	- -	X	X	X	X	- -	- -
Waukesha	Golden	- -	X	X	X	X	- -	- -
Waukesha	Hunters	- -	X	- -	X	X	- -	- -
Waukesha	Keesus	- -	X	X	X	X	- -	- -
Waukesha	Lac La Belle	- -	X	X	X	X	- -	- -
Waukesha	Little Muskego	- -	X	X	X	X	- -	- -
Waukesha	Lower Genesee	- -	X	X	X	X	X	- -
Waukesha	Lower Nashotah	- -	X	X	X	X	X	- -
Waukesha	Lower Nemahbin	- -	X	X	X	X	- -	- -
Waukesha	Lower Phantom	- -	X	X	X	X	- -	- -
Waukesha	Middle Genesee	- -	- -	- -	X	X	- -	- -
Waukesha	Moose	- -	X	- -	X	X	X	- -
Waukesha	Nagawicka	- -	X	X	X	X	- -	- -
Waukesha	North	- -	X	X	X	X	- -	X
Waukesha	Oconomowoc	- -	X	- -	X	X	- -	X
Waukesha	Okauchee	- -	X	X	X	X	- -	X
Waukesha	Pewaukee	X	X	X	X	X	- -	- -
Waukesha	Pine	- -	X	X	X	X	- -	X
Waukesha	Pretty	- -	X	- -	X	X	- -	- -
Waukesha	School Section	- -	X	X	X	X	- -	- -
Waukesha	Silver	- -	X	- -	X	X	- -	- -
Waukesha	Spring	- -	- -	- -	X	X	- -	- -
Waukesha	Upper Nashotah	- -	X	X	X	X	- -	- -
Waukesha	Upper Nemahbin	- -	X	X	X	X	- -	- -
Waukesha	Upper Phantom	- -	X	X	X	X	- -	- -
Waukesha	Waterville	- -	- -	- -	X	X	- -	- -

NOTE: Data were not available for two major lakes—East Lake Flowage in the Town of Brighton, Kenosha County, and an unnamed lake recently created from an abandoned quarry in the Village of Pleasant Prairie, Kenosha County.

Source: Wisconsin Department of Natural Resources, Wisconsin Lakes, 1978.

Table 22

STREAMS CLASSIFIED FOR LIMITED FISH AND AQUATIC LIFE IN SOUTHEASTERN WISCONSIN

Type of Variance	Stream	Reach	County
Special Variance	Underwood Creek	In Milwaukee and Waukesha Counties below Juneau Boulevard	Milwaukee, Waukesha
	Barnes Creek	In Kenosha County	Kenosha
	Pike Creek (tributary of Pike River)	In Kenosha County	Kenosha
	Pike River	In Racine County	Racine
	Indian Creek	In Milwaukee County	Milwaukee
	Honey Creek	In Milwaukee County	Milwaukee
	Menomonee River	In Milwaukee County below the confluence with Honey Creek	Milwaukee
	Kinnickinnic River	In Milwaukee County	Milwaukee
	Lincoln Creek	In Milwaukee County	Milwaukee
	Milwaukee River	Downstream of North Avenue dam in Milwaukee County	Milwaukee
	South Menomonee Canal and Burnham Canal	In Milwaukee County	Milwaukee
Intermediate Aquatic Life	Darien Creek	From its origin to Little Turtle Creek	Walworth
	Little Turtle Creek	From its origin to Turtle Creek	Walworth
	Eagle Creek	From CTH J to the Fox River	Racine
	East Branch Root River Canal	From STH 20 to the West Branch Root River Canal	Racine
	Union Grove Tributary to the Des Plaines River	Downstream of Fonk's Tributary	Racine
	Hales Corners Tributary	From the Hales Corners sewage treatment plant to Whitnall Park Pond	Milwaukee
	Tess Corners Creek	From its origin to Whitnall Park Pond	Milwaukee, Waukesha
	Poplar Creek	From the C&NW railroad bridge downstream to confluence with Fox River	Waukesha
	North Park Tributary to Lake Michigan	From its origin to Lake Michigan	Racine
	Hoods Creek	From STH 20 to confluence with Root River	Racine
	Salem Branch	From Salem Utility District No. 1 sewage treatment plant to 216th Avenue	Kenosha
	Rubicon River	From confluence with tributary in NW 1/4, NE 1/4, Section 13, T10N, R18E, to confluence with Slinger Tributary	Washington
	Wayne Creek	From its origin to the Kohlsville River	Washington
	South Branch of Pike River	From Somers tributary to Pike River	Kenosha
	Tributary to Pike River	Tributary from first railroad crossing at S. C. Johnson & Son to confluence with Pike River	Racine
	West Branch Root River Canal	From CTH C to STH 20	Racine
Marginal Use	Belgium Creek	From Belgium sewage treatment plant to the Onion River	Ozaukee
	Tributary to Des Plaines River	From Bristol sewage treatment plant to the Des Plaines River	Kenosha
	Tributary to Darien Creek	From its origin to Darien Creek	Walworth
	Eagle Creek	From Eagle Lake to CTH J	Racine
	East Branch Root River Canal	Upstream from STH 20	Racine

Table 22 (continued)

Type of Variance	Stream	Reach	County
Marginal Use (continued)	Tributary to Des Plaines River	From Fonk's Tributary downstream to the Union Grove industrial tributary	Racine
	Hales Corners Tributary	Upstream from the abandoned Hales Corners sewage treatment plant	Milwaukee
	Dover Ditch	Upstream of Dover Line Road	Racine
	Poplar Creek	From the abandoned Cleveland Heights treatment plant to the C&NW Railway bridge	Waukesha
	Deer Creek	From its origin to Poplar Creek	Waukesha
	Tributary to Brighton Creek	From Paddock Lake sewage treatment plant to Brighton Creek	Kenosha
	Drainage to Mud Lake	From the Mobile Home sewage treatment plant to Mud Lake	Kenosha
	Tributary to Lake Michigan	From the Pleasant Park sewage treatment plant to the Illinois state line	Kenosha
	Pleasant Prairie Tributary	From its origin to the Des Plaines River	Kenosha
	Tributary to Des Plaines River	From its origin to the Illinois state line	Kenosha
	Tributary to Hoods Creek	From its origin to confluence with Hoods Creek	Racine
	Tributary to Root River	From the Rawson Homes sewage treatment plant to the Root River	Milwaukee
	Little Turtle River	From Sharon sewage treatment plant downstream to Rock-Walworth county line	Walworth
	Unnamed Intermittent Stream	Stream in Sections 13, 14, and 23, T1N, R22E, Kenosha County	Kenosha
	Rubicon River	From origin downstream to confluence with tributary in NW 1/4, NE 1/4, Section 13, T10N, R18E	Washington
	Tributary to Rubicon River	Easterly tributary which flows into the Rubicon River at above location	Washington
	Tributary to South Branch Pike River	From its origin to South Branch Pike River	Kenosha
	Tributary to Pike River	From St. Bonaventure School sewage treatment plant to Sturtevant Tributary	Racine
	West Branch Root River Canal	From 67th Drive to CTH C	Racine
	Tributary to Des Plaines River	From the Wisconsin DOT Information Center sewage treatment plant to the Des Plaines River	Kenosha

Source: Wisconsin Administrative Code NR 104 (1989).

Wildlife Habitat

In its traditional sense, the term "wildlife" refers to those species of living things, especially birds and mammals, that are hunted by humans. Within such a context, then, wildlife of Southeastern Wisconsin is composed primarily of small upland game, such as rabbit and squirrel; some predators, such as fox and raccoon; game birds, including waterfowl; and game and non-game fish species, as described above. In proportion to available habitat, deer herds in the Region are large.

Inventories of wildlife habitat areas in the Region were carried out cooperatively by the Wisconsin Department of Natural Resources and the Commission in 1963, 1970, and 1985. As part of the 1985 inventory, three classes of wildlife

habitat areas were identified and delineated: Class I, defined as areas containing a good diversity of wildlife, of such size to meet all of the habitat requirements for each species, and generally located in close proximity to other wildlife habitat areas; Class II, defined as those wildlife habitat areas generally lacking one of the three criteria necessary for a Class I designation; and Class III, defined as those wildlife habitat areas that are generally remnant in nature and lack two of the three criteria for placement in Class I. Most of the remaining wildlife habitat areas identified through these inventory efforts are located within the primary and secondary environmental corridors and isolated natural resource areas shown on Map 22 and described in the following section. Lands in agricultural use, open fields, and fencerows also provide important wildlife habitat.

It should be noted that the populations of certain animals, including, among others, deer and geese, have been increasing in certain urban areas of the Region, and, in some cases, the increased animal populations have become nuisances to area residents. "Urban" wildlife management programs are needed in such areas to balance human concerns and wildlife population levels and needs.

In a broader sense, "wildlife" has come to also include those animal species that are nondomesticated but not normally hunted. For example, nongame bird species would include migratory songbirds and raptors, while nongame mammals include bobcats, skunks, and voles. Reptiles, amphibians, and even invertebrates are included in the Region's wildlife resources. What they require for survival is protection and appropriate management of their habitats. For example, certain species of native, nongame birds, such as bobolinks, meadowlarks, and upland sandpipers, require relatively large, undisturbed expanses of open grassland for nesting, regardless of whether the grasses are native or not. Conifer plantations in Southeastern Wisconsin have been observed to provide suitable habitat for such rare birds as acadian flycatchers and Cooper's hawks. Within woodlands, the presence of standing dead trees, or snags, and fallen dead wood is important because they provide denning, nesting, roosting, sheltering, and foraging habitats and territory markers for many wildlife species. In addition, dead fallen debris may constitute a major component of the forest floor, and, as such, provides an important source of recycled soil nutrients and substrates for a variety of organisms.

ENVIRONMENTAL CORRIDORS

The Corridor Concept

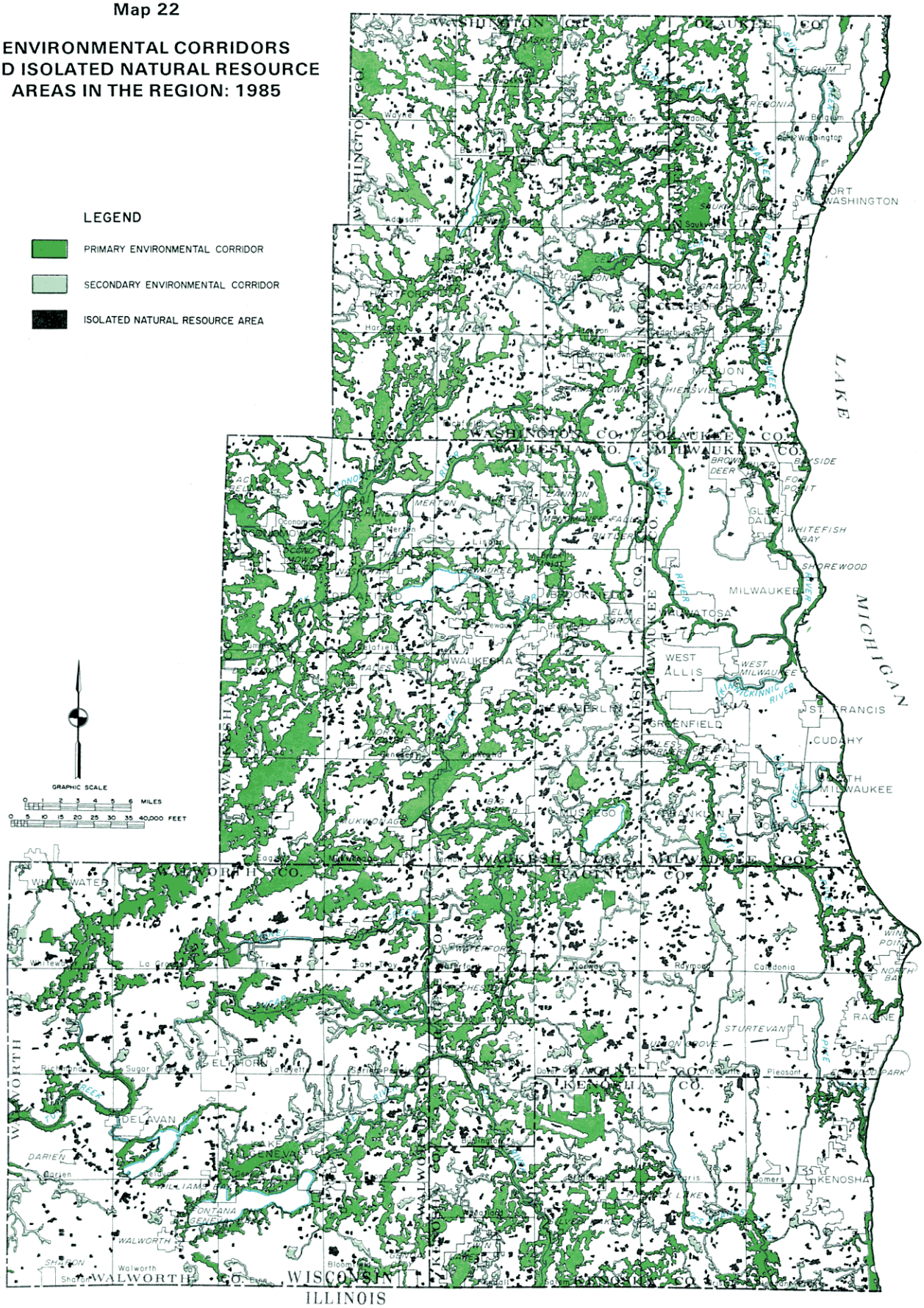
One of the most important tasks completed under the regional planning program for Southeastern Wisconsin has been the identification and delineation of those areas in the Region in which concentrations of natural resource elements occur. It was recognized that preservation of the natural resource elements, especially where these elements are concentrated in identifiable geographic areas, was essential both to the maintenance of the overall environmental quality of the Region and to the continued provision of the amenities required to maintain the quality of life for the resident population.

Under the regional planning program, seven elements of the natural resource base have been considered essential to the maintenance of both the ecological balance as well as the overall quality of life in the Region: 1) lakes, rivers, and streams and the associated shorelands and floodlands, 2) wetlands, 3) woodlands, 4) prairies, 5) wildlife habitat areas, 6) wet, poorly drained, and organic soils, and 7) rugged terrain and high-relief topography. In addition, there are certain other features which, although not a part of the natural resource base per se, are closely related to or centered on that base and are a determining factor in identifying and delineating areas with recreational, aesthetic, ecological, and cultural value. These features include: 1) existing park and open space sites, 2) potential park and open space sites, 3) historic sites, 4) scenic areas and vistas, and 5) natural and scientific sites.

The delineation of these 12 natural resource and natural resource-related elements on maps results in a concentration of such elements in an essentially linear pattern of relatively narrow, elongated areas which have been termed "environmental corridors" by the Commission. "Primary" and "secondary" environmental corridors have been identified. Primary environmental corridors include a wide variety of the most important natural resource and resource-related elements and are at least 400 acres in size, two miles long, and 200 feet wide. Secondary environmental corridors generally connect with the

Map 22

ENVIRONMENTAL CORRIDORS AND ISOLATED NATURAL RESOURCE AREAS IN THE REGION: 1985



The most important elements of the natural resource base of the Region are found in the environmental corridors and isolated natural resource areas shown on this map. Primary environmental corridors are a composite of the best remaining elements of the natural resource base. Such corridors, which encompass about 468 square miles, or 17 percent of the total area of the Region, contain all of the best remaining wetlands, woodlands, and wildlife habitat areas in the Region as well as most of the major lakes and streams and associated floodlands. The preservation of the identified primary environmental corridors is essential to the maintenance of a high level of environmental quality in the Region and the protection of its natural beauty. Secondary environmental corridors, often remnants of primary environmental corridors that have been partially converted to intensive urban or agricultural use, also contain a variety of resource elements. Secondary environmental corridors encompass about 74 square miles, or 3 percent of the Region. Such corridors, while not as significant as primary environmental corridors in terms of overall resource values, should be considered for preservation as the process of urban development proceeds. Isolated natural resource areas are smaller pockets of natural resource base elements which, although separated from the environmental corridor network, still retain important natural values. Such areas, which encompass about 63 square miles, or 2 percent of the Region, should be also be preserved to the extent practicable as the process of urban development proceeds with the Region.

Source: SEWRPC.

Table 23

PRIMARY ENVIRONMENTAL CORRIDOR LANDS IN THE REGION BY COUNTY: 1985

County	Primary Environmental Corridors											
	Surface Water		Wetlands		Woodlands		Other Open Lands		Urban Lands		Total	
	Acres	Percent of Total	Acres	Percent of Total	Acres	Percent of Total	Acres	Percent of Total	Acres	Percent of Total	Acres	Percent of Total
Kenosha	4,574	16.0	11,787	41.2	5,151	18.0	6,080	21.3	1,005	3.5	28,597	100.0
Milwaukee	994	10.1	2,774	28.4	2,091	21.4	2,773	28.4	1,148	11.7	9,780	100.0
Ozaukee	1,592	8.0	11,457	57.7	3,850	19.4	2,103	10.6	857	4.3	19,859	100.0
Racine	4,633	19.6	9,600	40.7	5,552	23.5	2,801	11.9	1,002	4.3	23,588	100.0
Walworth	13,659	20.9	21,308	32.7	22,922	35.1	5,906	9.1	1,433	2.2	65,228	100.0
Washington	3,942	6.5	33,527	55.6	14,841	24.6	7,319	12.2	655	1.1	60,284	100.0
Waukesha	16,233	17.6	43,936	47.7	21,108	22.9	8,791	9.5	2,155	2.3	92,223	100.0
Region	45,627	15.2	134,389	44.9	75,515	25.2	35,773	11.9	8,255	2.8	299,559	100.0

Source: SEWRPC.

primary environmental corridors and are at least 100 acres in size and one mile long. In addition, smaller concentrations of natural resource features that have been separated physically from the environmental corridors by intensive urban or agricultural land uses have also been identified. These areas, which are at least five acres in size, are referred to as isolated natural resource areas.

The preservation of these environmental corridors in essentially natural, open uses can assist in flood-flow attenuation, water pollution abatement, noise pollution abatement, glare reduction, and favorable climate modification. Such preservation is also essential to facilitate the movement of wildlife, especially in times of stress, and for the movement and dispersal of seeds for a variety of plant species. In addition, because of the many interacting relationships which exist between living organisms and their environment, the destruction or deterioration of one important element of the total environment may lead to a chain reaction of deterioration and destruction of other elements. Draining wetlands, for example, may destroy fish spawning areas, wildlife habitat, groundwater recharge areas, and natural filtration and floodwater storage areas of interconnecting stream systems. The resulting deterioration of surface water quality may, in turn, lead to a deterioration of the quality of the groundwater which serves as a source of domestic, municipal, and industrial water supply, and upon which low flows of rivers and streams may depend. In addition, the intrusion of intensive urban land uses into such areas may result in the creation of serious and costly problems, such as failing foundations for pavements and structures, wet basements, excessive operation of sump pumps, excessive clearwater infiltration into sanitary sewerage systems, and poor drainage. Similarly, destruction of ground cover may result in soil erosion, stream siltation, more rapid runoff, and increased flooding, as well as the destruction of wildlife habitat. Although the effects of any one of these environmental changes may not in and of itself be overwhelming, the combined effects must eventually lead to a serious deterioration of the underlying and sustaining natural resource base and of the overall quality of the environment for life. The need to maintain the integrity of the remaining environmental corridors and isolated natural areas in Southeastern Wisconsin should thus be apparent.

Primary Environmental Corridors

As shown on Map 22, the primary environmental corridors of Southeastern Wisconsin generally lie along major stream valleys, surround major lakes, or are found in the Kettle Moraine area, containing almost all of the best remaining wetlands, woodlands, and wildlife habitat areas in the Region, as well as most of the major lakes and streams and associated floodlands. These corridors also contain many of the best remaining potential park sites. The primary environmental corridors are, in effect, a composite of the best remaining elements of the natural resource base of Southeastern Wisconsin and have immeasurable environmental and recreational value. In 1985, primary environmental corridors encompassed about 468 square miles, or about 17 percent of the total area of the Region (see Table 23).

Table 24

SECONDARY ENVIRONMENTAL CORRIDORS LANDS IN THE REGION BY COUNTY: 1985

County	Secondary Environmental Corridors											
	Surface Water		Wetlands		Woodlands		Other Open Lands		Urban Lands		Total	
	Acres	Percent of Total	Acres	Percent of Total	Acres	Percent of Total	Acres	Percent of Total	Acres	Percent of Total	Acres	Percent of Total
Kenosha	115	1.9	2,153	35.3	1,987	32.6	1,824	29.9	20	0.3	6,099	100.0
Milwaukee	77	2.2	818	22.8	1,301	36.2	1,211	33.7	184	5.1	3,591	100.0
Ozaukee	111	2.3	2,799	59.1	756	16.0	1,012	21.4	55	1.2	4,733	100.0
Racine	190	2.9	2,121	32.1	2,327	35.2	1,938	29.4	27	0.4	6,603	100.0
Walworth	186	2.1	3,196	35.1	2,898	31.8	2,784	30.6	40	0.4	9,104	100.0
Washington	187	2.0	5,558	57.8	1,934	20.1	1,889	19.7	42	0.4	9,610	100.0
Waukesha	103	1.4	3,712	49.0	1,856	24.5	1,528	20.1	382	5.0	7,581	100.0
Region	969	2.0	20,357	43.0	13,059	27.6	12,186	25.8	750	1.6	47,321	100.0

Source: SEWRPC.

When the Commission first proposed the preservation of primary environmental corridors in the Region, it was recognized that a number of coordinated measures would be required, including public acquisition of certain corridor lands, public regulation of other privately owned corridor lands, and reformulation of public utility extension policies to avoid utility service extensions that would support inappropriate urban development in the corridors. Over the years, many important actions have been taken by implementing agencies toward protection of the primary environmental corridors in accordance with the recommendations of the adopted regional land use plans.

Secondary Environmental Corridors

Secondary environmental corridors are typically located along small perennial and intermittent streams within the Region. Secondary environmental corridors also contain a variety of resource elements, often being remnants of primary environmental corridors that have been partially converted to intensive urban or agricultural use. Secondary environmental corridors facilitate surface water drainage and maintain pockets of natural resource features. Such corridors, while not as significant as the primary environmental corridors in terms of overall resource values, should also be considered for preservation as the process of development proceeds within the Region, particularly when the opportunity is presented to incorporate these corridors into urban stormwater retention basins, associated drainageways, and neighborhood parks. As indicated in Table 24, secondary environmental corridors encompassed about 74 square miles, or 3 percent of the total area of the Region, in 1985.

Isolated Natural Resource Areas

In addition to the primary and secondary environmental corridors, other, smaller pockets of natural resource base elements exist within the Region. These pockets are isolated from the environmental corridors by urban development or agricultural uses. Even though they are separated from the environmental corridor network, these areas have important natural resource value. Since isolated natural resource areas may represent the only wildlife habitat in an area, provide good locations for local parks and nature study areas, and lend unique aesthetic character and natural diversity to an area, these uses should be protected and preserved to the extent practicable as the process of urban development proceeds within the Region. These "isolated natural resource areas" should not be confused with Designated State Natural Areas, or Natural Areas of Statewide, Regional, and Local Importance (NA-1, NA-2, or NA-3 areas). The isolated natural resource areas shown on Map 22 encompassed about 63 square miles, or about 2 percent of the total area of the Region, in 1985 (see Table 25).

SUMMARY

Demographic and Economic Base

These sections described historic trends in, and the contemporary state of, the demographic and

Table 25

ISOLATED NATURAL RESOURCE AREAS IN THE REGION BY COUNTY: 1985

County	Isolated Natural Resource Areas											
	Surface Water		Wetlands		Woodlands		Other Open Lands		Urban Lands		Total	
	Acres	Percent of Total	Acres	Percent of Total	Acres	Percent of Total	Acres	Percent of Total	Acres	Percent of Total	Acres	Percent of Total
Kenosha	126	3.5	1,141	32.1	1,904	53.5	381	10.7	8	0.2	3,560	100.0
Milwaukee	125	5.5	458	20.0	1,330	58.2	343	15.0	29	1.3	2,285	100.0
Ozaukee	80	2.3	1,598	46.2	1,452	42.0	320	9.3	8	0.2	3,458	100.0
Racine	162	2.1	2,625	34.8	3,846	50.9	913	12.1	7	0.1	7,553	100.0
Walworth	170	2.1	1,939	23.8	5,275	64.6	768	9.4	5	0.1	8,157	100.0
Washington	120	1.8	1,819	27.0	4,273	63.4	522	7.7	6	0.1	6,740	100.0
Waukesha	283	3.2	2,638	30.4	5,070	58.5	588	6.8	93	1.1	8,672	100.0
Region	1,066	2.6	12,218	30.2	23,150	57.3	3,835	9.5	156	0.4	40,425	100.0

Source: SEWRPC.

economic bases of the Southeastern Wisconsin Region. The interrelationships between these two bases are so numerous and close that the state of, and trends in, one cannot be properly considered without consideration of the other. The most important findings of these inventories and analyses include:

1. The resident population of the Region stood at about 1.81 million persons in 1990. Following decades of rapid rates of population growth, the Region has experienced substantially reduced rates of population growth since 1970. The total resident population of the Region increased from about 1.24 million persons in 1950 to about 1.57 million persons in 1960, an increase of about 333,000 persons, or about 27 percent. By 1970, the total resident population of the Region had increased to about 1.75 million persons, an increase of about 182,000 persons, or about 12 percent, over the 1960 population level. The resident population of the Region increased by only about 8,700 persons, or by less than 1 percent, between 1970 and 1980, to 1.76 million persons. It is estimated that between 1980 and 1985, the regional population actually decreased by 22,000 persons, or about 1 percent. Recently released data from the 1990 Federal Census indicates a recovery during the second half of the 1980s, with the 1990 regional population level exceeding the 1980 and 1985 levels by about 45,600 persons and 67,600 persons, respectively.

2. Since 1930, the highest rates of population increase in the Region have occurred in the suburban and exurban areas of Ozaukee, Washington, and Waukesha Counties. The demands for public services and facilities created by this decentralization of population affect both the older urban centers and the newer suburban and rural-fringe areas of the Region.

3. The total number of households in the Region increased from about 354,500 in 1950 to about 643,800 in 1985, an increase of about 289,300 households, or about 82 percent. During the same time, the household population increased from about 1.19 million persons to about 1.70 million persons, an increase of about 512,500 persons, or about 43 percent. Since the number of households increased at a faster rate than total household population, the average household size in the Region declined from 3.36 persons per household in 1950 to 2.64 in 1985. The rapid decline in the average number of persons per household is due in part to dramatic increases in the number of one-person households. Recently released data from the 1990 Federal Census indicate that the total number of households in the Region reached 676,100 in 1990, with the average household size decreasing further to 2.62 persons per household.

4. Personal income levels in the Region increased steadily between 1950 and 1980

before showing some decline. Total income in the Region, as measured in constant 1989 dollars, increased from about $9.2 billion in 1950 to about $15.5 billion in 1960, about 69 percent; increased again by about 40 percent to $21.7 billion in 1970; and increased again by about 18 percent to $25.7 billion in 1980. Between 1980 and 1990, however, total personal income in the Region is estimated to have increased from $25.7 billion to only $26.3 billion, or by only about 2.5 percent. Per capita income levels indicate a trend similar to that of total personal income. Per capita income, as measured in constant 1989 dollars, increased from about $7,390 in 1950 to about $9,840 in 1960, or by about 33 percent; increased to about $12,700 in 1970, or by about 29 percent; and again increased to about $14,500 in 1980, or by about 14 percent. Between 1980 and 1990, per capita income was estimated to have remained virtually unchanged. Between 1950 and 1980, per capita personal income grew at a rate less than that of either the State of Wisconsin or the United States. Between 1980 and 1990, per capita income in the Region remained virtually unchanged, in contrast to increases in both the State and the Nation. The decreased growth rates for the Region in the 1980s are largely attributable to the recession of the early 1980s and economic restructuring.

5. Population and employment levels in the Region have historically followed quite similar patterns because population migrations between various areas have been largely dependent upon the availability of jobs in these areas. The rapid historical growth of population in the Region, therefore, may be attributed primarily to the increasing economic activity in the Region. In the last two decades, significant changes in the distribution of economic activity in the Region have occurred as economic activity has decentralized from the established urban areas to the suburban areas of the Region. This trend is consistent with, but more moderate than, the population movements that have characterized the "urban sprawl" nature of much of the development in the Region since 1950.

6. One of the most important measures of the economy of an area is the number of employment opportunities, or jobs, available in the area. Historically, the number of jobs available in the Region has changed at varying rates, generally corresponding to the state of the national economy. Overall, between 1950 and 1990, the number of jobs in the Region increased by about 437,600 jobs, or by about 79 percent. The number of jobs in the Region increased steadily from about 552,700 in 1950 to about 884,200 in 1980. Between 1980 and 1982, the number of jobs decreased by about 65,500 jobs, or about 7 percent, from about 884,200 jobs to about 818,700 jobs. Between 1982 and 1985, however, total employment increased by about 53,200 jobs, or about 6 percent, from about 818,700 jobs to about 871,900 jobs, as the Region emerged from the recessionary period of 1979 to 1983.

7. For planning purposes, the character of the regional economy can best be described according to the distribution of economic activity in the following eight major categories: 1) agriculture, 2) construction and mining, 3) manufacturing, 4) transportation, communication, and utilities, 5) retail trade, 6) finance, insurance, and real estate, 7) services, and 8) government. Historically, employment in the Region was concentrated in manufacturing, which represented about 38 percent, about 35 percent, and about 30 percent of the total regional employment in 1970, 1980, and 1985, respectively. This decrease in percentage of employment in manufacturing has been accompanied by an increasing percentage of regional employment in public and private services, reflecting a national trend of increased demand for consumer goods and services and a national decrease in the proportion of manufacturing employment to overall employment.

The data presented in these sections relate to historical changes in the demographic and economic bases of the Region. These data are important considerations in any natural areas protection and management planning effort, since these data provide the principal bases for the demographic and economic analyses and

forecasts which determine the general scale and geographic distribution of the demand for land use and supporting facilities and services. Certain conclusions from the many possible interpretations of the data presented in this chapter follow.

Following a long period of steady and rapid growth, the population of the Region stabilized during the 1970s and 1980s and is again beginning to grow in the 1990s. Although the population of the Region stabilized, the movement of persons from the older urban central areas of the Region to the outlying areas of the Region, that is, the decentralization of the population which began after 1950, has continued largely unabated. This movement has markedly changed the development pattern of the Region, increasingly requiring outlying areas of the Region to provide many of the facilities and services once required only in the older, more highly developed urban areas of the Region.

The number of households has steadily increased throughout the Region, even though the overall population level has been relatively unchanged. The number of single-person households being formed and maintained, together with the trend toward smaller family size, has resulted in a significantly smaller average household size throughout the Region. This trend has created a continued demand for residential land and supporting facilities and services, even though overall population levels have stabilized.

The number of jobs in the Region has reflected national trends and policies. Job levels have fluctuated in response to overall business cycles, such as the severe recession of the early 1980s, which had a significant impact on employment levels both nationally and in the Region. The long-term trend in employment levels in the Region, however, has been one of steady increase. While the number of jobs has increased steadily, the types of jobs in the Region have been rapidly changing. Manufacturing has traditionally been, and still is, the largest employment category in the Region. However, the dominance of manufacturing jobs is lessening, while service employment is gaining in prominence. In addition to changes in type of employment, there is continuing decentralization of employment within the Region, with employment moving away from the larger and older urban industrial centers to outlying areas of the Region.

The preparation of a natural areas protection and management plan requires economic and demographic base forecasts in order to identify future urban land development and public facility needs. Presently, there is much uncertainty regarding probable future trends in some of the key determinants of the scale and location of development in the Region. It is unclear whether the current moderation of population growth is a temporary phenomenon or a more permanent departure from the steady and rapid growth rates of past decades. The extent to which the number of households in the Region can continue to increase further without an increase in regional population levels is clearly limited. Finally, the extent to which the decentralization of population and employment opportunities observed in the Region over the past several decades will continue is unclear. The natural areas protection and management planning process must recognize the uncertainty regarding future economic and social conditions in the Region and must be carried out in a manner which takes into account a wide range of possible future conditions.

Land Use

This section has provided an overview of land use trends in Southeastern Wisconsin along with a description of the land use base of the Region as of 1985 and changes in that base over approximately the preceding two decades. The most important findings of this section are summarized below.

1. Although urban development in the Region has been continuous since 1850, the character of this development has changed dramatically since 1950. The earlier form of compact, concentric urban development has been supplanted by a highly diffused pattern of areawide development. Between 1950 and 1985, a 47 percent increase in urban population was accompanied by a 227 percent increase in land committed to urban use. The conversion of land to urban uses occurred at a rate of about 10.5 square miles per year between 1950 and 1963, about 8.0 square miles per year between 1963 and 1970, and about 9.3 square miles per year between 1970 and 1985.

2. Urban land uses, consisting of lands devoted to residential, commercial, industrial, governmental and institutional, recreational, transportation, and unused

urban lands, as identified in the regional land use inventory, encompassed a total of about 606 square miles, or just under 23 percent of the Region, in 1985. Between 1963 and 1970, urban lands in the Region increased by about 62 square miles, or by 14 percent, an average annual increase of almost nine square miles. Between 1970 and 1985, urban lands increased by an additional 100 square miles, or 20 percent, an average annual increase of 6.7 square miles.

3. Nonurban lands, consisting of agricultural, woodlands, surface water and wetlands, and unused rural and other open land, encompassed about 2,083 square miles, or 77 percent of the total area of the Region, in 1985.

Public Utility Base

This section has described the public utility base of the Region. The public utilities of an area are vital to provide a pleasant and habitable environment. The following findings have particular significance for natural areas protection and management planning:

1. Public sanitary sewer service was provided to areas encompassing about 377 square miles, or about 14 percent of the total area of the Region, in 1985. About 1.51 million persons, representing nearly 87 percent of the total regional population, were served. Between 1970 and 1985, the area served by sanitary sewers increased by 68 square miles, or 22 percent. The population served increased by about 19,100 persons, or about 1 percent. The modest increase in population served by sanitary sewers is the net result of increases in the number of persons served in Kenosha, Ozaukee, Racine, Walworth, Washington, and Waukesha Counties and a significant decrease in the number served in Milwaukee County. In Milwaukee County, the population served by sanitary sewers decreased by 101,600 persons between 1970 and 1985, while the overall county population decreased by an estimated 114,700 persons. The percentage of the population served by sanitary sewers, however, increased at least slightly in each county in the Region, including Milwaukee County, between 1970 and 1985.

2. About 293 square miles, or 11 percent of the total area of the Region, was served by public water supply systems in 1985. About 1.39 million persons, or about 80 percent of the regional population, were served. Between 1970 and 1985, the area of the Region served by public water supply increased by almost 34 square miles, or about 13 percent. The total number of persons in the Region served by public water supply did not change significantly, however, as population increases in outlying counties were offset by a substantial decrease in Milwaukee County. In addition to the publicly owned water utilities, there are numerous private or cooperatively owned water supply systems in the Region. A total of 246 privately owned water supply systems, serving a total of about 32,600 persons, or about 2 percent of the total population of the Region, were known to exist in 1985.

Air Quality

This section notes that there has been a general improvement in air quality conditions in the Region, with a reduction in most major pollutants occurring over the past decade. Ozone pollution is the only remaining significant air quality problem, and can be effectively addressed only through a multi-state effort.

Park, Open Space, and Historic Sites

This section has described the existing parks and related outdoor recreation sites and historic sites in the Region.

1. There was a total of 2,608 park and related outdoor recreation sites in the Region in 1985. Together, these sites encompassed about 178 square miles, or 7 percent of the total area of the Region. Publicly owned sites accounted for 1,696 sites, or about 65 percent of all park and related outdoor recreation sites, and encompassed about 132 square miles, or 74 percent of the total recreation site area within the Region. The 912 privately owned recreation sites encompassed about 46 square miles, or 26 percent, of the total outdoor recreation site area. Many of these privately owned sites are water-oriented, clustered around the shores of inland lakes and rivers.

2. The history and cultural heritage of the Region is reflected in an abundance of

historic sites. Surveys of historic sites conducted by various units and agencies of government indicate that more than 14,000 historic sites have been identified in the Region. Particularly significant historic sites are listed on the National Register of Historic Places. As of 1985, a total of 254 sites and 20 historic districts in Southeastern Wisconsin were listed on the National Register of Historic Places.

3. As of 1989, a total of 312 natural areas were identified in the Region by various public agencies and by area naturalists. Of these sites, 47, or 15 percent, are classified as Natural Areas of Statewide or Greater Significance. However, only about 13 square miles, or about one-third of the total area of the 312 sites, is in public or other protective ownership and properly managed. Many high-quality natural areas and critical species habitats, as well as significant archaeological and geological sites, remain unprotected.

Natural Resource Base

These sections describe various elements of the Region's natural resource base. The term "natural resources" refers to anything required by organisms, populations, or ecosystems for their continued survival. Humankind makes use of these natural resources, which become vital to the economic development of an area and for the ability of an area to provide a pleasant and habitable environment. The following findings have particular significance:

1. The Southeastern Wisconsin Region contains a wide variety of soil types, ranging from poorly drained organic soils to excessively drained mineral soils, with significantly different soil types frequently intermingled in very small areas. It is essential that new urban development be properly located with respect to the soils of the Region, since many soils have characteristics questionable for urban development.

2. There are 101 major lakes with surface water areas of 50 acres or more in the Region, together having a combined surface water area of about 57 square miles, or about 2 percent of the total area of the Region. Because of human activities, many lakes in the Region face water quality problems which limit the use of lakes by humans and which threaten aquatic life. Since the completion of the regional water quality management plan in 1979, the water quality of some lakes has declined, usually due to the effects of urban development. The water quality of other lakes has improved, however, due to the implementation of nonpoint source water pollution control measures in some areas and to the elimination of malfunctioning septic tank systems, usually through the provision of sanitary sewer service.

3. There are about 1,148 miles of major streams in the Region, or perennial streams which minimally maintain a small, continuous flow throughout the year except under unusual drought conditions. A number of steps have been taken to address existing water quality problems, including the preparation of appropriate management plans. Implementation of these plans may be expected to result in a gradual improvement of water quality in many stream reaches.

4. The Region is richly endowed with groundwater resources. Continuous, relatively uniform discharge from groundwater storage helps maintain the base flow of major streams within the Region. The three groundwater aquifers underlying the Region are a major source of water supply for domestic, municipal, and industrial water users. Groundwater quality can be adversely affected by human activity and by naturally occurring phenomena. Relatively high levels of naturally occurring radium have been found in a number of municipal wells using the sandstone aquifer as a source. In certain areas, volatile organic materials have entered the groundwater system through commercial, industrial, and municipal waste disposal systems or chemical spills. Isolated cases of bacterial and nitrogen contamination have also been identified in the Region. Efforts are under way to address many of the identified problems, and despite such localized problems, the quality of groundwater in the Region overall may be generally characterized as good.

5. The most important elements of the natural resource base and features closely related to that base, including wetlands, woodlands, prairies, wildlife habitat, major lakes and streams and associated shorelands and floodlands, and historic, scenic, and recreational sites, when combined, result in essentially lineal elongated patterns referred to by the Commission as environmental corridors. "Primary" environmental corridors include a wide variety of important natural resource and resource-related elements and are, by definition, at least 400 acres in size, two miles long, and 200 feet wide. In 1985, primary environmental corridors encompassed about 468 square miles, or 17 percent of the total area of the Region.

6. "Secondary" environmental corridors facilitate surface water drainage and maintain pockets of natural resource features. While not as significant as the primary environmental corridors in terms of overall resource values, such corridors should be considered for preservation as the process of development proceeds within the Region, particularly insofar as they can be incorporated into urban stormwater retention basins, associated drainageways, and neighborhood parks. Isolated natural resource areas may represent the only wildlife habitat in an area, provide good locations for local parks and nature study areas, and lend natural diversity to an area, and, accordingly, these areas should also be protected and preserved to the extent practicable as urban development proceeds.

7. Wetlands remain one of the most important elements of the natural resource base of the Region, comprising about 10 percent of the total area of the Region in 1985. Wetlands perform an important set of natural functions including, among others, supporting a wide variety of plant and animal life, stabilizing lake levels and streamflows, contributing to the atmospheric oxygen and water supplies, reducing stormwater runoff, protecting shorelines from erosion, and reducing stream sedimentation. Wetlands have severe limitations for residential, commercial, industrial, and other forms of urban development. Wetlands should be protected from urban encroachment because of both their natural values and their development limitations. The vast majority of all wetlands in the Region are located within the identified environmental corridors and isolated natural areas, further underscoring the need for the preservation of those areas.

Chapter IV

SUMMARY OF THE REGIONAL LAND USE PLAN

INTRODUCTION

The regional natural areas protection and management plan is an integral part of the emerging comprehensive plan for the Southeastern Wisconsin Region. It is the basic element of that comprehensive plan, the third-generation, design year 2010, regional land use plan, adopted by the Commission in September 1992. This third-generation plan is fully documented in SEWRPC Planning Report No. 40, A Regional Land Use Plan for Southeastern Wisconsin—2010, January 1992. The new regional land use plan, which supersedes the second-generation, design year 2000, plan adopted by the Commission in 1977, was prepared and adopted as part of the Commission's ongoing review and reevaluation of the various elements of the overall plan for the physical development of the Region.

As another part of its ongoing planning program, the Commission in 1979 adopted a regional water quality management plan. This plan has been subsequently refined and detailed through plan amendments. The land use planning process necessarily depends upon past, must deal with existing, and seeks to influence future land use decisions which have had or may have significant impacts upon water quality in the Region. The current regional land use plan is an integral element of the evolving regional water quality management plan.

In addition, the regional land use plan has a significant impact upon efforts pertinent to the protection and management of natural areas and critical species habitat in the Region. This is accomplished through its inventories of, and recommendations regarding, the preservation and protection of environmental corridors, prime agricultural lands, and other environmentally sensitive areas in Southeastern Wisconsin. Accordingly, it is appropriate to summarize herein the key features of the adopted regional land use plan, particularly those applicable to the natural areas protection and management planning effort.

THE REGIONAL LAND USE PLAN

The new, third-generation regional land use plan has a base year of 1985 and, as already noted, a design year of 2010. It is an update and extension of the second-generation regional land use plan. In the course of preparing the third-generation plan, it was determined that the basic concepts of the second-generation plan would be brought forward and incorporated into the new plan. Both land use plans are "controlled existing trend" in nature, placing heavy emphasis upon the continued impact of the urban land market on determining the location, intensity, and character of future development in the Region, but seeking to influence the operation of that market in the public interest through, among other means, sound public land use regulations.

The forecasts of future growth and change underlying the third-generation regional land use plan reflect, in part, long-term trends in the decentralization of urban development in the Region. These forecasts, however, were adjusted to reflect new benchmark population and employment data, particularly data from the 1990 Census. Adjustments of the forecasts were also made at the county level to achieve a more centralized distribution of population, employment, and related urban land use development within the Region. The Commission's Technical Coordinating and Advisory Committee on Regional Land Use Planning, under whose guidance the plan was prepared, determined that the new land use plan should accommodate a design year 2010 population of about 1.9 million persons and a design year employment level of about 1.1 million jobs. Tables 26, 27, and 28, respectively, set forth the population, household, and employment levels forecast for the Region and its counties.

Urban Development Location, Densities, and Services

The current regional land use plan recommends that new urban development occur primarily in those areas of the Region which are covered by

Table 26

EXISTING AND ENVISIONED POPULATION DISTRIBUTION IN THE REGION BY COUNTY: 1985 AND 2010 ADOPTED LAND USE PLAN

County	1985 Population		Planned Increment 1985-2010		2010 Population	
	Number	Percent of Total	Number	Percent	Number	Percent of Total
Kenosha	121,100	7.0	26,800	22.1	147,900	7.7
Milwaukee	939,600	53.9	-5,600	-0.6	934,000	48.9
Ozaukee	67,500	3.9	12,300	18.2	79,800	4.2
Racine	169,200	9.7	16,800	9.9	186,000	9.7
Walworth	72,200	4.1	15,100	20.9	87,300	4.6
Washington	87,200	5.0	24,500	28.1	111,700	5.8
Waukesha	285,900	16.4	78,400	27.4	364,300	19.1
Region	1,742,700	100.0	168,300	9.7	1,911,000	100.0

Source: SEWRPC.

Table 27

EXISTING AND ENVISIONED HOUSEHOLD DISTRIBUTION IN THE REGION BY COUNTY: 1985 AND 2010 ADOPTED LAND USE PLAN

County	1985 Households		Planned Increment 1985-2010		2010 Households	
	Number	Percent of Total	Number	Percent	Number	Percent of Total
Kenosha	44,200	6.9	14,900	33.7	59,100	7.6
Milwaukee	368,200	57.2	32,800	8.9	401,000	51.8
Ozaukee	22,900	3.5	7,600	33.2	30,500	3.9
Racine	61,200	9.5	12,700	20.8	73,900	9.6
Walworth	25,600	4.0	10,000	39.1	35,600	4.6
Washington	28,500	4.4	13,100	46.0	41,600	5.4
Waukesha	93,200	14.5	39,400	42.3	132,600	17.1
Region	643,800	100.0	130,500	20.3	774,300	100.0

Source: SEWRPC.

Table 28

EXISTING AND ENVISIONED EMPLOYMENT DISTRIBUTION IN THE REGION BY COUNTY: 1985 AND 2010 ADOPTED LAND USE PLAN

County	1985 Employment		Planned Increment 1985-2010		2010 Employment	
	Number	Percent of Total	Number	Percent	Number	Percent of Total
Kenosha	42,500	4.9	20,500	48.2	63,000	5.7
Milwaukee	527,300	60.5	85,400	16.2	612,700	56.0
Ozaukee	26,900	3.1	11,800	43.9	38,700	3.5
Racine	74,500	8.5	17,600	23.6	92,100	8.4
Walworth	28,100	3.2	12,400	44.1	40,500	3.7
Washington	31,300	3.6	16,600	53.0	47,900	4.4
Waukesha	141,300	16.2	58,800	41.6	200,100	18.3
Region	871,900	100.0	223,100	25.6	1,095,000	100.0

Source: SEWRPC.

soils suitable for such development; which are not subject to special hazards such as flooding and shoreline erosion; and which can be readily served by essential municipal facilities and services, including public sanitary sewerage, water supply, and mass transit services.

The land use pattern recommended under the adopted third-generation regional land use plan is shown on Map 23 and is quantitatively summarized in Table 29. Like its predecessor, the new year 2010 plan recommends a relatively compact, centralized regional settlement pattern, with urban development occurring generally in concentric rings along the full periphery of, and outward from, existing urban centers in the Region. The plan proposes to accommodate anticipated growth in the Region by converting about 86 square miles of land from rural to urban uses, an increase of about 14 percent over the 1985 level. About 63 square miles, or 74 percent, of the rural lands envisioned for such conversion are now in agricultural use. As a result, the existing stock of agricultural land in the Region would decrease by about 4 percent by the year 2010.

Under the plan, most new urban development would occur in planned neighborhood development units at medium densities, with a typical single-family lot size of one-quarter acre and a typical multi-family development averaging about 10 dwelling units per net acre, provided with basic urban services and facilities.

The plan proposes to serve essentially all new urban development within the Region with public sanitary sewer and public water supply service. It envisions that, by the year 2010, about 85 percent of all urban land and about 91 percent of the resident population within the Region will have such services (see Table 30).

Primary Environmental Corridors

The preservation of existing primary environmental corridors within Southeastern Wisconsin has long been one of the most important objectives of the Commission's continuing regional planning efforts. The preservation and protection of these primary environmental corridors in accordance with regional development objectives is considered essential to the maintenance of a wholesome environment within the Region and to the preservation of the unique cultural and natural heritage of the Region and of its natural beauty. As noted in Chapter III, primary environmental corridor lands in the Region existing in 1985 encompassed about 468 square miles, or 17 percent of the total area of the Region. The adopted year 2010 regional land use plan, like the second-generation year 2000 plan, recommends the preservation of existing primary environmental corridor lands within the Region in essentially open, natural uses. Under the plan, development within these corridors would be limited to that needed to accommodate required transportation and utility facilities, compatible outdoor recreational facilities, and, on a limited basis, rural-density, estate-type residential use.

In addition, the regional land use plan envisions that certain adjacent floodland areas currently in agricultural or other open use would be restored to a wetland condition, thereby making them part of the environmental corridor network. These floodland areas, which together encompass about six square miles, have been recommended for county or State acquisition under existing county park and open space plans.

Map 23 shows the environmental corridor network recommended under the year 2010 land use plan, including both existing corridors and the proposed additional areas. The planned primary environmental corridors together encompass about 474 square miles, or just under 18 percent of the total area of the Region.

The primary environmental corridors of the Region generally lie along major stream valleys, surround major lakes, or are found in the Kettle Moraine area, and contain most of the best remaining wetlands, woodlands, wildlife habitat areas, surface waters, and associated shorelands and floodlands, as well as features closely related to those elements, such as historic, scenic, and recreational sites. In effect, therefore, these corridors are a composite of the best remaining elements of the natural resource base of Southeastern Wisconsin, and have immeasurable environmental and recreational value.

Decreases in primary environmental corridor lands occur, for the most part, as the result of the conversion of natural areas to intensive and inappropriate urban or agricultural use. The soils within these corridors are often unsuitable for urban development. The exclusion of urban development from these corridors, therefore, is important, not only in terms of preventing the potentially irreparable loss of precious elements

Table 29

EXISTING AND PROPOSED LAND USE IN THE REGION: 1985 AND ADOPTED 2010 REGIONAL LAND USE PLAN

Land Use Category	Existing 1985		Planned Increment 1985-2010		Total 2010	
	Acres	Percent of Total	Acres	Percent	Acres	Percent of Total
Urban						
Residential						
Urban High-Density	27,797	1.6	1,817	6.5	29,614	1.7
Urban Medium-Density	54,153	3.1	30,776	56.8	84,929	4.9
Urban Low-Density	94,618	5.5	3,039	3.2	97,657	5.7
Suburban-Density	8,035	0.5	1,344	16.7	9,379	0.6
Subtotal	184,603	10.7	36,976	20.0	221,579	12.9
Commercial	8,714	0.5	1,320	15.1	10,034	0.6
Industrial	12,080	0.7	5,186	42.9	17,266	1.0
Transportation, Communication, and Utilities[a]	120,279	7.0	14,560	12.1	134,839	7.8
Governmental and Institutional	17,240	1.0	1,042	6.0	18,282	1.1
Recreational	25,564[b]	1.5	4,089[c]	16.0	29,653	1.7
Unused Urban Land	19,215	1.1	-8,400	-43.7	10,815	0.6
Urban Subtotal	387,695	22.5	54,773	14.1	442,468	25.7
Rural						
Residential	--[d]	--	721	--	721	--[e]
Agricultural	931,956	54.1	-40,487	-4.3	891,469	51.8
Other Open Lands[f]	401,462	23.4	-15,007	-3.7	386,455	22.5
Rural Subtotal	1,333,418	77.5	-54,773	-4.1	1,278,645	74.3
Total	1,721,113	100.0	0	0.0	1,721,113	100.0

[a] *Includes off-street parking areas.*

[b] *Includes net site area of public and nonpublic recreation sites.*

[c] *Includes only that net site area recommended for public recreation use.*

[d] *Included in 1985 land use inventory as part of urban residential land use.*

[e] *Less than 0.1 percent.*

[f] *Includes woodlands, water, wetlands, unused rural land, landfill sites, and quarries.*

Source: SEWRPC.

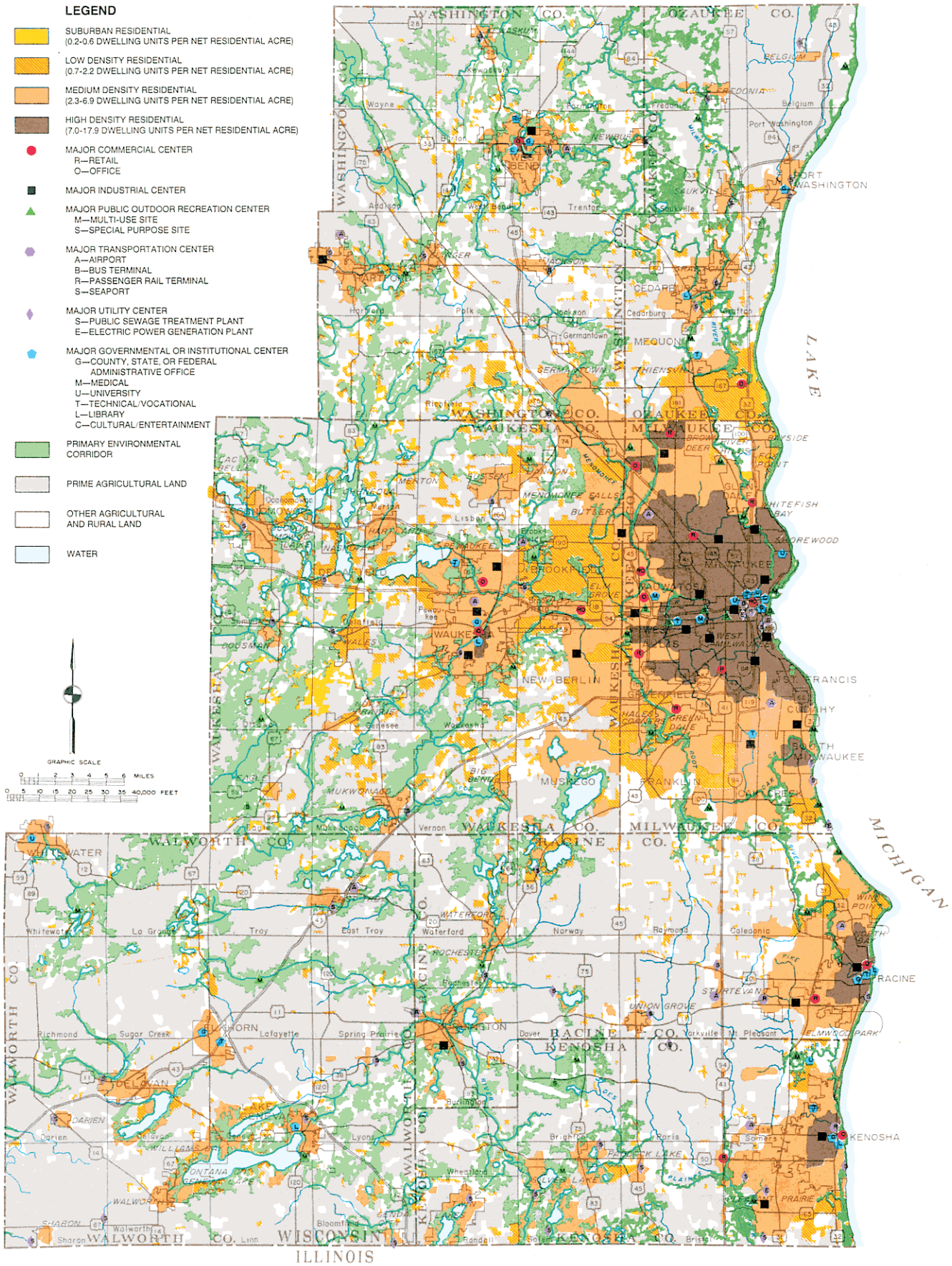
of the natural resource base of the Region, but also in terms of preventing the creation of such serious and costly problems as air and water pollution, wet and flooded basements, building and pavement foundation failures, and excessive infiltration and inflow of clear water into sanitary sewerage systems.

Prime Agricultural Lands

As noted above, much of the urban expansion envisioned under the adopted regional land use plan would involve the conversion of existing agricultural lands. However, the year 2010 regional land use plan, like the two plans which preceded it, proposes the preservation, to the

Map 23

ADOPTED LAND USE PLAN FOR THE SOUTHEASTERN WISCONSIN REGION: 2010



The adopted design year 2010 regional land use plan envisions a need to convert about 86 square miles of land from rural to urban use to accommodate an anticipated population increase of about 168,000 persons and an anticipated employment increase of about 223,000 jobs in the Region between 1985 and 2010. The plan seeks to promote a centralized regional settlement pattern, maintaining, to the extent practicable, population and employment levels of the central portions of the Kenosha, Milwaukee, and Racine urbanized areas. The plan seeks to encourage the location of new urban development only in areas which are covered by soils suitable for such use; which are not subject to special hazards such as flooding and erosion; and which can be readily provided with basic urban services and facilities, including public sanitary sewer, water supply, and mass transit services. The plan seeks to preserve all the remaining primary environmental corridors and most remaining prime agricultural lands in the Region.

Source: SEWRPC.

Table 30

EXISTING AND PROPOSED DEVELOPED AREA AND POPULATION SERVED BY PUBLIC SANITARY SEWER AND WATER SUPPLY SERVICE IN THE REGION: 1985 AND 2010 ADOPTED LAND USE PLAN

Area and Population	Existing Service 1985		Planned Service Increment		Total Service 2010	
	Public Sanitary Sewer	Public Water Supply	Public Sanitary Sewer	Public Water Supply	Public Sanitary Sewer	Public Water Supply
Developed Area[a]						
Total Square Miles	476.5	476.5	191.3	191.3	667.8	667.8
Square Miles Served	319.8[b]	262.9[c]	250.5	309.8	570.3[d]	572.7[d]
Percent of Total Served	67.1	55.2	--	--	85.4	85.8
Population						
Total Population	1,742,700	1,742,700	168,300	168,300	1,911,000	1,911,000
Population Served	1,507,800	1,389,700	231,300	352,800	1,739,100	1,742,500
Percent of Total Served	86.5	79.7	--	--	91.0	91.2

NOTE: Public sanitary sewer and water supply service areas presented in this table do not include lands that are located adjacent to, but outside, the Region, including 1.1 square miles of land in the Jefferson County portion of the Whitewater urban service area, 0.4 square mile of land in the Jefferson County portion of the Oconomowoc urban service area, and 0.4 square mile of land in the Dodge County portion of the Hartford urban service area.

[a] *Based on historic urban growth analysis.*

[b] *Does not include 57.1 square miles of land served with public sanitary sewer located outside the 1985 developed urban area.*

[c] *Does not include 30.1 square miles of land served with public water supply located outside the 1985 developed urban area.*

[d] *Does not include 4.9 square miles of land to be served with public sanitary sewer and water supply service located outside the planned 2010 developed urban area.*

Source: SEWRPC.

maximum extent practicable, of prime agricultural lands within the Region, defined as areas particularly well suited for highly productive agricultural use. In 1985, such lands encompassed about 1,047 square miles, or 39 percent of the Region, as well as about 72 percent of all land in agricultural use in the Region. The delineation of prime agricultural lands under the current land use plan reflects the refinements pertinent to the identification of such lands under county farmland preservation planning programs undertaken in Southeastern Wisconsin in recent years.

The current regional land use plan proposes to convert to urban use only those prime agricultural lands which have already been committed to urban development because of their proximity to existing and expanding concentrations of urban land uses and the prior commitment of heavy capital investment in utility extensions. Under the plan, only about 16 square miles, or just over 1 percent, of the remaining prime agricultural lands of the Region would be converted to urban use by the year 2010.

CONCLUSION

This chapter briefly summarizes the key aspects of the adopted regional land use plan for Southeastern Wisconsin. The plan is designed to help assure the protection, enhancement, and wise use of the natural resource base of the Region, particularly its soil, inland lakes and streams, wetlands, woodlands, prairies, and wildlife habitat areas. In this way it will assist in

maintaining a sound ecological balance between human activities and the natural environment which supports humans and other species. The plan recognizes the interdependence between the regional land use pattern and the transportation and public utility systems which sustain that pattern. Accordingly, the plan seeks to maximize the use of existing transportation and public utility facilities and to require the provision of transportation and utility services only to those areas of the Region suitable for urban use, thus helping meet the critical objective of the protection and wise management of the Region's precious and finite land, water, and other resources.

More specifically, the regional land use plan seeks to assure the allocation of new urban and rural development only to those areas of the Region which are covered by soils well suited to such development; the protection of shoreline frontage of lakes and perennial streams of the Region from incompatible development; the protection of the floodways and floodplains of perennial streams and watercourses of the Region from urban encroachment; the protection of remaining wetland areas from destruction through improper development; the protection of remaining native prairies in a natural condition; and the maintenance of appropriate levels of woodland cover and of the remaining high-value natural resource areas of the Region in a wholesome state to assure suitable habitat for the maintenance of wildlife within the Region. Above all, the regional land use plan seeks to assure the preservation and protection, to the maximum extent possible, of the primary environmental corridors and prime agricultural lands of the Region. All of these objectives are paramount to any natural areas and critical species habitat protection and management planning effort.

The regional natural areas protection and management plan must be prepared and implemented in the context of, and capitalize on the relevant features of, the adopted regional land use plan. As complementary elements of the emerging comprehensive plan for the Southeastern Wisconsin Region, these two plans, as well as the regional water quality plan and other elements of the comprehensive plan that are pertinent to the natural resource base of the Region, are intended as coordinated and harmonious guides to achieving the protection and wise management of that base.

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Chapter V

HISTORIC LOSS OF NATURAL AREAS AND CRITICAL SPECIES HABITATS IN SOUTHEASTERN WISCONSIN

INTRODUCTION

The natural landscape of the Southeastern Wisconsin Region is subject to change from a number of factors. In prehistoric times, climatic, geological, and vegetational changes altered the landscape and these changes continue to operate. Plant and animal species have invaded and increased as others have declined. These changes have occurred over the course of millennia. However, the recent introduction of intensive European settlement has resulted in rapid landscape changes compressed within a relatively short time span. This chapter describes some of these changes. The chapter focuses on changes in vegetation for a number of reasons. Although the topography of the Region has been drastically altered in relatively small areas by the earth-moving and earth-shaping activities attendant to urban and rural development overall, the overall topography of the Region remains much as it was at the time of European settlement. Similarly, the Region's climate, while altered in intensely developed urban areas, overall remains relatively the same as it was at the time of European settlement. Animal populations have changed greatly, but no reliable quantitative measure of this change is available. The vegetation of the Region has also been altered drastically since European settlement, but an accurate inventory of that vegetation as it existed at the very time of European settlement does exist. The changes in vegetation provide a reasonable surrogate measure of the changes that have taken place in the animal population.

PRE-SETTLEMENT VEGETATION OF THE REGION

European settlement of Southeastern Wisconsin radically altered the pre-settlement landscape. To gauge the magnitude of this change, baseline information about the landscape prior to widespread settlement is required. Studies of remnants of natural vegetation provide clues to pre-settlement conditions, but these remnants are frequently small and widely scattered. Historical accounts of the early explorers, naturalists, traders, and settlers tend to be fragmentary and anecdotal, and thus are of limited usefulness in describing the pre-settlement landscape. However, many scientific researchers have found that the original field notes of the government surveyors that conducted the U. S. Public Land Survey provide a satisfactory basis for describing the pre-settlement vegetation. Recorded at the inception of European settlement of the Region, the U. S. Public Land Survey notes contain much valuable ecological information about the original vegetation. Because the data were collected in a uniform way to give systematic coverage of extensive areas, and because the professional and responsible surveyors—men like Garret Vliet, William Burt, John Brink, and Hiram Burnham—did the work with painstaking care, the notes are considered to be a reliable data base for assessing general changes in vegetational composition.

The Southeastern Wisconsin Region was surveyed during 1835 and 1836. The land was divided into townships six miles square, each township consisting of 36 sections. Each section was one square mile in area. The exterior boundaries of the townships were first surveyed and monumented, to be followed, at a later date, by the interior subdivision of each township into sections. Government surveyors walked each north-south and east-west section line, establishing section and quarter-section corners—the locations of which have been accurately perpetuated to this day. Because the government surveys were to provide an inventory of the resources of the area—and a basis for the preparation of the first large-scale maps, as well as the basis for title to real-property ownership—the surveyors were requested to record landscape information by the following four methods: 1) Running descriptions were recorded along each section line pertaining to soil quality, physiography, predominant tree and underbrush species, and stream widths, crossing locations, and directions of flow. Large lakes were measured. 2) The soils, topography, and vegetation of each township were described in a summary. 3) Plat maps of the townships were drawn, depicting such features as lakes, streams, swamps, marshes, prairies, tornado tracks, burned areas, windthrows, Indian villages, settlements, trails, and wagon roads. 4) At each corner a timber post was set and the two—or sometimes four—closest trees in different quadrants were blazed and marked and the identity, diameter, bearing, and distance of the trees from the corner point were recorded. This information was obtained to enable future surveyors to relocate exactly the section and quarter-section corners. In treeless

areas, such as prairies, earthen mounds were raised around the corner posts to indicate the corner position.

An important objective of the survey was to provide relevant information to prospective land purchasers, particularly for agricultural purposes. Ecological information must, therefore, be derived from the survey notes and plats. In this latter respect, the pre-settlement landscape can be described qualitatively from the U. S. Public Land Survey, line descriptions, township plats and summaries, and tree identities. Because, ideally, the bearing trees represent a random sampling of forest composition for a large land area based on a standardized plan, vegetation may also be described quantitatively, using tree sizes, tree numbers, and point-tree distances.

The coarse scale of the surveys, that is, section lines a mile apart from one another, and perhaps as few as six bearing trees identified in one mile, precludes mapping in fine detail. Small, isolated plant communities can be missed entirely. Unfortunately, very few data were provided by the surveyors about the species composition of nonforested plant communities, such as prairies, marshes, shrublands, and sedge meadows. This knowledge can only be inferred from the remnants of original vegetation remaining in the present landscape. Also, the continuum nature of midwestern vegetation does not lend itself to delineating discrete types. For example, much of southern Wisconsin was originally covered by a mosaic of prairie, oak savanna, and dry oak forest, each community blending into the others. Mapping locations of boundaries between these community types is often an arbitrary, subjective, and generalized decision.

A qualitative approach was used to map the vegetation of Southeastern Wisconsin as it existed in 1835 to 1836. Each section line was followed in the original survey notes, and community types were platted on blank township maps as they were noted by the surveyors. Species of bearing trees also gave strong indication of overall vegetation at each corner location. Corner-to-tree distances, indicators of tree density at corners, aided in distinguishing between prairie, oak savanna, and dry oak forest, following the method of Anderson and Anderson[1] in the prairie-forest transition region of Illinois. Prairies, savannas, and oak forests were identified as follows:

1. Prairies were identified when a point-to-nearest-tree distance of at least 467 links—308 feet—occurred. This equates to less than 0.2 trees per acre.

2. Savannas were identified when a point-to-nearest-tree distance between 50 links—33 feet—and 467 links—308 feet—occurred. This equates to between 0.2 and 19 trees per acre.

3. Oak forests were identified when a point-to-nearest-tree distance of less than 50 links—33 feet—occurred. This equates to more than 19 trees per acre.

In addition, previous descriptions of portions of Southeastern Wisconsin were consulted in order to correlate the findings of others.[2]

Based on a combination of physiognomy, or type of life form, and floristics, or species composition, the pre-settlement vegetation of the Region (see Map 24) was categorized as follows:

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[1]*Roger C. Anderson and M. Rebecca Anderson, "The Presettlement Vegetation of Williamson County, Illinois," Castanea, Vol. 40, 1975, pp. 345-363.*

[2]*L. H. Bartz, "Vegetation of the Kettle Moraine State Forest (Southern Unit): Past 1835-6 and Present 1978," M.S. thesis, University of Wisconsin-Milwaukee, Milwaukee, Wisconsin, 1978.*

L. R. Brumm, "The Vegetation of Ozaukee County—Past and Present," M.S. thesis, University of Wisconsin-Milwaukee, Milwaukee, Wisconsin, 1977.

T. C. Chamberlin, "Native Vegetation of Eastern Wisconsin," Geology of Wisconsin, Vol. 2, 1887, pp. 176-187.

R. W. Finley, Original Vegetation Cover of Wisconsin From U. S. General Land Office Notes, U. S. Department of Agriculture Forest Service, North Central Forest Experiment Station, St. Paul, Minnesota, 1976.

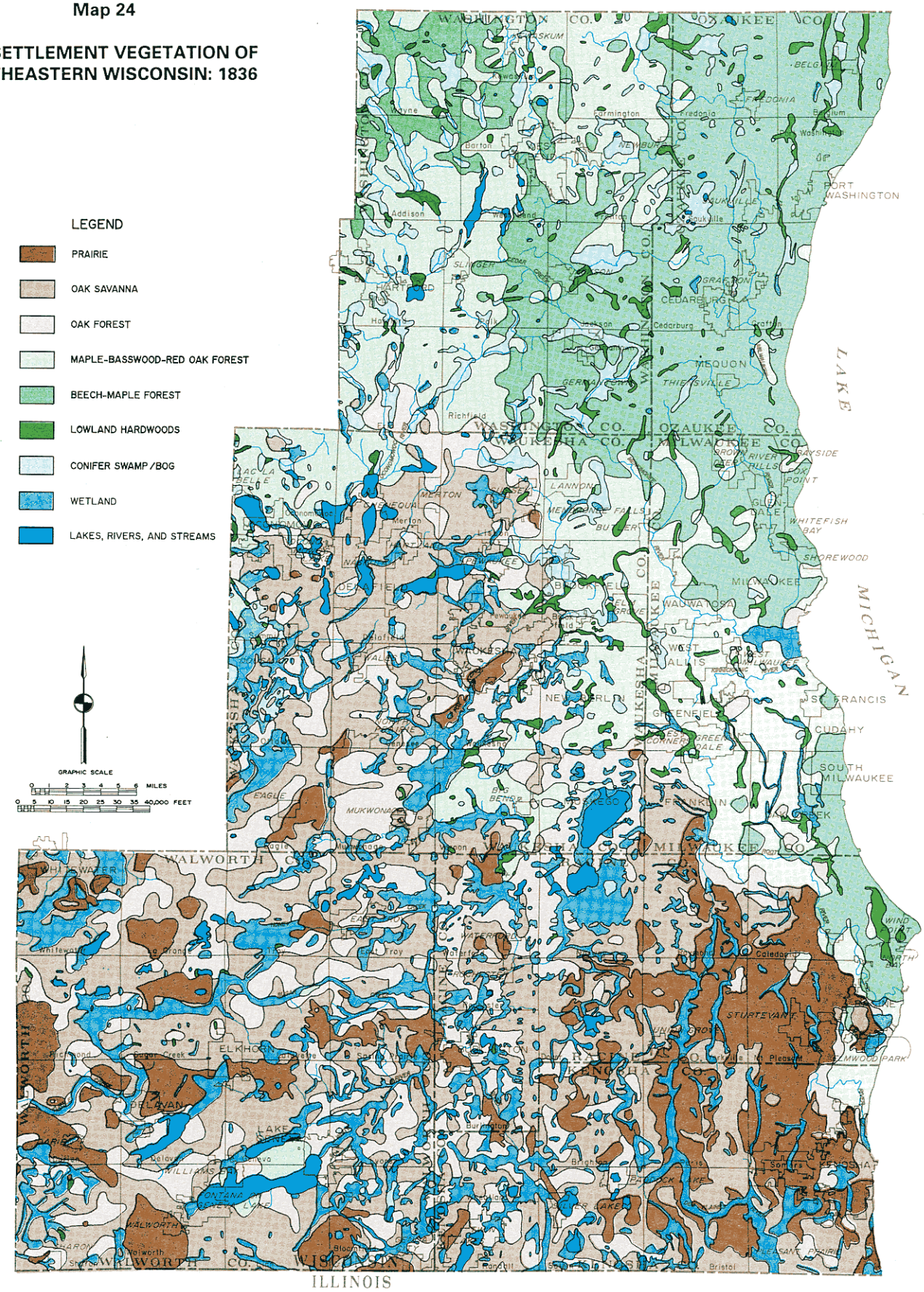
H. A. Goder, "Pre-settlement Vegetation of Racine County," Transactions of the Wisconsin Academy of Sciences, Arts and Letters, Vol. 45, 1956, pp. 169-176.

M. Johnson and J. Schwarzmeier, Presettlement Vegetation of Waukesha County, 1836, Map From Original Land Survey Records, Waukesha County Park Commission, 1973. Unpublished.

Philip Whitford and Peter J. Salamun, "An Upland Forest Survey of the Milwaukee Area," Ecology, Vol. 35, 1954, pp. 533-540.

Map 24

PRE-SETTLEMENT VEGETATION OF SOUTHEASTERN WISCONSIN: 1836



The map of the pre-European-settlement vegetation cover of Southeastern Wisconsin was interpreted from the 1835-1836 records of the original land surveyors who conducted the first United States government survey of the State. This map presents the natural vegetation of the Region as it existed before significant alteration by European settlement. Because of the small scale of the map, minor areas of vegetation cannot be shown. The limited detail of the survey records allows only generalized vegetation types to be mapped. Judgments had to be made as to precisely where to draw the boundaries between cover types, since different vegetation types in nature rarely exhibit distinct boundaries.

Source: SEWRPC.

1. Beech-Maple Forest: Co-dominated by American beech and sugar maple, this forest type closely corresponds to the southern mesic forest described in Chapter III. In addition to American beech and sugar maple, associated tree species include basswood, red oak, white ash, slippery elm, yellowbud hickory, and American elm. Best forest development occurred on the better-drained, mesic sites. Because of the limited range of American beech in Southeastern Wisconsin, these communities are restricted to within a few miles of Lake Michigan, mostly in Ozaukee, Washington, and Milwaukee Counties.

2. Maple-Basswood Forest: This forest type is very similar to the beech-maple forest, but without American beech, which is limited in range. This forest type extends farther west and south, where the red and white oaks become more important tree species in this forest type.

3. Aspen/Birch Forest: This is a relatively short-lived successional forest community, dominated by young stands of quaking or trembling aspen and paper birch. It occurs in forest areas that have suffered recent disturbance, such as fire or windthrow. It was probably more frequent on the pre-settlement landscape than the original land survey records suggest. Usually the stands were too small to be mapped.

4. Oak Forest: This forest type includes xeric, or dry, and dry-mesic upland woods dominated by various species of oaks—white, red, black, bur, and Hill's. Other species, such as shagbark hickory, and a frequently thick underbrush of prickly-ash, hawthorn, bramble, and dogwood, also occurred in the dry forest. This forest type occurred primarily south of the vegetation tension zone. Throughout much of Waukesha and Walworth Counties, the government surveyors listed "yellow oak" as one of the more abundant common tree species. According to the literature,[3] "yellow oak" usually refers to chinkapin oak (Quercus muehlenbergii), a member of the white oak group. However, field surveys in the Region have only infrequently encountered Q. muehlenbergii, and these observations have been restricted to areas north and east of the tension zone in Milwaukee, Ozaukee, and Washington Counties. No other member of the "white oak group"—white oak, bur oak, and swamp white oak—that occurs in Wisconsin has ever been commonly referred to as "yellow oak." However, "yellow oak" is sometimes listed as an alternative name for two members of the red oak group—black oak (Q. velutina) and Hill's oak (Q. ellipsoidalis)[4]—that are common on drier sites in present-day Waukesha and Walworth Counties. "Yellow" probably refers to the yellow-orange inner bark of these two species.

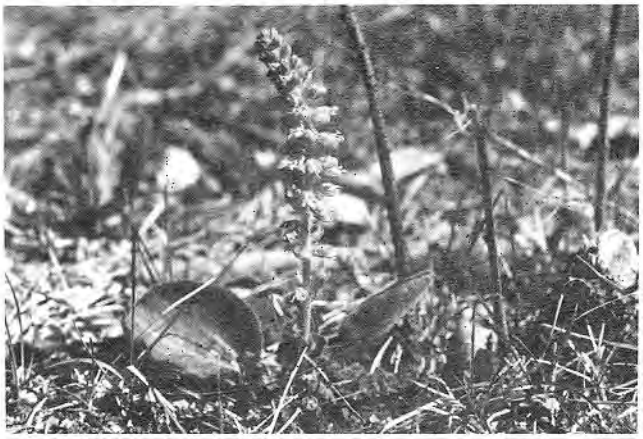
5. Oak Savanna: Dominated by scattered bur, white, or black oaks over prairie forbs and grasses, this type corresponds to the oak openings of Chapter III. It was very widespread in Southeastern Wisconsin south of the vegetation tension zone, where it grades into both oak forest and prairie. It may have had its own set of particular species, such as kittentails (Besseya bullii). Hazelnut was a common underbrush species.

The parklike oak savanna once covered over 605 square miles, or about 23 percent, of Southeastern Wisconsin. Today, only about 117 acres of this rare prairie land, with its scattered, open grown oak trees, remain in the Region.

Source: Donald M. Reed.

[3]*Elbert L. Little, Jr., Checklist of United States Trees (Native and Naturalized), Agriculture Handbook No. 541, Forest Service, U. S. Department of Agriculture, Washington, D. C., 1979.*

[4]*Ibid.*



The kittentails (Besseya bullii), shown above, is classified by the State as threatened. This species is restricted to the droughty soils of the oak savannas. However, good populations of this member of the snapdragon family still may be found in the remaining oak openings and dry prairies of the Kettle Moraine.

Source: Donald M. Reed.

6. Prairie: This type includes dry, dry-mesic, mesic, and probably wet-mesic prairies, although the latter graded into wetlands and could not consistently be separated. The prairie was a very common plant community in Kenosha, Racine, and Walworth Counties.

7. Lowland Hardwood Forest: This forest type corresponds to the riverine and lacustrine swamp forests of Chapter III. Found adjacent to waterways and lakes, the lowland hardwood forest was dominated by black and green ashes, American elm, red and silver maples, and willows. This wetland forest type frequently graded into conifer swamps and nonforested wetlands.

8. Conifer Swamp: This lowland forest type also includes some open bogs, since the latter community cannot readily be distinguished in the original land survey records. The conifers included both tamarack and white cedar. Conifer swamps usually occurred on poorly drained sites, mostly north of the tension zone.

9. Wetlands: This is an inclusive term that encompasses a variety of treeless wetlands on hydric sites and includes deep and shallow marshes, sedge meadows, shrub-carrs, alder thickets, and wet prairies, all of which can intergrade, making them difficult to distinguish in the original land survey records.

Many of the specific vegetation communities listed in Chapter III, such as fens or shaded cliffs, were of such limited areal extent on the pre-settlement landscape that either mapping them at such a small scale was impossible, or they were not recognized as separate communities by the surveyors.

Table 31 presents the areas and percentages of each of the counties of the Region, and of the Region as a whole, occupied by each of the pre-settlement vegetation types as determined from the land survey records. Bodies of water are not included in the total vegetation acreages; however, it may be assumed that bodies of open water have changed considerably in areal extent, plant and animal species composition, and water quality since 1836. The vegetation type occupying the greatest area of pre-European-settlement Southeastern Wisconsin was oak savanna, which occupied over 387,000 acres, or 23.0 percent, of the Region. This was concentrated largely in Walworth and Waukesha Counties. The second and third most widespread vegetation types were the two forest types for which the sugar maple was a major component—maple-basswood forest and beech-maple forest. Combined, they occupied 36.0 percent of the Region, mostly in Washington, Ozaukee, and Milwaukee Counties. Lowland hardwood forests were scattered throughout much of the Region, but conifer swamps were concentrated mainly in Ozaukee and Washington Counties.

There were originally over 170,000 acres of prairie in the Region, mostly in Walworth, Racine, and Kenosha Counties. Nonforested wetlands were most commonly found in Kenosha, Racine, Walworth, and Waukesha Counties.

CHANGES SINCE SETTLEMENT

Proportion of Remaining Natural Vegetation Types

Tables 32 through 39 compare the vegetation types present in the Region and its counties in 1836, as derived from the government land survey records, to the natural vegetation of the Region in 1990 as compiled from Commission surveys. The Commission data combine all upland forest vegetation into one type—upland woods—and all wetland vegetation, whether forested or not, into one type—wetlands. Because of this, for comparison purposes, the pre-settlement upland forest types—oak, maple-basswood, and beech-maple—were similarly combined, as were the pre-settlement wetland types—lowland hardwood forest, conifer swamp, and wetlands. The prairie and oak savanna acreages are

Table 31

PRE-SETTLEMENT VEGETATION OF SOUTHEASTERN WISCONSIN AND ITS COUNTIES: 1836

Vegetation Type	County							
	Kenosha		Milwaukee		Ozaukee		Racine	
	Acres	Percent of County Land Area	Acres	Percent of County Land Area	Acres	Percent of County Land Area	Acres	Percent of County Land Area
Prairie	50,509	28.7	1,413	0.9	0	0.0	54,394	25.3
Oak Savanna	63,432	36.1	6,968	4.5	0	0.0	59,887	27.9
Oak Forest	26,856	15.3	6,774	4.4	0	0.0	35,802	16.7
Maple-Basswood Forest	3,879	2.2	74,302	48.0	3,229	2.1	12,500	5.8
Beech-Maple Forest	0	0.0	49,485	32.0	131,001	87.0	13,669	6.4
Lowland Hardwood Forest	0	0.0	7,268	4.7	6,401	4.3	2,662	1.2
Conifer Swamp	123	0.1	2,193	1.4	9,318	6.2	521	0.2
Wetlands[a]	30,850	17.6	6,322	4.1	644	0.4	35,447	16.5
Total	175,649	100.0	154,725	100.0	150,593	100.0	214,882	100.0

Vegetation Type	County						Region	
	Walworth		Washington		Waukesha			
	Acres	Percent of County Land Area	Acres	Percent of County Land Area	Acres	Percent of County Land Area	Acres	Percent of Regional Land Area
Prairie	55,912	15.7	22	<0.1	8,692	2.5	170,942	10.2
Oak Savanna	151,521	42.5	405	0.1	105,105	29.4	387,318	23.0
Oak Forest	81,033	22.7	5,874	2.1	81,110[b]	22.7	237,449[b]	14.1
Maple-Basswood Forest	4,243	1.2	132,062	47.8	86,983	24.4	317,198	18.8
Beech-Maple Forest	0	0.0	90,829	32.9	5,032	1.4	290,016	17.2
Lowland Hardwood Forest	569	0.2	8,521	3.1	8,243	2.3	33,664	2.0
Conifer Swamp	987	0.3	36,240	13.1	13,668	3.8	63,050	3.7
Wetlands[a]	62,040	17.4	2,278	0.8	48,323	13.5	185,904	11.0
Total	356,305	100.0	276,231	100.0	357,156[b]	100.0	1,685,541[b]	100.0

[a] *Includes nonforested wetlands (e.g., marsh, sedge meadow, shrub-carr, etc.).*

[b] *Includes 318 acres of aspen-birch forest in Waukesha County.*

Source: SEWRPC.

based on the actual field surveys conducted under this planning effort.

Kenosha County, in which oak savanna originally occupied over 63,000 acres, has none of this vegetation type remaining (see Table 32). Prairie also has decreased by almost 99 percent. Milwaukee County has suffered the greatest loss, in percentage terms, of natural vegetation—93.9 percent, including nearly all of its prairie and oak savanna (see Table 33). Only about 5 percent of the upland woods originally in Ozaukee County remains (see Table 34). The pre-settlement vegetation of Racine County has suffered a fate similar to that of Kenosha County, with destruction of all of its oak savanna and nearly all of its prairie (see Table 35). Only about 0.1 percent of Walworth County's original approximately 207,000 acres of prairie and oak savanna remain (see Table 36). In 1836, most of Washington County, nearly 83 percent, was occupied by upland woods (see Table 37). By 1990, over 90 percent of this forest cover had been destroyed. By 1990, Waukesha County had lost nearly all of its 105,000 acres of oak savanna (see Table 38).

Regionally, nearly 83 percent of the pre-settlement vegetation had been lost by 1990 (see Table 39). The greatest percentage losses have involved prairie and oak savanna, with less than 1 percent remaining (see Figure 13). The greatest loss in terms of acreage has taken place with upland woods, with a

Low prairies have become rare wetland plant communities in Southeastern Wisconsin as a result of plowing, draining, and filling. Low prairies, such as those occurring at the Chiwaukee Prairie, shown above, are dominated by grasses and forbs such as prairie cord grass, big bluestem grass, gay-feather, and prairie dock.

Source: Donald M. Reed.

Good-quality stands of southern mesic hardwoods, such as the one shown above located in the City of West Bend's Lac Lawrann Conservancy, are becoming rare in Southeastern Wisconsin due to urban encroachment. Such woodlands, dominated by sugar maple, American beech, red oak, and basswood, have become highly desirable residential development sites. As a result of such development, forest-edge shrubs and trees begin to invade the woods, changing the forest interior habitat structure, species composition, and microclimatic conditions.

Source: Donald M. Reed.

reduction of over 725,000 acres. By comparison, wetlands have suffered the least reduction, with over 60 percent of such vegetation types remaining. It is important to note that the vertical axes of Figure 13 are logarithmic scales. Logarithmic transformations of the vertical axes allow for easier presentation of numbers of greatly differing orders of magnitude. However, at the same time, smaller numbers appear relatively greater in comparison to the larger numbers. Thus, as in the case of prairie and oak savanna, the differences between the smaller and larger acreages are even greater than they appear merely by casual visual inspection of the graphs.

Land Use Changes and Their Effects on Natural Systems

By 1937, only about 15 percent of the rural landscape of Southeastern Wisconsin remained in a natural vegetation cover, half of which was forest.[5] About 81 percent of the rural land was in uses related directly to agriculture, while about 4 percent was in urban use. These percentages remained essentially unchanged through 1975. However, even though the percentage relationships remain the same, the landscape is dynamic, not static. Therefore, during this same time span, some natural vegetation was being converted to agricultural and residential uses, while an approximately equal amount of farmland was reverting back to natural vegetation conditions. This exchange was not equivalent, however, because the vegetation being destroyed tended to be older and more mature vegetation cover, while the re-created vegetation was younger, more early-successional. Thus, there was a slight shift from forest to a more herbaceous, or nonwoody, and shrubby vegetation cover.

Since at least 1937, the primary conversion of the landscape of Southeastern Wisconsin has been from agricultural land use to urban land use.[6] Between 1937 and 1963, urbanizing landscapes, that is, those regions undergoing a transformation from rural to urban uses, showed a 23 percent decrease in agri-

[5]*D. M. Sharpe, F. W. Stearns, R. L. Burgess, and W. C. Johnson, "Spatio-Temporal Patterns of Forest Ecosystems in Man-dominated Landscapes of the Eastern United States," in Proceedings of the International Congress of the Netherlands Society for Landscape Ecology, Veldhoven, The Netherlands, 1981, pp. 109-116.*

[6]*David M. Sharpe, Forest Stearns, Lawrence A. Leitner, and John R. Dorney, "Fate of Natural Vegetation During Urban Development of Rural Landscapes in Southeastern Wisconsin," Urban Ecology, Vol. 9, 1986, pp. 267-287.*

Table 32

VEGETATION OF KENOSHA COUNTY: 1836 AND 1990

Vegetation Type	Areal Extent of Vegetation (acres)		Percent of County Land Area		Percent of County Natural Vegetation	Net Loss	
	1836	1990	1836	1990	1990	Acres	Percent
Prairie	50,509	572	28.7	0.3	2.2	-49,937	98.9
Oak Savanna	63,432	0	36.1	0.0	0.0	-63,432	100.0
Upland Woods	30,735	9,719	17.5	5.5	37.9	-21,016	68.4
Wetlands[a]	30,973	15,352	17.7	8.8	59.9	-15,621	50.4
Total	175,649	25,643	100.0	14.6	100.0	-150,006	85.4

[a]*Includes both forested and nonforested wetlands.*

Source: SEWRPC.

Table 33

VEGETATION OF MILWAUKEE COUNTY: 1836 AND 1990

Vegetation Type	Areal Extent of Vegetation (acres)		Percent of County Land Area		Percent of County Natural Vegetation	Net Loss	
	1836	1990	1836	1990	1990	Acres	Percent
Prairie	1,413	6	0.9	<0.1	0.1	-1,407	99.6
Oak Savanna	6,968	0	4.5	0.0	0.0	-6,968	100.0
Upland Woods	130,561	4,773	84.4	3.1	50.3	-125,788	96.3
Wetlands[a]	15,783	4,702	10.2	3.0	49.6	-11,081	70.2
Total	154,725	9,481	100.0	6.1	100.0	-145,244	93.9

[a]*Includes both forested and nonforested wetlands.*

Source: SEWRPC.

Table 34

VEGETATION OF OZAUKEE COUNTY: 1836 AND 1990

Vegetation Type	Areal Extent of Vegetation (acres)		Percent of County Land Area		Percent of County Natural Vegetation	Net Loss	
	1836	1990	1836	1990	1990	Acres	Percent
Prairie	0	0	0.0	0.0	0.0	--	--
Oak Savanna	0	0	0.0	0.0	0.0	--	--
Upland Woods	134,230	6,993	89.1	4.6	30.0	-127,237	94.8
Wetlands[a]	16,363	16,334	10.9	10.9	70.0	-29	0.2
Total	150,593	23,327	100.0	15.5	100.0	-127,266	84.5

[a]*Includes both forested and nonforested wetlands.*

Source: SEWRPC.

Table 35

VEGETATION OF RACINE COUNTY: 1836 AND 1990

Vegetation Type	Areal Extent of Vegetation (acres)		Percent of County Land Area		Percent of County Natural Vegetation	Net Loss	
	1836	1990	1836	1990	1990	Acres	Percent
Prairie	54,394	145	25.3	0.1	0.5	-54,249	99.7
Oak Savanna	59,887	0	27.9	0.0	0.0	-59,887	100.0
Upland Woods	61,971	13,348	28.8	6.2	46.2	-48,623	78.5
Wetlands[a]	38,630	15,422	18.0	7.2	53.3	-23,208	60.1
Total	214,882	28,915	100.0	13.5	100.0	-185,967	86.5

[a]*Includes both forested and nonforested wetlands.*

Source: SEWRPC.

Table 36

VEGETATION OF WALWORTH COUNTY: 1836 AND 1990

Vegetation Type	Areal Extent of Vegetation (acres)		Percent of County Land Area		Percent of County Natural Vegetation	Net Loss	
	1836	1990	1836	1990	1990	Acres	Percent
Prairie	55,912	223	15.7	0.1	0.4	-55,689	99.6
Oak Savanna	151,521	5	42.5	<0.1	<0.1	-151,516	>99.9
Upland Woods	85,276	31,942	23.9	9.0	54.8	-53,334	62.5
Wetlands[a]	63,596	26,146	17.9	7.3	44.8	-37,450	58.9
Total	356,305	58,316	100.0	16.4	100.0	-297,989	83.6

[a]*Includes both forested and nonforested wetlands.*

Source: SEWRPC.

Table 37

VEGETATION OF WASHINGTON COUNTY: 1836 AND 1990

Vegetation Type	Areal Extent of Vegetation (acres)		Percent of County Land Area		Percent of County Natural Vegetation	Net Loss	
	1836	1990	1836	1990	1990	Acres	Percent
Prairie	22	1	<0.1	<0.1	<0.1	-21	95.5
Oak Savanna	405	0	0.1	0.0	0.0	-405	100.0
Upland Woods	228,765	22,595	82.8	8.2	35.0	-206,170	90.1
Wetlands[a]	47,039	42,029	17.0	15.2	65.0	-5,010	10.7
Total	276,231	64,625	100.0	23.4	100.0	-211,606	76.6

[a]*Includes both forested and nonforested wetlands.*

Source: SEWRPC.

Table 38

VEGETATION OF WAUKESHA COUNTY: 1836 AND 1990

Vegetation Type	Areal Extent of Vegetation (acres)		Percent of County Land Area		Percent of County Natural Vegetation	Net Loss	
	1836	1990	1836	1990	1990	Acres	Percent
Prairie	8,692	223	2.4	0.1	0.3	-8,469	97.4
Oak Savanna	105,105	100	29.4	<0.1	0.1	-105,005	99.9
Upland Woods	173,125[a]	29,584	48.5	8.3	36.1	-143,541	82.9
Wetlands[b]	70,234	51,978	19.7	14.5	63.5	-18,256	26.0
Total	357,156	81,885	100.0	22.9	100.0	-275,271	77.1

[a]*Includes 318 acres of aspen-birch forest.*

[b]*Includes both forested and nonforested wetlands.*

Source: SEWRPC.

Table 39

VEGETATION OF SOUTHEASTERN WISCONSIN: 1836 AND 1990

Vegetation Type	Areal Extent of Vegetation (acres)		Percent of Regional Land Area		Percent of Regional Natural Vegetation	Net Loss	
	1836	1990	1836	1990	1990	Acres	Percent
Prairie	170,942	1,170	10.1	0.1	0.4	-169,772	99.3
Oak Savanna	387,318	105	23.0	<0.1	<0.1	-387,213	>99.9
Upland Woods	844,663[a]	118,954	50.1	7.0	40.7	-725,709	85.9
Wetlands[b]	282,618	171,963	16.8	10.2	58.9	-110,655	39.2
Total	1,685,541	292,192	100.0	17.3	100.0	-1,393,349	82.7

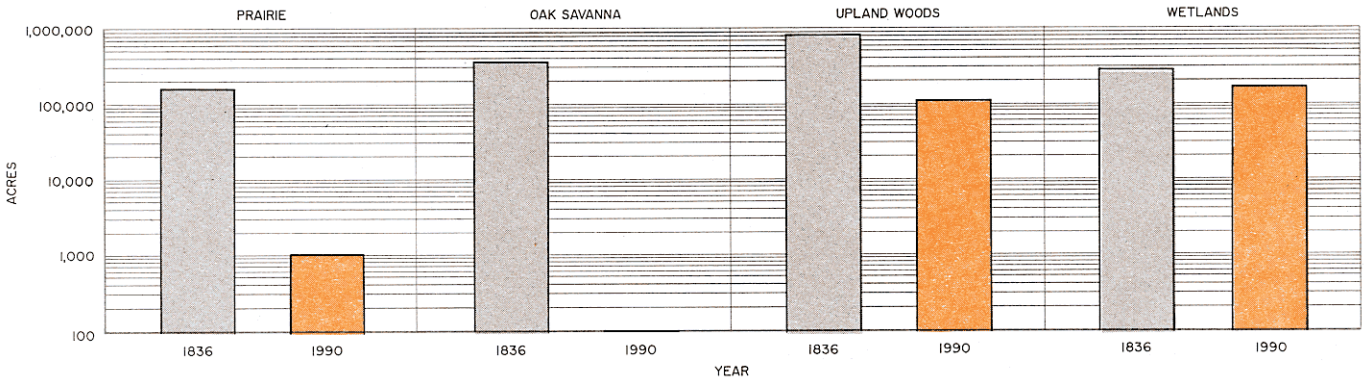
[a]*Includes 318 acres of aspen-birch forest in Waukesha County.*

[b]*Includes both forested and nonforested wetlands.*

Source: SEWRPC.

Figure 13

VEGETATION OF SOUTHEASTERN WISCONSIN: 1836 AND 1990



cultural land and a 6 percent decrease in natural vegetation. Further, from 1963 to 1975, agricultural land was further reduced by 22 percent, and natural vegetation by 3 percent. During the period from 1937 to 1975, the average interior area of woodlots in urbanizing areas remained nearly constant—between 3.2 and 3.4 acres per woodlot—but total woodlot interior sizes decreased by 11.0 percent because of the lower number of woodlots. By 1975, only about 16 percent of the original upland vegetation and only about 12 percent of the lowland vegetation remained in these urbanizing areas. Overall, 18 percent of the original natural vegetation still existed in urbanizing areas.

Not only has the total area of natural vegetation in Southeastern Wisconsin greatly diminished since European settlement, but the composition and structure of the remnant patches have been altered through disturbance, elimination of native species, and the addition of exotics, or nonnative species. For example, Dunn[7] listed the following factors as influencing species composition of the low forests of Southeastern Wisconsin: selective logging of tamarack; larch sawfly infestation; Dutch elm disease; natural succession; and human disturbance, such as construction of roads and dams, which alters water levels. Species composition has thus shifted, with declines in American elm and tamarack, and concomitant increases in silver maple. Severe elm mortality opened the canopy of lowland hardwood stands, increasing light penetration and allowing dense shrub layers to develop. It is anticipated that these shrublands may be successionally long-lasting because tree reproduction is inhibited by the dense shading. The pre-settlement swamps which were dominated by black ash, tamarack, and white cedar have now been replaced by swamps of silver maple, black ash, and green ash.[8]

The pre-settlement upland woodlands of Southeastern Wisconsin have been fragmented, clear-cut, selectively logged, and otherwise disturbed. Today, for the most part, they exist as isolated farm woodlots, forming island-like habitats in a sea of cropland and pasture. Their small size results in an increase in the edge-to-interior ratio, more light penetration, and in generally drier interior conditions. This leads to an increase in edge species, a denser shrub layer, and altered wildlife habitat.

The most prevalent forms of human-induced woodlot disturbance in southern Wisconsin in recent times have been grazing and timber cutting. Grazing by cattle was at one time the most widespread form of disturbance in southern Wisconsin woodlots; at least 80 percent of all stands were affected.[9] Trampling by cattle causes soil compaction, poor soil aeration, increased runoff and erosion, reduced ground cover, and decreased water infiltration. Selective feeding eliminates desirable, native plant species while favoring undesirable ones, particularly the thorny or spiny plants. The overall effect is to change stand composition and structure toward a more xeric condition. With changing farm practices, cattle have been removed from most woodlots, but their consequences remain. Grazing-resistant, thorny species have an initial advantage, so that today such species as barberry, hawthorns, prickly-ash, and currants and gooseberries are common in formerly grazed woods. The typical woodlot of today shows an underrepresentation of native trees in the middle size classes, indicative of the effect that cattle had on tree reproduction decades ago. Selective logging, by opening the canopy, simplifying stand structures, and retarding succession, has had some of the same effects as grazing.

The other great forcing factor which influences woodland composition in Southeastern Wisconsin, especially xeric and dry-mesic upland woods and oak savannas south of the vegetation tension zone, has been fire. Since European settlement, natural wildfires have all but been eliminated. Periodic fire was one of the components of the pre-settlement landscape. Not only did it help sustain the tall-grass prairie, but it also maintained the oak savannas by inhibiting woody invasion, controlling competition, and retarding succession, while leaving the thick-barked bur oaks unscathed. It probably occasionally entered the more closed-canopy oak woods bordering the savannas and prairie. These periodic fires may

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[7]*Christopher P. Dunn, "Shrub layer response to death of Ulmus americana in Southeastern Wisconsin lowland forests," Bulletin of the Torrey Botanical Club, Vol. 113(2), 1986, pp. 142-148, and "Post-settlement changes in tree composition of Southeastern Wisconsin forested wetlands," The Michigan Botanist, Vol. 26, 1987, pp. 43-51.*

[8]*Ibid.*

[9]*John T. Curtis, The Vegetation of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1959.*

also have been important for the perpetuation of certain species. For example, white oak may rely on periodic ground fires to reproduce effectively, because of the inability of seedling roots to penetrate a thick leaf layer.

With the advance of European settlement, fires were controlled, with far-reaching implications. Open grasslands were rapidly invaded by trees and shrubs. The consequences of fire suppression were most evident in the marginal zones between prairie and forest which developed a thick understory of various shrub species, including such invaders as European buckthorn and honeysuckles.

Thus, in drier upland woods, fires were replaced by grazing and tree cutting as the predominant forms of disturbance, and more recently, by urbanization. Today, forest stands are relatively young, disturbance regimes have changed, and new species are being introduced as native ones are eliminated. Current xeric and dry-mesic forests of the Region present an amalgam of species from different sources: remnant canopy oaks; elms and such weedy natives as boxelder originally from moister habitats; black cherry; and some fire-sensitive invaders such as white ash, basswood, and sugar maple. With cessation of fire and release from grazing pressure, a thick, almost impenetrable shrub layer frequently develops, which consists of such species as gray dogwood, several kinds of viburnums, buckthorn, honeysuckles, hawthorns, barberry, prickly-ash, and currants and gooseberries. Not only did grazing by cattle affect the species composition of woods, but there was a great increase in brush on open agricultural land after grazing declined.

The more mesic upland woods, located mostly north of the vegetation tension zone, have developed somewhat differently. Periodic fires were never a major disturbance factor. Their denser canopies, especially of American beech and sugar maple, precluded a thick understory from developing. Honeysuckles and European buckthorn are noticeably absent from these shady woods.[10] A commonality today, though, between upland woods northeast and southwest of the vegetation tension zone in Southeastern Wisconsin, is that most of the largest, intact remnants are on atypical sites; that is, they are situated on steep slopes that are of marginal agricultural value, most notably in the North and South Units of the Kettle Moraine State Forest. Elsewhere, woods tend to be small and isolated.

Landscape changes have also resulted in changes in animal populations in the Region. Alterations or elimination of plant communities have caused degradation and loss of wildlife habitat. At the same time, the increased human population has put greater hunting pressure on some species. Further, the addition of toxic chemical pesticides and herbicides has led to both direct and indirect poisoning, resulting in reduced breeding success in such species as bald eagles, peregrine falcons, and ospreys; reduction in insect food; and concentrations of poisons after eating contaminated prey, such as in robins, bluebirds, and hognose snakes.

Pathogens and Destructive Insects

There are numerous kinds of diseases and insects that directly affect the vegetation of Southeastern Wisconsin. Those which have caused the most destruction in the past or have the potential for great destruction of the remaining native cover and associated wildlife habitat of the Region include:

1. Dutch Elm Disease: Dutch elm disease is caused by a fungus (Ceratocystis ulmi) that is spread by the elm bark beetle. This fungal disease was introduced into Ohio about 1930 on infected elm logs brought in from Europe. All native species of elms are susceptible to the fungus, but the most serious losses have been to the American elm (Ulmus americana), both in its natural habitat and as an urban street tree. The disease has all but eliminated native American elms from mesic and lowland forests throughout the eastern and midwestern United States, including Southeastern Wisconsin. The disease obstructs the water-conducting tissues of the tree, which then dies, usually within the season of infestation. The disease also spreads from one tree to another through natural root grafts. Today, dead, whitened elm trunks mark almost every hardwood swamp. Young trees are still common because elms reproduce prolifically, but the life span of an individual tree has been dramatically reduced.

2. Oak Wilt: Believed to have originated in the Upper Mississippi Valley in the late 19th century, oak wilt is another systemic disease

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[10]*Lawrence A. Leitner, "An Alien Shrub in a Changing Landscape: The European Buckthorn (Rhamnus cathartica L.) in Southeastern Wisconsin," Ph.D. dissertation, University of Wisconsin-Milwaukee, Milwaukee, Wisconsin, 1985.*

caused by a fungus (Ceratocystis fagacearum).[11] All species of oaks are susceptible to this fungus, although members of the red oak group are more vulnerable, usually dying within a few weeks of infestation. The fungus is dispersed over long distances by insects. In addition, improper use and maintenance of pruning tools helps spread the disease. Spread of the disease is slow and erratic; usually individual trees or groups of trees scattered through a stand are affected.[12] Spread of the disease is facilitated by natural root grafts between oak trees. The oak wilt disease is known only in the United States, centering in the north central States. It was widely disseminated by the 1940s, at which time it was thought that oak losses would become catastrophic. The most considerable losses of oaks have been in Wisconsin, Iowa, Minnesota, Indiana, and Illinois. Fortunately, however, it has not become epidemic except in local areas, and the prediction of enormous numbers of dead oaks has not come true. The potential, though, still exists. By creating openings in the forest canopy, oak wilt has changed the forest interior environment and allowed such species as black cherry, aspen, or shagbark hickory to fill the gaps.[13]

3. Butternut Canker: Butternut canker is a disease that appears to universally affect all mature butternut (Juglans cinerea) trees. In pre-European-settlement Southeastern Wisconsin, butternuts were a minor but fairly widespread tree of mixed deciduous woods on mesic sites. The disease is caused by a sac fungus (Melanconis juglandis) which progressively kills the upper tree branches, giving the tree a ragged appearance. The entire tree slowly dies. Butternut is now declining throughout its range in the eastern United States as a result of this disease. The evidence strongly suggests that butternut is much less common today in the Region than it was in 1836, and that it may be expected to continue to decline.

4. Larch Sawfly: The larch sawfly (Pristophora ericksonii) is a serious insect enemy of the American larch, or tamarack (Larix laricina). The sawfly kills the tree by defoliation, and tree mortality may be severe. Periodically, it becomes epidemic, lasting over several successive years. The larch sawfly is responsible for killing extensive stands of tamarack in Waukesha County between 1900 and 1910.[14] The swamps where the tree had been were then drained and converted by farmers to fields or pastures.

5. Gypsy Moth: The gypsy moth (Parthetria dispar) is an important defoliator of various deciduous trees. It is a very destructive pest of oaks in the northeastern United States, where it has defoliated millions of acres of forest. Imported into this country from Europe in 1869, the gypsy moth has been observed in scattered localities in Southeastern Wisconsin in the past two decades. Death of a tree from these moths is rare—most healthy trees can survive defoliation for two or three years. The potential for destruction is great, though; the U. S. Department of Agriculture is conducting an ongoing program in southern Wisconsin aimed at monitoring and checking the spread of the moth.

Hydrologic Changes

Perhaps the most profound change in the natural landscape of Southeastern Wisconsin brought about by European settlement has been drastic alteration of the Region's natural hydrology. Wetlands have been lost through draining and filling, to be replaced by agriculture and urban development. Ditches have been dug across wetlands to remove floodwaters from low fields to the nearest waterway. Streams, large and small, have been channelized. The original purpose of channelization was to control seasonal floodwaters that spilled over stream banks by removing water more quickly, making potentially farmable adjacent lands more

[11] *J. N. Gibbs and D. W. French, The Transmission of Oak Wilt, U. S. Department of Agriculture Forest Research Paper NC-185, North Central Forest Experiment Station, St. Paul, Minnesota, 1980.*

[12] *H. A. Fowells, Silvics of Forest Trees of the United States, Agriculture Handbook No. 271, U. S. Department of Agriculture, Forest Service, Washington, D. C., 1965.*

[13] *John T. Curtis, The Vegetation of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1959.*

[14] *Ibid.*

suitable for agriculture and urban development. In the process, natural waterways were dredged, straightened, narrowed, widened, shortened, and had their gradients increased, while natural vegetation was removed to facilitate runoff. In addition, streams have been altered by cutting the surrounding forests, cultivating up to the banks, draining the surrounding wetlands, damming, and polluting. The environmental consequences have been severely destructive to native plants and animals. Dredging frequently destroys natural vegetation and wildlife habitat. Water quality is compromised through increases in erosion and siltation rates, resulting in declines in native fish production. Pollution of downstream waters has increased, and floodplain development has been encouraged. Many productive aquatic systems have been converted into drainage ditches.

As water is confined into narrower channels, and floodplain storage eliminated through filling, higher flood flows and stages have occurred along the streams. In urbanized areas the increase in impervious surface areas results in an increase in stormwater runoff. The more efficient urban drainage systems result in altered flood-flow regimens with higher flood peaks.

The overall effect is that many wetlands have lost their capacity to act as sponges, absorbing and slowly releasing excess water. Also, as water recedes more quickly from drainage basins, less groundwater recharge occurs. Lowering of the water table has occurred where humans have made changes in the land surface to accelerate runoff, and where large amounts of water have been withdrawn from the ground through wells, for example, near muck farms. Wetland succession is altered, changing sedge meadows or other wetlands to shrub-carr or even upland vegetation. Devegetation of surrounding uplands causes accelerated runoff, soil erosion, and increased sediment, pollution, and nutrient loadings, all leading to eutrophication of downstream waters. The result of wetland alteration has been to decrease wildlife habitat, lower native species diversity, lower habitat quality, and decrease many of the functional capabilities of wetlands.

Exotic Species

A noticeable feature on the post-European-settlement landscape of Southeastern Wisconsin is the large number of exotic organisms, that is, nonnative species of plants and animals that have become naturalized, or established and capable of reproducing. Most, if not all, have been aided by direct or indirect human intervention. Disturbances to natural habitats greatly facilitate exotic species invasion. Because most of Southeastern Wisconsin is strongly influenced by human activities, exotic species, especially vascular plants, have become widespread and abundant. It is only in the relatively undisturbed natural environments that exotic species have difficulty competing with native species. The highest-quality, least-disturbed remnants of the pre-settlement landscapes in the Region are found in the State Natural Areas. However, these areas are not immune to exotic species invasion, but the proportion of the total flora and the densities of the exotic species are lower. For example, in a study of 13 State Natural Area sites in southern Wisconsin, 64 nonnative plant species were found for a total of 178 species-site occurrences.[15] Only 1 percent of these species-site occurrences were considered to be abundant, and 30 percent were common. Over two-thirds were only occasional or rare. The most common exotics in these natural areas were European buckthorn (Rhamnus cathartica), common dandelion (Taraxacum officinale), and Japanese barberry (Berberis thunbergii). The community type suffering the greatest degree of exotic invasion was the oak openings—about 20 percent of all species found here were nonnatives. The more mesic forests and swamps, where only about 5 percent of all species were exotics, appeared relatively resistant. The highest concentrations of exotics were commonly found in the more disturbed portions of these natural areas. For example, several of these natural areas included networks of hiking and horse trails, along which exotics were frequent. Some exotics were found almost exclusively along such well-used trails. Thus, there seems to be a direct relationship between the degree of exotic species establishment and the extent of human disturbance. It was concluded that only one exotic plant species, the European buckthorn, could be considered widespread and common in these 13 State Natural Areas.

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[15] *Lawrence A. Leitner, "Status of Alien Plant Species in Eight State Natural Areas in Eastern Wisconsin," University of Wisconsin-Milwaukee Field Station Bulletin, Vol. 21(2), 1988, pp. 10-19, and "Alien Plant Species in Eastern Wisconsin Natural Areas: An Update," University of Wisconsin-Milwaukee Field Station Bulletin, Vol. 23(2), 1990, pp. 8-17.*

The number of exotic species of plants and animals that are known to occur in the Region is large and increasing. The more widespread and pernicious exotics found within the Region are described below.

Among introduced bird species, two stand out as being particularly abundant—the starling and the English, or house, sparrow. Both were introduced from Europe and are frequently found in large flocks close to human habitation, such as cities, suburbs, and farms. The ring-necked pheasant, a native of the Orient, has been widely introduced for hunting purposes and has become naturalized in open, brushy fields and woodlands. A more recent introduction from the West Coast, the house finch, has been increasing and spreading in the Region.

Table 40 lists some of the more common nonnative fish species that have been introduced, whether deliberately or accidentally, into the Region's waters and that have been naturalized. Among these, three species—the sea lamprey, the carp, and the alewife—have become serious pests, causing the decline of a number of endemic Wisconsin fishes.[16] The common carp (Cyprinus carpio), a native of Asia, is an aggressive exotic fish species that was deliberately introduced into Wisconsin waters in the last decades of the 19th century. By 1895 it was well established in the State.[17] Tolerant of a wide range of ecological conditions, the common carp is most abundant in large, shallow lakes. It prefers warm waters with abundant aquatic vegetation, and can survive polluted waters with low oxygen levels and high temperatures. It is not usually found in clean, cold waters. The common carp has been implicated in the loss of certain types of waterfowl from water bodies because the fish destroys important aquatic vegetation, such as wild rice and wild celery, upon which these waterfowl rely for food. The carp may also out-compete certain native fish species, such as black bass, largemouth bass, and pike for food and spawning areas.

Among invertebrates, the zebra mussel (Driessena polymorpha) has arrived in the waters of Lake Michigan in countless numbers, and has great potential to invade inland lakes. While it is well noted for clogging water intake pipes, its effect on the native ecosystem has yet to be fully understood.

[16]*George C. Becker, Fishes of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1983.*

[17]*Ibid.*

Table 40

COMMON NATURALIZED, EXOTIC FISH SPECIES OF SOUTHEASTERN WISCONSIN

Scientific Name	Common Name
Alosa pseudoharengus	Alewife
Carassius auratus	Goldfish
Cyprinus carpio	Common carp
Oncorhynchus kisutch	Coho salmon
Oncorhynchus tshawytscha	Chinook salmon
Osmerus mordax	Rainbow smelt
Petromyzon marinus	Sea lamprey
Salmo gairdneri	Rainbow trout
Salmo trutta	Brown trout

Source: George C. Becker, Fishes of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1983.

As already noted, the gypsy moth, while still at low densities in the Region, is potentially very destructive of native deciduous trees.

The floristic composition of natural plant communities has always been in flux—new species are added as others decline. But, since European settlement, these changes have accelerated. Increasingly pervasive human influence throughout the natural landscape has been accompanied by exotic plant species. Once established, they may displace native species, alter micro-environments, change patterns of succession, and influence vegetation structure. The dense shade that some exotics produce may impede regeneration of forest trees, shrubs, and herbaceous ground-layer plants.

Deprived of periodic fires, the open oak woods and oak savannas of Southeastern Wisconsin now contain a dense, thick shrub layer, including large numbers of European buckthorn and members of the Tatarian honeysuckle complex. In the typical oak woodlot south of the vegetation tension zone—small in size, with a large amount of edge, and disturbed—not only do the mature buckthorns form a dense understory, but buckthorn seedlings often carpet the ground. Densities of the latter frequently approach 25,000 seedlings per acre, and may exceed 60,000 per acre in extreme cases.[18] A more recent

[18]*Lawrence A. Leitner, "An Alien Shrub in a Changing Landscape: The European Buckthorn (Rhamnus cathartica L.) in Southeastern Wisconsin," Ph.D. dissertation, University of Wisconsin-Milwaukee, Milwaukee, Wisconsin, 1985.*

invasive shrub, spreading from the eastern United States, is the Amur honeysuckle (Lonicera maackii), lately found in scattered localities in Walworth and Kenosha Counties. In growth form and habitat it resembles the other shrub honeysuckles, and it threatens to become just as pervasive a pest. Swink and Wilhelm state that "it would be difficult to exaggerate the vicious and pernicious weedy potential of this shrub."[19]

Garlic mustard (Alliaria petiolata or A. officinalis) is a tall biennial herb that is native to Eurasia, but which has recently become all too abundant in many of the woodlands of the midwestern United States, including some of the higher-quality woodlands of Southeastern Wisconsin. For example, it is common in Monches Woods in Waukesha County and several of the larger woods in northern Washington County. It has even been observed in Renak Woods State Natural Area in Racine County. Garlic mustard is relatively shade-tolerant, and is apparently spread primarily by anthropogenic means, particularly in disturbed portions of woods, such as along roads and trails.[20]

Considered one of the worst weeds of the Chicago region,[21] multiflora rose (Rosa multiflora) forms dense, tangled, prickly masses. It is found fairly commonly in the Region, but not at the high densities seen farther south. Eurasian highbush cranberry (Viburnum opulus) is a relatively abundant component of dry-mesic to wet-mesic woods. A serious invader of fens, bogs, and sedge meadows, glossy buckthorn (Rhamnus frangula) often forms impenetrable thickets, shading out native herbaceous species. It has become especially predominant in portions of the Cedarburg Bog State Natural Area.[22]

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[19]*Floyd Swink and G. Wilhelm, Plants of the Chicago Region, Morton Arboretum, Lisle, Illinois, 1979, p. 458.*

[20]*Victoria A. Nuzzo, "Current and Historic Distribution of Garlic Mustard (Alliaria officinalis) in Illinois," Michigan Botanist, Vol. 32, 1993, pp. 23-33.*

[21]*Floyd Swink and G. Wilhelm, Plants of the Chicago Region, Morton Arboretum, Lisle, Illinois, 1979, p. 639.*

[22]*James A. Reinartz and Joanne Kline, "Glossy Buckthorn (Rhamnus frangula), A Threat to the Vegetation of the Cedarburg Bog," University of Wisconsin-Milwaukee Field Station Bulletin, Vol. 21(2), 1988, pp. 20-35.*

Leafy spurge (Euphorbia esula) occurs, as yet, only sporadically in the Region, but it is a weedy exotic that warrants monitoring. Originally from Europe, this perennial herb has become widely naturalized in the New World, especially in waste places. But it has been known to actively invade oak woods, as well as mesic and dry prairie remnants.[23] In the West, where it may dominate disturbed rangelands, leafy spurge is an abundant, aggressive, noxious weed that is poisonous to livestock. Apparently tolerant of a wide range of soil moisture conditions, leafy spurge is particularly successful under very dry conditions. Its deep and extensive root system makes it difficult to eradicate.

Spotted knapweed (Centaurea maculosa), a European native, is common along disturbed roadsides throughout the Region, and has invaded some dry prairies in the Southern Kettle Moraine.

Of the invasive exotics in the waters and wetlands of Southeastern Wisconsin, three species stand out as being widespread, successful, and pernicious. These three exotics are Eurasian water milfoil, reed canary grass, and purple loosestrife.

The Eurasian water milfoil (Myriophyllum exalbescens) is a submersed aquatic that has become a serious weed of lakes and ponds. An aggressive species, it spreads primarily by fragmentation, often forming dense mats that can interfere with recreational activities.

Reed canary grass (Phalaris arundinacea) is a tall perennial grass that forms dense colonies in marshes, wet meadows, ditches, and stream borders. It favors lowered water levels, a condition common throughout the wetlands of the Region. Originally planted for lowland pastures and erosion control, reed canary grass often forms nearly monotypic stands, especially in degraded wetlands. Its aggressiveness, rapid growth, and toleration of the Upper Midwest climate makes it a major threat to natural wetlands. Reed canary grass is native to both the Old and New Worlds, but apparently the ecotype that is invasive in the Midwest is of Eurasian origin.[24]

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[23]*Margaret A. R. Cole, "Vegetation Management Guideline: Leafy Spurge (Euphorbia esula L.)," Natural Areas Journal, Volume 11(3), 1991, pp. 171-172.*

[24]*Max Hutchinson, "Vegetation Management Guideline: Reed Canary Grass (Phalaris arundinacea L.)," Natural Areas Journal, Volume 12(3), 1992, p. 159.*

Another Eurasian introduction that has found a home in the New World is purple loosestrife (Lythrum salicaria), a tall emergent that is often planted as a garden ornamental because of its colorful magenta flowers. Unfortunately, it escapes to native wetlands, such as marshes, wet meadows, pond margins, and stream borders, where it becomes an aggressive weed, often forming large, dense monotypic colonies that crowd out the native flora. It has little wildlife value and has been known to destabilize shorelines. The possibilities of biological controls are being explored.[25]

Recent Losses of Natural Areas and Critical Species Habitats in Southeastern Wisconsin

Developmental pressures on the natural landscape of Southeastern Wisconsin have resulted in the degradation or complete destruction of many natural areas and critical species habitats of significant value. A few examples of recent losses that can be documented because of data acquisition prior to degradation include the following:

1. Adam Channing Fen: The Adam Channing Fen, located in the Town of Whitewater, Walworth County, was surveyed in 1985[26] at which time over 40 plant species characteristic of calcareous fens, including grass-of-Parnassus, prairie blazing-star, and twig-rush, were noted. Two Wisconsin Natural Heritage "Special Concern" species were also found—Ohio goldenrod (Solidago ohioensis) and the small fringed gentian (Gentiana procera). Although encompassing only about 0.4 acre, the fen was of good quality, probably ranking about NA-3a. This is confirmed from a Swink and Wilhelm Rating Index of 42, indicating a site of good natural area quality, or, as the authors state, "of rather profound environmental importance in terms of a regional natural area perspective."[27] By the time the fen had been revisited for the Regional Natural Area survey in 1992, the site had been fenced by the landowner and was being intensively grazed by cattle. Few of the typical fen species remained, and a revised Swink and Wilhelm Rating Index totaled only 23, indicating a heavily disturbed site of at most only marginal natural area value. None of the species specifically mentioned above was found; those species that were present included those exotics and weedy natives that could tolerate severe disturbance.

2. Bishops Woods: Bishops Woods is located within the City of Brookfield in eastern Waukesha County. Bishops Woods was an excellent stand of mature southern mesic and dry-mesic hardwoods, containing large red and white oaks, sugar maple, basswood, and white ash, with some trees reaching three feet in diameter and 200 years of age. The site was not undisturbed—prior to 1900 selective logging removed individual trees, but even that ceased when the woods was acquired by the Roman Catholic Archdiocese of Milwaukee in 1905.[28] Because of urban development, this type of forest, especially in such a near-undisturbed condition, is extremely rare in Southeastern Wisconsin. It requires hundreds of years of succession without fire or other significant disturbance to develop, but when mature it is self-perpetuating for long periods of time. In 1976, the Commission described Bishops Woods as "the best woodland in the [Menomonee River] watershed" and one which "illustrates the dominant forest types in this region prior to settlement."[29] At that time its

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[25]*Stephen D. Hight and John J. Dea, Jr., "Prospects for a Classical Biological Control Project Against Purple Loosestrife (Lythrum salicaria L.)," Natural Areas Journal, Volume 11(3), 1991, pp. 151-157.*

[26]*Donald M. Reed, "Composition and Distribution of Calcareous Fens in Relation to Environmental Conditions in Southeastern Wisconsin," M.S. thesis, University of Wisconsin-Milwaukee, Milwaukee, Wisconsin, 1985.*

[27]*Floyd Swink and G. Wilhelm, "A Method for Environmental Assessment of Open Land," in Plants of the Chicago Region, Morton Arboretum, Lisle, Illinois, 1979, pp. 850-880.*

[28]*James B. Levenson, The Southern-Mesic Forest of Southeastern Wisconsin: Species Composition and Community Structure, Milwaukee Public Museum Contributions in Biology and Geology, No. 41, Milwaukee, Wisconsin, 1981.*

[29]*SEWRPC Planning Report No. 26, A Comprehensive Plan for the Menomonee River Watershed, Volume One, Inventory Findings and Forecasts, Southeastern Wisconsin Regional Planning Commission, Waukesha, Wisconsin, October 1976, p. 382.*

size—89 acres—was sufficient to produce a significant amount of forest interior environment. Among the native flora were three species on the Wisconsin Natural Heritage List of "Special Concern" species: American gromwell (Lithospermum latifolium), goldenseal (Hydrastis canadensis), and heart-leaved skullcap (Scutellaria ovata). From plant species surveys conducted between 1970 and 1980, Swink and Wilhelm Rating Indexes ranged from 38 to 45, indicative of a woods of significant natural area value. A natural area classification for this period of time would probably be NA-2a.

Beginning in the 1970s, though, destruction of a significant portion of the woods for office-park development resulted in a decrease in natural area value. This trend continued into the 1980s, so that by the time of the Natural Areas Survey in 1992, the integrity of the woods had been severely compromised. At present, the total wooded area is about 50 acres in an irregularly shaped patch, with little forest interior environment remaining.

An updated Swink and Wilhelm Rating Index totaled only 30, indicating an area of moderate natural area value. Neither the goldenseal nor the heart-leaved skullcap were found during the 1992 survey. The current classification of Bishops Woods is NA-3a, but this will probably be reduced further as development continues.

3. Delavan Mesic Railroad Prairie: The Delavan mesic railroad prairie, located in the Town of Delavan in Walworth County, is a 0.125-mile-long remnant mesic prairie within the right-of-way of the former Chicago, Milwaukee, St. Paul & Pacific Railroad, formerly the Wisconsin and Calumet Railroad. This prairie was described in 1951 by the Plant Ecology Laboratory of the University of Wisconsin-Madison as being in fair condition, with little disturbance and a luxuriant growth of prairie forbs. The prairie forbs included marsh blazing-star (Liatris spicata), a Wisconsin Natural Heritage List species of "Special Concern" status. The Swink and Wilhelm Rating Index based on the 1951 species list totaled 42, indicating a site of good quality, probably NA-3a. Since that time, however, the abatement of periodic burning coupled with routine herbicide application along the right-of-way has severely degraded the prairie, so much so that at the time of the Natural Areas Survey in 1991 the site was considered to have no natural area value. While a few native prairie species remained, the marsh blazing-star is now absent. Presently, most of the railway right-of-way has been dominated by exotics and the more aggressive, weedy natives, resulting in a revised Swink and Wilhelm Rating Index of only 19.

4. STH 142 Prairie: This small patch of remnant mesic prairie, located in the Town of Brighton, Kenosha County, was surveyed by the Commission staff in 1981. The survey indicated a natural area of apparent moderate quality, with at least 24 native prairie species and several active native prairie ant colonies. Classification at that time would probably have been NA-3b. The Natural Areas Survey in 1991 revealed a site that had undergone severe disturbance, including the laying of a buried cable and intensive grazing by a herd of bison from an adjacent farm. While a few native prairie species still persist, it was determined that the site had no significant natural area value.

5. Hoffman-Wolter Woods: Hoffman-Wolter Woods is an upland mesic and dry-mesic woods on undulating morainal topography located on the northwest side of the City of West Bend in Washington County. The woods was surveyed by the Commission staff in 1983,[30] at which time it was rated NA-2. Totaling 219 acres, it was one of the largest contiguous blocks of woodland in the Region, and as such contained a good amount of forest interior environment. It was, however, recovering from past grazing and selective tree cutting. Subsequent construction of USH 45 divided the woods in two, with the resultant loss of much of the forest interior. The western portion, the better in quality of the two portions, totals about 170 acres in an irregularly shaped patch. The current ranking is NA-2b, so the area is still a natural area of regional significance, but its importance has

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[30]*SEWRPC Community Assistance Planning Report No. 104, A Park and Open Space Plan for the City of West Bend, Washington County, Wisconsin, Southeastern Wisconsin Regional Planning Commission, Waukesha, Wisconsin, June 1985.*

diminished because of the loss of forest interior. In addition, it is being invaded by urban development on the south and west. At about 35 acres, the eastern portion has very little forest interior, and is also being developed on both north and south. While the actual loss of total forest area was minor—less than 20 acres—the natural area loss due to fragmentation was substantial because of the reduction of forest interior.

6. Jacobus Park Woods: Jacobus and Grant Parks were the first two Milwaukee County parks, both acquired in 1910.[31] Located in the City of Wauwatosa, Milwaukee County, Jacobus Park is a small and very human-influenced urban park that nevertheless contains remnants of the original vegetation on north-facing bluffs and in ravines adjacent to the Menomonee River. A number of uncommon plant species are present within the park woods, including bush-honeysuckle (Diervilla lonicera) and snowberry (Symphoricarpos albus). In addition, two species of Wisconsin Natural Heritage "Special Concern" status—twinleaf (Jeffersonia diphylla) and American gromwell (Lithospermum latifolium) occur in this woods. Perhaps the most outstanding feature is the presence of several scattered populations of the forked aster (Aster furcatus), a species defined by the State as "threatened." The largest concentration of this species within Jacobus Park occurs at the top of a bluff. In 1986, the County sold part of the land above the bluff for a housing development. Construction fill covered the asters, threatening their existence. Most of the fill was subsequently removed, and many of the asters seem to have survived according to the 1991 Natural Areas Survey. However, the plants are only precariously protected, growing nearly in the back yards of the condominiums. A portion of the bluff ground layer vegetation was also destroyed during construction to accommodate both sanitary and storm sewer lines.

7. Kenosha Bike Trail Prairie Remnant: Between 1980 and 1982, a member of the Commission staff noted numerous native prairie species growing along the Kenosha Bike Trail on the north side of the City of Kenosha. This trail occupies the bed of a former railway right-of-way, which had been built on what was originally wet-mesic prairie. All that remained of this prairie were the narrow strips bordering the path. Two Wisconsin Natural Heritage plant species were present—the "Special Concern" marsh blazing-star, and a small population of the prairie white-fringed orchid (Platanthera leucophaea), defined by the State as "endangered" and by the Federal government as "threatened." Shortly after this initial survey, the trail was widened, the top layer of soil scraped, and the right-of-way planted with exotic grasses which are periodically mowed. Only a few native prairie species have been able to persist.

   In 1991, the Natural Areas Survey revisited the site, noting that the "prairie" was in very poor condition, with only a few native species growing at the edges of the mowed grass. The orchid could not be found. At present, this site does not qualify as either a Natural Area or as a Critical Species Habitat.

Grassland Nesting Bird Habitat Loss: The Nelson Farm Example

Critical habitat sites for animal species are not necessarily the same sites that hold remnants of undisturbed native vegetation or provide critical habitat for rare plants. Habitat for grassland-nesting birds illustrates this point. With the virtual disappearance of native prairies and savannas, which originally occupied one-third of the Region, agricultural hayfields and pastures dominated by nonnative forage plants became an acceptable and essential substitute as breeding habitat for many species of grassland and open-country birds.

About 50 acres of agricultural pastures and hayfields on the Nelson Farm, adjoining the Nelson Woods Preserve in the Town of Ottawa, Waukesha County, were surveyed for breeding birds each mid-June from 1961 through 1969.[32] These grassland surveys found one species that has since been listed as "endangered" in the State, the loggerhead shrike, and seven additional species now rated as birds of "special concern"—the northern harrier, sedge wren, bobolink, western meadowlark, dickcissel, grasshopper sparrow, and Henslow's sparrow.

[31] *Milwaukee County Park Commission and Milwaukee County Regional Planning Board Quadredecennial Report: 1937-1950 Inclusive, [Milwaukee County] Court House, Milwaukee, Wisconsin.*

[32] *C. Nelson, M. Nelson, and J. Bielefeldt, unpublished data.*

By 1992, however, grasslands at the Nelson Farm had passed to new ownership and been converted to cornfields, a sandpit, and an imminent residential development. At least four of the eight bird species noted in the 1960s are now absent, and populations of the others are much reduced. This local situation at the Nelson Farm exemplifies a much more extensive loss of grassland habitats in the Region. Urbanization, the decline of dairy farming, and the cultivation of row crops such as corn and soybeans have eliminated tens of thousands of acres of on-farm grassland habitat. Remaining habitat, mostly alfalfa hay, is now harvested early and often, from late May to September, leaving little opportunity for grassland birds to nest successfully. Similar circumstances have been linked to declining populations of several grassland-breeding birds at State, midwestern, and national levels.[33] Uncropped grasslands, even though composed mostly of nonnative plants, have increasingly become critical habitat sites for grassland-breeding birds and other wildlife using similar habitat.

Extirpated Species

Table 41 lists those species of vertebrate animals that have been documented as having existed in Southeastern Wisconsin at the time of initial European settlement but have since disappeared from the Region. Two of these species have become globally extinct—the Carolina parakeet and passenger pigeon. The passenger pigeon formerly occurred in incredible abundance throughout the vast wooded areas of the northeastern and north central United States. Its being slaughtered on its breeding grounds, combined with destruction of large areas of unbroken woodland, led to its disappearance from Wisconsin in 1899 and its ultimate extinction in 1914.[34] Other species, such as the elk, cougar, and whooping crane, have been extirpated from the State but still survive in other parts of the United States. A third category includes such animals as the lynx and fisher, gone from the Region but still existing in the more unpopulated areas of northern Wisconsin.

It is somewhat more difficult to establish that an individual plant species has been extirpated. Some plant species once grew successfully in the Region, and may yet survive in some overlooked spot. A few, because of a lack of recent collections or sightings,

Table 41

EXTIRPATED ANIMALS OF SOUTHEASTERN WISCONSIN

Scientific Name	Common Name
Mammals	
Bison bison	Bison
Canis lupus	Gray wolf
Cervus canadensis	Elk
Felis concolor	Cougar
Lynx canadensis	Lynx
Martes pennanti	Fisher
Myotis sodalis	Indiana bat
Birds	
Conuropsis carolinensis	Carolina parakeet (extinct)
Ectopistes migratorius	Passenger pigeon (extinct)
Elanoides forficatus	Swallow-tailed kite
Grus americana	Whooping crane
Numenius americanus	Long-billed curlew
Olor buccinator	Trumpeter swan
Pelecanus erythrorhynchos	White pelican
Fish	
Coregonus alpenae	Longjaw cisco
Coregonus johannae	Deepwater cisco
Coregonus nigripinnis	Blackfin cisco
Erimyzon oblongus	Creek chubsucker
Moxostoma duquesnei	Black redhorse

Source: Wisconsin Natural Heritage Inventory Working List, Wisconsin Department of Natural Resources, 1990; and SEWRPC.

[33] *C. S. Robbins, D. Bystrak, and P. H. Geisler, The Breeding Bird Survey: Its First Fifteen Years, 1965-1979, U. S. Department of the Interior, Fish and Wildlife Service Resource Publication 157, Washington, D. C., 1986.*

S. D. Robbins, Jr., Wisconsin Birdlife, University of Wisconsin Press, Madison, Wisconsin, 1991.

E. K. Bollinger and T. A. Gavin, "Eastern Bobolink populations: ecology and conservation in an agricultural landscape," in J. M. Hagan III and D. W. Johnston (eds.), Ecology and Conservation of Neotropical Migrant Land-birds, Smithsonian Institution Press, Washington, D. C., 1992.

[34] *Betty L. Les, The Vanishing Wild: Wisconsin's Endangered Wildlife and Its Habitat, [Wisconsin] Department of Natural Resources, Madison, Wisconsin, 1979.*

may reasonably be deemed to have been extirpated from Southeastern Wisconsin. They include:

1. Harbinger-of-spring (Erigenia bulbosa), a member of the parsley family (Apiaceae), is a low perennial herb with small white flowers. As its name implies, it opens the growing season, blooming from February to May throughout the eastern United States in rich, mesic, somewhat moist deciduous woods, including floodplains and riverbanks. In Southeastern Wisconsin, where it began flowering from mid- or late April to early May, it was at its northern range limits. It apparently was never common in Wisconsin. Fassett described it as "rare" in Milwaukee, Racine, and Kenosha Counties.[35] In 1976, Read described it as "now [occurring] only in Milwaukee County."[36] The probable cause of its demise was the destruction and degradation of its habitat. Extensive searches in former habitats by knowledgeable ecologists, including members of the Milwaukee Public Museum and Regional Planning Commission staffs, have failed to relocate this species.

2. The dwarf lake iris (Iris lacustris), listed by the State as "threatened," is endemic to the northern shores of Lakes Michigan and Huron. A very short iris, with large blue flowers, it is particularly abundant on the beach ridges and beneath conifers in Door County, where it blooms in May and June. However, it also formerly occurred in the vicinity of Milwaukee on abandoned beaches, relics of a period of higher lake water.[37] It has long been extirpated from here—the latest herbarium specimens from the Milwaukee Public Museum are from Wauwatosa in 1898 and the "Menomonee River Valley at Castalia Park" in 1913.

3. Wild petunia (Ruellia humilis), in the acanthus family (Acanthaceae), is a southern species that reaches its northern range limits in the southern counties of Wisconsin. It grows on dry, gravelly hill prairies, and was last collected in Wisconsin in 1940 on a dry hillside in Walworth County.[38]

4. Prairie bush-clover (Lespedeza leptostachya), a member of the legume family (Fabaceae), is a plant of dry prairies that is endemic to the upper Midwest. Historically known from one station in Racine County, it was thought to have been extirpated from the State. In the 1970s, though, populations were discovered in Rock, Dane, and Sauk Counties,[39] but none from Southeastern Wisconsin.

5. The eared false foxglove (Tomanthera auriculata), of the figwort family (Scrophulariaceae), is a species of prairies and prairie borders. Known from only three counties in the State—Racine, Dane, and Lafayette—it is now presumed to be extirpated from the Region.[40]

6. Beaked hazelnut (Corylus cornuta), of the birch family (Betulaceae), is perhaps the most abundant shrub in northern Wisconsin, where it often forms dense thickets. Historically, it was uncommon in Southeastern Wisconsin, where it reached its southern range limits. Fassett[41] noted its presence in Milwaukee County, and referred to a collection from a

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[35]*Norman C. Fassett, Spring Flora of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1976.*

[36]*Robert H. Read, Endangered and Threatened Vascular Plants in Wisconsin, Technical Bulletin No. 92, Scientific Areas Preservation Council, [Wisconsin] Department of Natural Resources, Madison, Wisconsin, 1976.*

[37]*Joan A. McIntosh, "Preliminary Reports on the Flora of Wisconsin, XXXIV, Liliales," Transactions of the Wisconsin Academy of Sciences, Arts and Letters, Vol. 40, 1950, pp. 215-242.*

[38]*Robert H. Read, Endangered and Threatened Vascular Plants in Wisconsin, Technical Bulletin No. 92, Scientific Areas Preservation Council, [Wisconsin] Department of Natural Resources, Madison, Wisconsin, 1976.*

[39]*Ibid.*

[40]*Peter J. Salamun, "Preliminary Reports on the Flora of Wisconsin, XXXVI, Scrophulariaceae," Transactions of the Wisconsin Academy of Sciences, Arts and Letters, Vol. 40, 1951, pp. 111-138.*

[41]*Norman C. Fassett, "Preliminary Reports on the Flora of Wisconsin, VII, Betulaceae," Transactions of the Wisconsin Academy of Sciences, Arts and Letters, Vol. 25, 1930, pp. 189-194.*

station in Racine County that was destroyed before 1909. It is presumed to be extirpated from the Region.

Rare, Threatened, and Endangered Species

The concept of species rarity is not well defined. Populations of rare species may be stable and healthy, not threatened or endangered. In general, the concept of "rarity" applies to species that occur in low densities, whether widespread or localized. Some species that are considered rare may be locally common or even abundant, but occur in only a few places because they are specialists for rare habitats which themselves are of restricted occurrence. A number of natural factors contribute to species rarity. For instance, species may be restricted to certain soils. Calcareous fens were never a widespread community type in Wisconsin; as a consequence, species that are adapted to these calcareous wetlands, such as Ohio goldenrod (Solidago ohioensis), Kalm's lobelia (Lobelia kalmii), lesser fringed gentian (Gentiana procera), false asphodel (Tofieldia glutinosa), and slender bog arrow-grass (Triglochin palustre) are very uncommon across the landscape. Lupine (Lupinus perennis) is modal in oak barrens,[42] yet these thin oak woods on sandy soils were never an abundant community type in Southeastern Wisconsin, although a dominant community type elsewhere in the State. As a result, lupine populations in Southeastern Wisconsin tend to be rare. Sand barrens and dry prairies are restricted to local areas of the Southern Kettle Moraine in the Region; as a result, such species as rock sandwort (Arenaria stricta), pasqueflower (Anemone patens), western prickly-pear cactus (Opuntia compressa), bluets (Houstonia longifolia), and pinweed (Lechea spp.) are, like the lupine, limited in their regional occurrences. Shaded limestone cliffs are likewise uncommon, and, correspondingly, walking fern (Camptosorus rhizophyllus) and smooth cliff brake (Pellaea glabella) are rare.

Other rare species may occur over a wide geographic range, but nowhere exist in large numbers. They usually occur singly or in small groups, more or less evenly distributed across their range, or else they occur in only a few widely disjunct populations. An example is heart-leaved plantain (Plantago cordata), which is relatively widespread geographically, but occurs in few populations and low numbers, and which has drastically declined because of the disappearance of suitable stream habitats.

Endemic species are very localized; they are known from only a particular restricted area and nowhere else. Disjunct species are those which occur in outlying sites, widely separated from the main population. Peripheral species occur at the edges of their ranges. For example, many species are common to the north or south of the Region, but are naturally rare in Southeastern Wisconsin because they are at the edges of their ranges. Species that reach their northern range limits in southern Wisconsin include black haw (Viburnum prunifolium), red trillium (Trillium recurvatum), hoptree (Ptelea trifoliata), and blue-stemmed goldenrod (Solidago caesia), all on the Wisconsin Natural Heritage List of rare plant species. More common in Missouri, the heart-leaved plantain (Plantago cordata) is known from only one or two natural populations in Wisconsin, all within the Region. There are also many species abundant in northern Wisconsin, but that are uncommon in local habitats at their southern range limits in Southeastern Wisconsin. These include mountain maple (Acer spicatum), a large shrub of mixed deciduous-coniferous woods; various herbs of northern forests, such as bunchberry (Cornus canadensis), partridgeberry (Mitchella repens), goldthread (Coptis groenlandica), wintergreen (Gaultheria procumbens), and yellow beadlily (Clintonia borealis); black spruce (Picea mariana), a dominant tree of conifer swamps in the north, but present as a relict in only a handful of such habitats in the northern part of the Region; and bog species such as bog rosemary (Andromeda glaucophylla), Labrador-tea (Ledum groenlandicum), and bog laurel (Kalmia polifolia). In fact, bogs themselves are at the southern limit of their range in Southeastern Wisconsin.

Despite the fact that many rare species that exist in an area as disjunct or peripheral populations are more abundant elsewhere within their ranges, these outlier populations are important genetically. These isolated, locally adapted populations, frequently occupying atypical habitats, contain an inherent genetic diversity. Environmental conditions along species borders are characteristically more extreme and less predictable than nearer the center of the range. These conditions may evolutionarily select for species adaptations that differ from other populations of the same species. Thus, it is important to protect and manage such outlier populations even though the species represented by these populations may be more abundant elsewhere. Genetic varia-

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[42] *John T. Curtis, The Vegetation of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1959.*

The entire habitat range in Wisconsin for the blue-stemmed goldenrod (Solidago caesia), classified by the State as endangered, extends from about the Root River in the City of Racine north to College Avenue in the City of Milwaukee and west from Lake Michigan to about STH 38. This goldenrod of the mesic forest is at the westernmost limits of its North American range in Wisconsin. The photograph shown above was taken at Racine County's Cliffside Park.

Source: Donald M. Reed.

bility may contribute to the survival of the species under rarely occurring extreme climatic conditions.

There are other natural reasons why the population sizes of certain species are small. The carrying capacity of a site, that is, the maximum population size of a particular species that the environment can support, may be low. Species with poor dispersal abilities may have difficulty colonizing suitable habitats if the sites are few and widely separated. Some colonizing species may not yet have time to fully exploit new sites. As succession proceeds, new communities are created that may displace species that inhabit earlier successional stages. Case[43] contends that most of our native orchids inhabit transient, early- or mid-successional communities. If succession proceeds toward a mature state, these species will need new habitats to colonize that may or may not be available.

Animals at the top of the food chain, such as predators, frequently require large territories for survival. They naturally exist in few numbers, and usually have low reproductive rates. Such predators

[43]*Frederick W. Case, Jr., Orchids of the Western Great Lakes Region, Cranbrook Institute of Science Bulletin 48, Bloomfield Hills, Michigan, 1987.*

Mitrewort (Mitella diphylla), also known as bishop's cap, occurs in wet-mesic to mesic hardwood forests throughout Wisconsin. However, as wet-mesic to mesic hardwood forests continue to be lost to urban development within the Southeastern Wisconsin Region, this plant will become increasingly rare. The above photograph was taken at the City of West Bend's Lac Lawrann Conservancy.

Source: Donald M. Reed.

cannot withstand hunting pressure or habitat destruction. When reduced, their numbers only rebound slowly, if at all.

As discussed above, for any number of complex, interacting reasons, many species have historically always been rare. However, many species have more recently become rare because of human intervention. By far, the most profound, widespread cause of species endangerment has been habitat destruction, degradation, and conversion to human use. Certain species that were once abundant throughout Southeastern Wisconsin are now regionally uncommon because of wholesale destruction of their habitats. For example, the deep-soil mesic prairies of the pre-European-settlement landscape

were prime agricultural lands; today, such prairies persist only in small, isolated patches. Plant species that grew in this environment, such as compass plant (Silphium laciniatum), rattlesnake-master (Eryngium yuccifolium), cream wild indigo (Baptisia leucophaea), and prairie white-fringed orchid (Platanthera leucophaea), have been correspondingly reduced in numbers. In this same regard, species that were never common in Southeastern Wisconsin tend to be disproportionately affected by habitat destruction. Snow trillium (Trillium nivale), which grows on limestone-derived soils in rich woods, was probably never common, but disturbance to its habitat has led to its listing by the State as a "threatened" plant.

Some species are more vulnerable to disturbance than others. Widespread species with poor dispersal abilities are prone to local extinction through habitat destruction because of difficulty in colonizing new sites or recolonizing disturbed sites. Endemics and disjunct species with unusually restricted distributions are disproportionately affected by land development because of their restricted occurrences. The severe decline of Canada yew (Taxus canadensis) and some orchids, especially lady's-slippers (Cypripedium spp.), has been attributed to overgrazing by deer. Both Indian cucumber-root (Medeola virginiana) and American gromwell (Lithospermum latifolium) are adversely affected by cattle grazing in woodlots. Curtis[44] specifically mentioned four prairie species—Sullivant's milkweed (Asclepias sullivantii), wild quinine (Parthenium integrifolium), prairie Indian plantain (Cacalia tuberosa), and Indian paintbrush (Castilleja coccinea)—as being unable to tolerate disturbance. Sweet flag (Acorus calamus), found in old, stable marshes, is depleted by water pollution. Wetland drainage has caused significant drops in water tables, resulting in local species extinctions.

Certain species inhabit plant communities of a particular successional stage. Some invertebrate animals that are dependent on old-growth forests are decreasing because of the scarcity of such stands. Other species require early- or mid-successional communities which, as they mature, displace these species. Periodic fire or other natural disturbances that would have retarded succession may have been eliminated. For example, showy lady's-slipper (Cypripedium reginae) inhabits open, relatively sunny tamarack swamps. In the absence of disturbance, these swamps mature, producing dense shade to which the orchid is intolerant.[45]

Another form of human-induced disturbance that has led to species endangerment has been the introduction of poisons into the environment. These are generally correctable if eliminated in time. Organochlorine pesticides, such as DDT, have threatened the bald eagle, osprey, and peregrine falcon populations in Wisconsin and elsewhere. With control of these chemicals, these species are recovering, although for the peregrine falcon in Wisconsin, artificial reintroductions are being used.

Eastern hognose snakes eat toads. A toad sprayed with Atrazine® will itself remain unharmed, but will kill the snake that ingests it.[46] The Commission staff has noted a significant decline in the population of this snake in Southeastern Wisconsin. It is now mostly restricted to the Kettle Moraine State Forest area.

Another aspect of human-induced disturbance that tends to reduce populations of sensitive native species is that certain animals, especially such generalists as raccoons, skunks, and opossums, are able to survive and even thrive under such conditions. These animals are nest predators of bird and turtle eggs. Egg predation has had a significant effect on the reproduction of Blanding's turtle in Southeastern Wisconsin.

Traditionally, certain wild plant species have been collected for their real or reputed curative properties. Ginseng (Panax quinquefolius) has had various folk medicine uses. Believed by some to be a cure-all for every ill, it has no proven medicinal value.[47]

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[44]*John T. Curtis, The Vegetation of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1959.*

[45]*Frederick W. Case, Jr., Orchids of the Western Great Lakes Region, Cranbrook Institute of Science Bulletin 48, Bloomfield Hills, Michigan, 1987.*

[46]*Richard Carl Vogt, Natural History of Amphibians and Reptiles in Wisconsin, Milwaukee Public Museum, Milwaukee, Wisconsin, 1981.*

[47]*Edward G. Voss, Michigan Flora, Part II, Dicots (Saurraceae-Cornaceae), Cranbrook Institute of Science Bulletin 59, Bloomfield Hills, Michigan, 1985.*

Nevertheless, it has been put under such intense commercial pressure, particularly for export to the Orient, that it has become severely depleted throughout the entire eastern United States, including Southeastern Wisconsin. It is rarely encountered in the wild today, but it is being grown commercially. Similarly, the rhizome of goldenseal (Hydrastis canadensis) has long been reputed to contain medicinal properties, and, also similarly, its numbers have also been severely reduced by commercial exploitation throughout the eastern United States.

The following specific examples illustrate some of the problems associated with threatened and endangered animal species in Wisconsin.

1. The starhead topminnow (Fundulus dispar) is a small—about 2.5 inches long—forage fish that inhabits clear, quiet, shallow backwaters, such as swamps, marshes, cut-off ponds, and stream and lake shallows,[48] with abundant submerged vegetation. In Wisconsin, it has been designated as an "endangered" species primarily because of habitat loss—slow-moving water is particularly susceptible to the impacts associated with erosion, siltation, and chemical runoff. In Southeastern Wisconsin, the starhead topminnow survives in the Mukwonago River watershed. This area has been recommended to be established as a unique "topminnow sanctuary."[49]

2. The queen snake (Regina septemvittata) is a medium-sized water snake that, in Wisconsin, has historically been restricted to the extreme southeastern counties where it is at the northwestern limits of its range.[50] It is designated an "endangered" species within the State, currently known to exist in only a few sites in the Region. It inhabits clear, spring-fed streams with at least moderate currents and bottoms with rocks beneath which it hibernates. It feeds almost exclusively on crayfish. Drainage, cultivation, and pollution of wetlands, along with poor floodplain soil conservation practices, have led to its decline through the loss of its very specific habitats.

3. Blanding's turtle (Emydoidea blandingii) is a medium-sized, semi-aquatic turtle that has been designated as a "threatened" species in Wisconsin. It is basically a species of the prairie region, ranging across most of southern and western Wisconsin.[51] Its habitat includes grassy marshes, mesic prairies, prairie potholes, shallow slow-moving rivers, and shallow lakes. Blanding's turtles must be at least 12 years old before they can reproduce. This, combined with over-collection, nest predation, and wetland drainage, has diminished its numbers. Also, because of its semi-aquatic habit, it is vulnerable to becoming roadkill.

4. The red-shouldered hawk (Buteo lineatus) is a State-defined "threatened" species that requires large, intact wooded areas, particularly such moist woodlands as river-bottom woods and upland woods with frequent wet pockets, for nesting.[52] It was once common in Wisconsin, but habitat destruction, including creation of large forest openings, and unsuccessful competition with the red-tailed hawk (Buteo jamaicensis) has led to its decline.

The following terms are generally used in describing rare species:

1. Endangered Species: This is a legal category that includes any species that is in danger of extinction throughout all or a significant portion of its range. These are species in trouble, whose continued existence as part of Wisconsin's bio-diversity is in jeopardy, and which may become extirpated without help.

2. Threatened Species: This is a legal category that includes any species likely to become endangered within the foreseeable future throughout all or a significant portion of its

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[48]*George C. Becker, Fishes of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1983.*

[49]*Ibid.*

[50]*Richard Carl Vogt, Natural History of Amphibians and Reptiles in Wisconsin, Milwaukee Public Museum, Milwaukee, Wisconsin, 1981.*

[51]*Ibid.*

[52]*Betty L. Les, The Vanishing Wild: Wisconsin's Endangered Wildlife and Its Habitat, [Wisconsin] Department of Natural Resources, Madison, Wisconsin, 1979.*

range. This usually applies to species whose populations are declining due to destruction either of the organism or its habitat.

3. Special Concern/Watch/Rare Species: This nonlegal category includes those species not designated as "threatened" or "endangered" but about which some problem of abundance or distribution is suspected but not yet proved. The main purpose of this category is to focus attention on certain species prior to their becoming threatened or endangered.

In addition, the following term is being used for other species occurring within the Region:

4. Uncommon Species: This nonlegal category includes those species that have been documented as occurring in the Region, but are too abundant on a statewide basis to justify listing as "rare," "threatened," or "endangered." They usually exist in low numbers or restricted distribution in the Region; frequently, they are found in disjunct populations or at the limits of their ranges, or in habitats that are fast disappearing. Their status merits monitoring on a regional level.

Tables 42 through 47 list rare and uncommon species of mammals, birds, fish, herptiles, and vascular plants that are known to occur in Southeastern Wisconsin. These lists are updated periodically as more knowledge is obtained about native species, as species become more or less rare, and as the degree of endangerment increases or decreases. The position of a species on the State list does not necessarily reflect the status of its population within the Region. A number of species may have relatively extensive and apparently stable statewide populations, but still be of high concern on a regional level. Conversely, other species' populations may be extensive and stable within the Region, yet be scarce or declining elsewhere in the State. Table 48 lists those vascular plant species native to the Region which, although not State-listed, occur in low numbers or restricted distributions and whose status should be monitored.

CONCLUSIONS

Intensive European settlement of Southeastern Wisconsin has resulted in severe disruption of the Region's natural communities, causing the extirpation of several plant and animal species and threatening regional extinction of many others. Two of the most extensive pre-settlement community types—prairie and oak savanna—have been reduced to an extremely small fraction of their former acreage, while the more extensive upland forests have had their integrity threatened through a variety of disturbances and loss of forest interior environment.

Table 42

RARE MAMMALS OF SOUTHEASTERN WISCONSIN

Scientific Name	Common Name
Clethrionomys gapperi	Red-backed vole
Lepus townsendii	White-tailed jackrabbit
Lynx rufus	Bobcat
Microtus ochrogaster	Prairie vole
Sorex thompsoni	Thompson's pigmy shrew
Spermophilus franklinii	Franklin's ground squirrel
Synaptomys cooperi	Southern bog lemming

Source: Wisconsin Natural Heritage Inventory Working List, Wisconsin Department of Natural Resources, 1993; Hartley H. T. Jackson, Mammals of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1961; and SEWRPC.

At the current rate of urban development within the Region, these trends are likely not only to continue, but to accelerate. The small number of high-quality natural areas in the Region will continue to be subjected to increased developmental pressure. Loss and degradation of habitat will mean further endangerment of native plant and animal species. Continued disturbance of high-quality natural communities will result in further invasion by exotic species at the expense of native ones. Certain uncommon natural communities may disappear from the Region. For example, the few remaining stands of prairie not under official protection may be expected to be plowed, grazed, or developed. Even natural communities that are officially protected, but without proper management, particularly those natural community types that depended on periodic fire for maintenance, such as oak savannas, prairies, and even some wetland communities, will be lost.

A number of species listed by the State as "endangered," such as Cooper's milk vetch (Astragalus neglectus), heart-leaved plantain (Plantago cor-

Table 43

ENDANGERED, THREATENED, AND SPECIAL CONCERN BIRDS OF SOUTHEASTERN WISCONSIN

Scientific Name	Common Name
Endangered Species	
Charadrius melodus	Piping plover
Dendroica dominica	Yellow-throated warbler
Falco peregrinus	Peregrine falcon
Helmitheros vermivorus	Worm-eating warbler
Lanius ludovicianus	Loggerhead shrike
Podiceps grisegna	Red-necked grebe
Sterna caspia	Caspian tern
Sterna forsteri	Forster's tern
Sterna hirundo	Common tern
Thryomanes bewickii	Bewick's wren
Tyto alba	Common barn owl
Threatened Species	
Buteo lineatus	Red-shouldered hawk
Casmerodius albus	Great egret
Dendroica cerulea	Cerulean warbler
Empidonax virescens	Acadian flycatcher
Haliaeetus leucocephalus	Bald eagle
Nyctanassa violaceus	Yellow-crowned night heron
Oporornis formosus	Kentucky warbler
Pandion haliaetus	Osprey
Vireo bellii	Bell's vireo
Wilsonia citrina	Hooded warbler
Special Concern Species	
Accipiter gentilis	Northern goshawk
Ammodramus caudacutus	Sharp-tailed sparrow
Ammodramus henslowii	Henslow's sparrow
Ammodramus leconteii	LeConte's sparrow
Ammodramus savannarum	Grasshopper sparrow
Anas acuta	Northern pintail
Anas rubripes	American black duck
Asio flammeus	Short-eared owl
Asio otus	Long-eared owl
Aythya affinis	Lesser scaup
Aythya americana	Redhead
Bartramia longicauda	Upland sandpiper

Scientific Name	Common Name
Special Concern Species (continued)	
Botaurus lentiginosus	American bittern
Bubulcus ibis	Cattle egret
Bucephala clangula	Goldeneye
Carduelis pinus	Pine siskin
Catharus ustulatus	Swainson's thrush
Chlidonias niger	Black tern
Chondestes grammacus	Lark sparrow
Circus cyaneus	Northern harrier
Cistothorus platensis	Sedge wren
Coccothraustes vespertinus	Evening grosbeak
Coturnicops noveboracensis	Yellow rail
Dendroica fusca	Blackburnian warbler
Dendroica tigrina	Cape May warbler
Dolichonyx oryzivorus	Bobolink
Empidonax flaviventris	Yellow-bellied flycatcher
Falco columbarius	Merlin
Gallinula chloropus	Common moorhen
Icteria virens	Yellow-breasted chat
Icterus spurius	Orchard oriole
Ixobrychus exilis	Least bittern
Mergus merganser	Common merganser
Mergus serrator	Red-breasted merganser
Nycticorax nycticorax	Black-crowned night heron
Oporornis agilis	Connecticut warbler
Perisoreus canadensis	Gray jay
Phalaropus tricolor	Wilson's phalarope
Protonotaria citrea	Prothonotary warbler
Rallus elegans	King rail
Regulus calendula	Ruby-crowned kinglet
Seiurus motacilla	Louisiana waterthrush
Spiza americana	Dickcissel
Sturnella neglecta	Western meadowlark
Tyrannus verticalis	Western kingbird
Vermivora peregrina	Tennessee warbler

Source: Wisconsin Natural Heritage Inventory Working List, Wisconsin Department of Natural Resources, 1993; and SEWRPC.

data), or prairie white-fringed orchid (Platanthera leucophaea), will likely be extirpated from the Region. Several State-defined "threatened" species, such as Sullivant's milkweed (prairie milkweed) (Asclepias sullivantii), prairie Indian plantain (Cacalia tuberosa), or ram's-head lady's-slipper (Cypripedium arietinum), will likely become designated as "endangered," while many of those species now considered to be rare or uncommon, such as twinleaf (Jeffersonia diphylla), goldenseal (Hydrastis canadensis), or sea rocket (Cakile edentula), will be classified as "threatened" or "endangered." The ultimate result of these losses will be a major decrease in the Region's bio-diversity.

SUMMARY

Natural area and critical species habitat losses in Southeastern Wisconsin have been profound. The map of pre-European-settlement Southeastern Wisconsin, based on the original U. S. Public Land Survey of 1835 to 1836, reveals that the area of the Region north and east of the vegetation tension zone, a line which runs northwest to southeast from Washington County through Milwaukee County, was predominantly maple-basswood and beech-maple forest, while the area south and west of the vegetation tension zone was mostly oak forest, oak savanna, and prairie. The vegetation type occupying

Table 44

UNCOMMON BIRDS OF SOUTHEASTERN WISCONSIN

Scientific Name	Common Name	Regional Status[a]
Accipiter cooperii	Cooper's hawk	U
Accipiter striatus	Sharp-shinned hawk	E
Aegolinus acadicus	Northern saw-whet owl	E
Anas carolinensis	Green-winged teal	U, L
Anas strepera	Gadwall	U, L
Ardea herodias	Great blue heron	U
Aythya collaris	Ring-necked duck	R
Bonasa umbellus	Ruffed grouse	U, L
Buteo platypterus	Broad-winged hawk	E
Capella gallinago	Common snipe	R, L
Caprimulgus vociferus	Whip-poor-will	U, L
Cathartes aurea	Turkey vulture	U
Certhia familiaris	Brown creeper	U, L
Dendroica discolor	Prairie warbler	R
Dendroica pensylvanica	Chestnut-sided warbler	R
Dendroica pinus	Pine warbler	R, D
Dendroica virens	Black-throated green warbler	E
Dryocopus pileatus	Pileated woodpecker	R
Empidonax minimus	Least flycatcher	U
Empidonax traillii	Alder flycatcher	U, L
Euphagus cyanocephalus	Brewer's blackbird	R
Fulica americana	American coot	U
Grus canadensis	Sandhill crane	U
Hylocichla fuscescens	Veery	U
Hylocichla mustelina	Wood thrush	U
Lophodytes cucullatus	Hooded merganser	U, D
Loxia curvirostra	Red crossbill	R, L
Loxia leucoptera	White-winged crossbill	E
Mareca americana	American widgeon	R
Minus polyglottos	Northern mockingbird	R
Mniotilta varia	Black-and-white warbler	L
Oporornis philadelphia	Mourning warbler	U, L, D
Oxyura jamaicensis	Ruddy duck	U, L
Parus bicolor	Tufted titmouse	U
Philohela minor	American woodcock	U
Polioptila caerulea	Blue-gray gnatcatcher	U
Regulus satrapa	Golden-crowned kinglet	E
Seiurus aurocapillus	Ovenbird	U
Seiurus noveboracensis	Northern waterthrush	U, L
Sialia sialis	Eastern bluebird	U
Sitta canadensis	Red-breasted nuthatch	E
Spatula clypeata	Northern shoveler	U, L
Sphyrapicus varius	Yellow-bellied sapsucker	U, L
Spizella pallida	Clay-colored sparrow	R, D
Troglodytes troglodytes	Winter wren	R, D
Vermivora chrysoptera	Golden-winged warbler	R, L
Vermivora pinus	Blue-winged warbler	U
Vermivora ruficapilla	Nashville warbler	U, L
Vireo griseus	White-eyed vireo	R
Vireo solitarius	Solitary vireo	E
Wilsonia canadensis	Canada warbler	U, D
Zonotrichia leucophrys	White-throated sparrow	U, L

[a] *U = Uncommon in Southeastern Wisconsin in summer*
R = Rare in Southeastern Wisconsin in summer
L = Range limit in Southeastern Wisconsin in summer
D = Disjunct range in Southeastern Wisconsin in summer
E = Extralimital: usually mapped as summer range in Southeastern Wisconsin by Robbins but multiple summer records by Bielefeldt

Source: S. D. Robbins, Jr., Wisconsin Birdlife, University of Wisconsin Press, Madison, Wisconsin, 1991; and John Bielefeldt, Naturalist, Racine County Parks Department.

Table 45

RARE FISH OF SOUTHEASTERN WISCONSIN

Scientific Name	Common Name
Endangered Species	
Fundulus dispar	Starhead topminnow
Luxilus chrysocephalus	Striped shiner
Noturus exilis	Slender madtom
Threatened Species	
Lepomis megalotis	Longear sunfish
Lythrurus umbratilis	Redfin shiner
Moxostoma carinatum	River redhorse
Moxostoma valenciennesi	Greater redhorse
Notropis anogenus	Pugnose shiner
Notropis nubilis	Ozark minnow
Special Concern Species	
Anguilla rostrata	American eel
Aphredoderus sayanus	Pirate perch
Coregonus artedii	Lake herring
Erimyzon sucetta	Lake chubsucker
Etheostoma microperca	Least darter
Opsopoeodus emiliae	Pugnose minnow

Source: Wisconsin Natural Heritage Inventory Working List, Wisconsin Department of Natural Resources, 1993; George C. Becker, Fishes of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1983; and SEWRPC.

Table 46

RARE HERPTILES OF SOUTHEASTERN WISCONSIN

Scientific Name	Common Name
Endangered Species	
Acris crepitans blanchardi	Blanchard's cricket frog
Regina septemvittata	Queen snake
Sistrurus catenatus catenatus	Eastern massasauga
Thamnophis proximus	Western ribbon snake
Thamnophis sauritus	Northern ribbon snake
Threatened Species	
Emydoidea blandingii	Blanding's turtle
Special Concern Species	
Rana catesbeiana	Bullfrog
Rana palustris	Pickerel frog
Uncommon Species	
Ambystoma maculatum	Spotted salamander
Hemidactylium scutatum	Four-toed salamander
Thamnophis butleri	Butler's garter snake

Source: Wisconsin Natural Heritage Inventory Working List, Wisconsin Department of Natural Resources, 1993; Richard Carl Vogt, Natural History of Amphibians and Reptiles in Wisconsin, Milwaukee Public Museum, Milwaukee, Wisconsin, 1981; and SEWRPC.

the greatest area of pre-settlement Southeastern Wisconsin was oak savanna, with over 387,000 acres, or 23.0 percent of the Region. This was followed by the mesic upland forests—maple-basswood forest and beech-maple forest—which had a combined total of over 600,000 acres, or 36.0 percent of the Region. Of the more than 170,000 acres of original prairie in the Region, most occurred in Walworth, Racine, and Kenosha Counties. Regionally, nearly 83.0 percent of the pre-settlement vegetation had been lost by 1990, with oak savanna and prairie each having less than 1.0 percent of their original acreage remaining. More than 725,000 acres of upland forest have also been lost.

The woodlands of Southeastern Wisconsin have suffered disturbance from clear-cutting, selective logging, and grazing by cattle. These have led to loss of forest interior environment, decreases in numbers of native plants and animals, and increases in the percentage of exotic organisms. Cessation of periodic fire has caused oak savannas to convert to shrubby oak woods and prairies to convert to shrub-thickets. The vegetation of the Region has been adversely affected by such pathogens and destructive insects as the imported Dutch elm disease, oak wilt, butternut canker, and larch sawflies, and, potentially, by the exotic gypsy moths.

Alteration of the Region's hydrology has also been profound. The alterations have resulted in the loss of wetlands through draining and filling, ditching, stream channelization, pollution, floodplain development, and destruction of natural vegetated shorelines. These impacts have resulted in a diminution of many of the natural functions wetlands performed in the Region.

Numerous exotic organisms have been introduced into Southeastern Wisconsin. Several of these have become naturalized and become pests, including the European and glossy buckthorns, honeysuckles, garlic mustard, multiflora rose, highbush cranberry, Eurasian water milfoil, reed canary grass, purple loosestrife, starling, house sparrow, sea lamprey, and alewife.

Table 47

ENDANGERED, THREATENED, AND RARE VASCULAR PLANT SPECIES KNOWN TO OCCUR IN SOUTHEASTERN WISCONSIN[a]

Scientific Name	Common Name	State Status[b]
Agalinis gattingeri	Round-stemmed false foxglove	T
Agastache nepetoides	Yellow giant hyssop	T
Agrimonia parviflora	Swamp agrimony	R
Amerorchis rotundifolia	Small round-leaved orchis	T
Arethusa bulbosa	Dragon's-mouth	R
Artemesia dracunculus	Dragon sagewort	R
Asclepias lanuginosa	Wooly milkweed	T
Asclepias purpurascens	Purple milkweed	E
Asclepias sullivantii	Sullivant's milkweed	T
Aster furcatus	Forked aster	T
Astragalus neglectus	Cooper's milk vetch	E
Besseya bullii	Kittentails	T
Cacalia muhlenbergii	Great Indian plantain	R
Cacalia tuberosa	Prairie Indian plantain	T
Cakile edentula	Sea rocket	R
Calamagrostis inexpansa	Bog reed grass	R
Calamintha arkansana (= Satureja glabella)	Low calamint	R
Calamovilfa longifolia	Sand reed	T
Cardamine pratensis	Cuckoo flower	R
Carex crawei	Crawe sedge	R
Carex crus-corvi	Crow-spur sedge	E
Carex formosa	Handsome sedge	R
Carex garberi	Garber's sedge	T[c]
Carex gracilescens	Slender sedge	R
Carex lupuliformis	Hop-like sedge	E
Carex richardsonii	Richardson sedge	R
Carex suberecta	Prairie straw sedge	R
Carex swanii	Swan sedge	R[c]
Carex sychnocephala	Many-headed sedge	R
Carex tenuiflora	Sparse-flowered sedge	R
Cirsium hillii	Prairie thistle	T
Collinsonia canadensis	Stoneroot	E[c]
Conioselinum chinense	Hemlock parsley	E[c]
Corallorhiza odontorhiza	Late coral-root	R
Coreopsis lanceolata	Sand coreopsis	R
Cypripedium arietinum	Ram's-head lady's-slipper	T
Cypripedium candidum	White lady's-slipper	T
Cypripedium parviflorum	Small yellow lady's-slipper	R
Cyprepedium reginae	Showy lady's-slipper	R
Deschampsia cespitosa	Tufted hairgrass	R
Diplazium pycnocarpon	Glade fern	R
Drosera linearis	Linear-leaved sundew	T
Dryopteris clintoniana	Clinton wood fern	R
Eleocharis olivacea	Capitate spike-rush	R
Eleocharis quadrangulata	Angle-stemmed spike-rush	E[c]
Eleocharis quinqueflora	Few-flowered spike-rush	R
Eleocharis rostellata	Beaked spike-rush	T
Elymus lanceolatus (= Agropyron dasystachyum)	Thickspike wheat grass	T
Epilobium strictum	Downy willow-herb	R
Equisetum variegatum	Variegated scouring-rush	R
Erigenia bulbosa	Harbinger-of-spring	E[c]
Eupatorium sessilifolium	Upland boneset	R
Euphorbia polygonifolia	Seaside spurge	R
Fimbristylis puberula	Chestnut sedge	E

Table 47 (continued)

Scientific Name	Common Name	State Status[b]
Fraxinus quadrangulata	Blue ash	T
Gentiana alba (= G. flavida)	Yellowish gentian	T
Gentianopsis procera	Small fringed gentian	R
Gymnocladus dioicus	Kentucky coffeetree	R
Hedyotis caerulea	Bluets	R
Hydrastis canadensis	Goldenseal	R
Iris lacustris	Dwarf lake iris	T[c]
Jeffersonia diphylla	Twinleaf	R
Lespedeza leptostachya	Prairie bush-clover	E[c]
Liatris spicata	Marsh blazing-star	R
Lithospermum latifolium	American gromwell	R
Malaxis brachypoda	White adder's-mouth	R
Medeola virginiana	Indian cucumber root	R
Onosmodium hispidissimum	Marbleseed	R
Ophioglossum vulgatum	Adder's-tongue	R
Orobanche fasciculata	Clustered broomrape	T
Orobanche uniflora	One-flowered broomrape	R
Panax quinquefolius	Ginseng	R
Panicum wilcoxianum	Wilcox panic grass	R
Parthenium integrifolium	Wild quinine	T
Penstemon hirsutus	Hairy beardtongue	R
Penstemon pallidus	Pale beardtongue	R
Phegopteris hexagonoptera	Broad beech fern	R
Phlox bifida	Cleft phlox	R
Phlox glaberrima	Smooth phlox	E
Plantago cordata	Heart-leaved plantain	E
Platanthera dilatata	White bog orchid	R
Platanthera flava	Tubercled orchid	T
Platanthera hookeri	Hooker orchid	R
Platanthera leucophaea	Prairie white-fringed orchid	E
Platanthera orbiculata	Large round-leaved orchid	R
Platanus occidentalis	Sycamore	R
Polygala cruciata	Cross milkwort	R
Polystichum acrostichoides	Christmas fern	R
Polytaenia nuttallii	Prairie parsley	T
Prenanthes aspera	Rough white lettuce	E
Ptelea trifoliata	Hoptree	R
Pterospora andromeda	Pine-drops	E
Ranunculus cymbalaria	Seaside crowfoot	E
Ruellia humilis	Wild petunia	E[c]
Salix cordata	Sand dune willow	E
Scirpus cespitosus	Tussock bulrush	E
Scleria triglomerata	Tall nut-rush	R
Scleria verticillata	Low nut-rush	R
Scutellaria ovata	Heart-leaved skullcap	R
Solidago caesia	Blue-stemmed goldenrod	E
Solidago ohioensis	Ohio goldenrod	R
Talinum rugospermum	Prairie fame-flower	R
Thalictrum revolutum	Waxy meadow-rue	R
Thaspium trifoliatum	Meadow parsnip	R
Tofieldia glutinosa	False asphodel	T
Tomanthera auriculata	Eared false foxglove	R[c]
Triglochin maritimum	Common bog arrow-grass	R
Triglochin palustre	Slender bog arrow-grass	R
Trillium nivale	Snow trillium	T

Table 47 (continued)

Scientific Name	Common Name	State Status[b]
Trillium recurvatum	Red trillium	R
Trisetum melicoides	Purple false oats	R
Viburnum prunifolium	Black haw	R
Viola rostrata	Long-spurred violet	R
Viola septentrionalis	Northern blue violet	R

[a]*Adapted from Natural Heritage Working Lists of Wisconsin Department of Natural Resources, Bureau of Endangered Resources, 1993.*

[b]*Species status in State as determined by Wisconsin Natural Heritage Program:*
E = endangered
T = threatened
R = species of special concern

[c]*Species which, according to Wisconsin Department of Natural Resources, Scientific Areas Preservation Council Technical Bulletin No. 92, has probably been extirpated from the Region.*

Source: R. H. Read, Endangered and Threatened Vascular Plants in Wisconsin, Technical Bulletin No. 92, Scientific Areas Preservation Council, Wisconsin Department of Natural Resources, Madison, Wisconsin, 1976; and SEWRPC.

A number of native plant and animal species have been extirpated from the Region since 1836, including harbinger-of-spring, dwarf lake iris, wild petunia, prairie bush-clover, eared false foxglove, beaked hazelnut, passenger pigeon, Carolina parakeet, bison, gray wolf, cougar, elk, and lynx. A total of 45 native plant and 35 vertebrate animal species that occur in Southeastern Wisconsin are listed by the Wisconsin Department of Natural Resources as "endangered" or "threatened." In addition, about 70 plant and about 70 vertebrate animal species have been identified as being of "special concern." Many "special concern" plant species are considered by the Commission to be uncommon within the Region.

It is anticipated that if developmental trends continue in the Region at the current rate, an increasing acreage of natural communities will be degraded or destroyed, and an increasing number of native species will have their populations decreased and will be faced with regional extinction. The result will be a major decline in the bio-diversity of the Region.

Table 48

UNCOMMON VASCULAR PLANTS OF SOUTHEASTERN WISCONSIN

Scientific Name	Common Name
Acer spicatum	Mountain maple
Acorus calamus	Sweet flag
Agastache scrophulariaefolia	Purple giant hyssop
Aletris farinosa	Colic-root
Allium cernuum	Nodding wild onion
Ammophila breviligulata	Marram grass
Amorpha canescens	Lead plant
Anaphallis margaritacea	Pearly everlasting
Andromeda glaucophylla	Bog rosemary
Anemone patens	Pasqueflower
Anemonella thalictroides	Rue-anemone
Aplectrum hyemale	Putty-root
Arabis divaricarpa	Rock cress
Arabis hirsuta (= A. pycnocarpa)	Hairy rock cress
Aralia nudicaulis	Wild sarsaparilla
Aralia racemosa	Spikenard
Arctostaphylos uva-ursi	Bearberry
Arenaria stricta	Rock sandwort
Arisaema dracontium	Green dragon
Aristida basiramea	Triple-awn grass
Aristida intermedia	False arrow feather
Artemisia serrata	Saw-toothed sagebrush
Asclepias amplexicaulis	Bluntleaf milkweed
Asclepias hirtella	Tall green milkweed
Asclepias ovalifolia	Oval milkweed
Asclepias quadrifolia	Four-leaved milkweed
Asclepias tuberosa	Butterflyweed
Asclepias viridiflora	Short green milkweed
Asplenium pleyneuron	Ebony spleenwort
Aster cordifolius	Heart-leaved aster
Aster linariifolius	Flax-leaved aster
Aster praealtus	Willow aster
Aster prenanthoides	Crooked-stem aster
Astragalus canadensis	Canada milk-vetch
Aureolaria grandiflora	Yellow false foxglove
Baptisia leucantha	White wild indigo
Baptisia leucophaea	Cream wild indigo
Beckmannia syzigachne	American slough grass
Berula erecta	Small water-parsnip
Boltonia latisquama (= B. asteroides)	False aster
Botrychium multifidum	Leathery grape fern
Brasenia schreberi	Water shield
Bromus kalmii	Prairie brome
Bulbostylis capillaris	Hair-sedge
Cacalia atriplicifolia	Pale Indian plantain
Cacalia suaveolens	Sweet Indian plantain
Calla palustris	Water arum
Callitriche palustris	Common water-starwort
Calopogon pulchellus	Grass-pink orchid
Camptosorus rhizophyllus	Walking fern
Carex alopecoides	--
Carex atherodes	--
Carex aurea	Golden sedge
Carex bromoides	--
Carex cephalantha	--
Carex communis	--
Carex conoidea	--
Carex cryptolepis (= C. fertilis)	--
Carex deweyana	--
Carex disperma	--
Carex eburnea	--
Carex grayi	Bur sedge
Carex haydenii	--
Carex limosa	Mud sedge
Carex meadii	--
Carex tuckermanii	--
Cassia fasciculata	Partridge-pea

Scientific Name	Common Name
Castilleja coccinea	Indian paintbrush
Castilleja sessiliflora	--
Ceratophyllum echinatum	Spiny hornwort
Chimaphila umbellata	Prince's-pine
Cinna arundinacea	Common wood reed
Circaea alpina	Northern enchanter's-nightshade
Cladium mariscoides	Twig-rush
Clintonia borealis	Yellow beadlily
Conopholis americana	Squawroot
Convolvulus spithamaeus	Low bindweed
Coptis groenlandica (= C. trifolia)	Goldthread
Corallorhiza maculata	Spotted coral-root
Corallorhiza trifida	Early coral-root
Corispermum hyssopifolium	Bugseed
Cornus canadensis	Bunchberry
Cornus rugosa	Round-leaved dogwood
Corylus cornuta[a]	Beaked hazelnut
Cryptogramma stelleri	Slender rock brake
Cynoglossum boreale	Wild comfrey
Cyperus diandrus	--
Cypripedium acaule	Moccasin flower
Cypripedium pubescens	Large yellow lady's-slipper
Dentaria diphylla	Crinkleroot
Desmanthus illinoensis	Illinois sensitive-plant
Desmodium cuspidatum	Bracted tick-trefoil
Desmodium nudiflorum	Bare-stemmed tick-trefoil
Desmodium paniculatum	Panicled tick-trefoil
Dicentra canadensis	Squirrel-corn
Dicentra cucullaria	Dutchman's-breeches
Diervilla lonicera	Bush honeysuckle
Dirca palustris	Leatherwood
Drosera intermedia	Spatulate-leaved sundew
Drosera rotundifolia	Round-leaved sundew
Dryopteris goldiana	Goldie's fern
Echinochloa walteri	Salt-marsh cockspur grass
Elodea nuttallii (= Anacharis n.)	Slender waterweed
Equisetum pratense	Meadow horsetail
Equisetum scirpoides	Dwarf scouring-rush
Equisetum sylvaticum	Wood horsetail
Erigeron pulchellus	Robin's plantain
Eriophorum gracile	Slender cotton-grass
Eriophorum spissum	Dense cotton-grass
Eriophorum viridi-carinatum	--
Eryngium yuccifolium	Rattlesnake-master
Floerkea proserpinacoides	False mermaid
Galium brevipes	--
Galium lanceolatum	Lance-leaved wild licorice
Gaultheria hispidula (= Chiogenes h.)	Creeping snowberry
Gaultheria procumbens	Wintergreen
Gaura biennis	Biennial gaura
Gentiana crinita	Fringed gentian
Gentiana puberula	Downy gentian
Gentianella quinquefolia	Stiff gentian
Geranium bicknellii	Northern cranesbill
Gerardia aspera	Rough false-foxglove
Gerardia flava (= Aureolaria f.)	Smooth false-foxglove
Gerardia pedicularia v. ambigens (= Aureolaria p. a.)	Clammy false-foxglove
Geum rivale	Purple avens
Gleditsia triacanthos	Honeylocust
Glyceria borealis	Northern manna grass
Glyceria canadensis	Rattlesnake grass
Goodyera pubescens	Rattlesnake-plantain
Habenaria viridis var. bracteata	Bracted orchid
Helianthemum bicknellii	Rockrose
Hemicarpha micrantha (= Scirpus m.)	--

Table 48 (continued)

Scientific Name	Common Name
Heuchera richardsonii	Alum-root
Hippuris vulgaris	Mare's-tail
Houstonia longifolia	Long-leaved bluets
Hydrophyllum appendiculatum	Maple-leaved waterleaf
Hypericum boreale	Northern St. John's-wort
Hypericum kalmianum	Kalm's St. John's-wort
Hypericum majus	--
Hypericum pyramidatum	Great St. John's-wort
Isanthus brachiatus	False pennyroyal
Juncus acuminatus	Sharp-fruited rush
Juncus alpinus	Richardson's rush
Juncus bufonius	Toad rush
Juncus effusus	Common rush
Juncus greenei	Greene's rush
Juniperus horizontalis	Trailing juniper
Kalmia polifolia	Bog laurel
Koeleria cristata	Junegrass
Lactuca floridana	Blue lettuce
Lactuca ludoviciana	Western wild lettuce
Lathyrus japonicus (= L. maritimus)	Beach pea
Lathyrus ochroleucus	Pale vetchling
Lechea intermedia	Pinweed
Lechea stricta	Bushy pinweed
Ledum groenlandicum	Labrador-tea
Liatris cylindracea	Cylindric blazing-star
Liatris ligulistylis	Showy blazing-star
Lilium philadelphicum	Wood lily
Linaria canadensis	Blue toadflax
Lindernia dubia	False pimpernel
Linnaea borealis	Twinflower
Liparis liliifolia	Purple twayblade
Liparis loeselii	Green twayblade
Lippia lanceolata (= Phyla l.)	Fog fruit
Listera cordata	Heartleaf twayblade
Lonicera canadensis	American fly honeysuckle
Lonicera oblongifolia	Swamp fly honeysuckle
Lonicera villosa	Mountain fly honeysuckle
Lupinus perennis	Wild lupine
Lycopodium clavatum	Running ground-pine
Lycopodium dendroideum	--
Lycopodium digitatum	--
Lycopus virginicus	Bugleweed
Lysimachia quadrifolia	Whorled loosestrife
Malaxis unifolia	Green adder's-mouth
Megalodonta beckii (= Bidens b.)	Water marigold
Melampyrum lineare	Cow-wheat
Menyanthes trifoliata	Buckbean
Milium effusum	Wood millet
Mimulus glabratus	Yellow monkey-flower
Mitchella repens	Partridgeberry
Mitella nuda	Small bishop's-cap
Moneses uniflora	One-flowered pyrola
Monotropa hypopithys	Pinesap
Monotropa uniflora	Indian pipe
Muhlenbergia cuspidata	Prairie satin grass
Muhlenbergia tenuiflora	Slender satin grass
Myriophyllum verticillatum	Whorled water-milfoil
Nelumbo lutea	Lotus
Nemopanthus mucronatus	Mountain holly
Nyssa sylvatica	Black gum
Opuntia compressa	Western prickly-pear
Orchis spectabilis	Showy orchis
Oryzopsis asperifolia	Rough-leaved rice grass
Oryzopsis racemosa	Black-seeded rice grass
Oxalis violacea	Violet wood sorrel
Panax trifolius	Dwarf ginseng
Panicum depauperatum	Starved panic grass

Scientific Name	Common Name
Panicum flexile	Wiry panic grass
Panicum lindheimeri	--
Panicum linearifolium	Slender-leaved panic grass
Panicum perlongum	Long-stalked panic grass
Panicum villosissimum (= P. praecocius)	White-haired panic grass
Paronychia canadensis	Tall forked chickweed
Pellaea glabella	Smooth cliff brake
Penstemon calycosus	Long-sepeled beardtongue
Penstemon digitalis	Foxglove
Petalostemum candidum	White prairie-clover
Picea mariana	Black spruce
Pilea fontana	Bog clearweed
Pinus strobus	White pine
Plantago purshii (= P. patagonica)	Woolly plantain
Platanthera clavellata	Small green wood-orchid
Platanthera hyperborea	Tall northern bog orchid
Platanthera lacera	Ragged-fringed orchid
Platenthera obtusata	Blunt-leaf orchid
Platanthera psycodes	Purple-fringed orchid
Poa languida	Weak blue grass
Pogonia ophioglossoides	Rose pogonia
Polemonium reptans	Jacob's-ladder
Polygala paucifolia	Gaywings
Polygonella articulata	Jointweed
Polymnia canadensis	Leafcup
Polypodium virginianum	Polypody
Pontederia cordata	Pickerel-weed
Populus balsamifera	Balsam poplar
Potamogeton epihydrus	Ribbon-leaved pondweed
Potamogeton gramineus	Grass-leaved pondweed
Potamogeton pusillus	Small pondweed
Potamogeton robbinsii	Fern pondweed
Potamogeton strictifolius	Stiff pondweed
Prenanthes racemosa	Rattlesnake-root
Pyrola asarifolia	Pink shinleaf
Pyrola elliptica	Large-leaved shinleaf
Pyrola rotundifolia	Round-leaved shinleaf
Pyrola secunda	One-sided shinleaf
Quercus muehlenbergii	Chinkapin oak
Ranunculus hispidus	Rough buttercup
Ranunculus rhomboideus	Prairie buttercup
Rhamnus alnifolia	Alder-leaved buckthorn
Rhynchospora alba	White beak-rush
Rhynchospora capillacea	Hair beak-rush
Rhynchospora capitelleta	Clustered beak-rush
Ribes hirtellum	Northern gooseberry
Ruppia maritima	Ditch-grass
Salix candida	Sage willow
Salix humilis	Prairie willow
Salix serissima	Autumn willow
Sambucus pubens	Red-berried elder
Samolus parviflorus	Water pimpernel
Satureja vulgaris (= Clinopodium v.)	Dogmint
Saxifraga pensylvanica	Swamp saxifrage
Scheuchzeria palustris (= S. americana)	Arrow-grass
Schizachne purpurascens	False melic
Scirpus clintonii	--
Scirpus heterochaetus	Slender bulrush
Scirpus rubrotinctus (= S. microcarpus)	--
Scirpus smithii	--
Scirpus subterminalis	--
Senecio plattensis	Prairie ragwort
Shepherdia canadensis	Buffaloberry
Sicyos angulatus	Bur cucumber

Table 48 (continued)

Scientific Name	Common Name
Silene stellata	Starry campion
Silphium laciniatum	Compass plant
Sisyrinchium albidum	Blue-eyed-grass
Sisyrinchium angustifolium	Short blue-eyed-grass
Sisyrinchium campestre	Prairie blue-eyed-grass
Smilacina trifolia	Three-leaved Solomon's plume
Solidago hispida	White goldenrod
Sorbus americana	American mountain-ash
Sorbus decora	Showy mountain-ash
Sparganium chlorocarpum	--
Spiraea tomentosa	Hardhack
Spiranthes lacera	Slender ladies'-tresses
Spiranthes lucida	Shining ladies'-tresses
Spiranthes magnicamporum	Prairie ladies'-tresses
Spiranthes romanzoffiana	Hooded ladies'-tresses
Staphylea trifolia	Bladdernut
Streptopus roseus	Twisted-stalk
Symphoricarpos albus	Snowberry
Taxus canadensis	Canada yew
Tephrosia virginiana	Goat's-rue
Trillium cernuum	Nodding trillium
Utricularia cornuta	Horned bladderwort
Utricularia gibba	Humped bladderwort
Utricularia minor	Small bladderwort
Vaccinium myrtilloides	Canada blueberry
Valeriana edulis	Common valerian
Verbena simplex	Narrow-leaved vervain
Viola nephrophylla	Northern bog violet
Vitis vulpina	Frost grape
Vulpia octoflora (= Festuca o.)	Slender fescue
Waldsteinia fragarioides	Barren strawberry
Wolffia punctata	Dotted water-meel
Zannichellia palustris	Horned pondweed
Zizania aquatica	Wild rice
Zygadenus elegans	White camas

[a]*Probably extirpated from Southeastern Wisconsin.*

Source: SEWRPC.

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Chapter VI

INVENTORY OF EXISTING NATURAL AREAS AND CRITICAL SPECIES HABITAT SITES IN SOUTHEASTERN WISCONSIN

INTRODUCTION

One of the most important steps in the preparation of a comprehensive natural areas and critical species habitat protection and management plan is the conduct of a detailed inventory that identifies, delineates, and evaluates the highest-quality remaining elements of the natural and archaeological sites of the planning area involved. The inventory process includes an analysis of basic data on a uniform, areawide basis. While much of the basic data involves a compilation of completed species lists for each site, the presence of these species can be related to the integrity of specific ecosystems. This chapter describes the methods used in the inventory of the natural, geological, and archaeological resource base of the seven-county Southeastern Wisconsin Region under this planning effort, including methods used to confirm existing information collated under the inventory as well as the methods used to collect new information. It also presents the inventory findings, that is, a list of areas of natural, geological, and archaeological importance and the locations of these areas in the Region, with an analysis and assessment of ecological values for each of the areas concerned.

EXISTING INFORMATION ON NATURAL AREAS AND SPECIES

The inventory process consisted of a series of steps. The first was a compilation of known potential natural and archaeological area sites and critical species habitats to be field-surveyed. The framework under this step consisted of the assembly of pertinent information previously collected, including all available published and unpublished reports and surveys; information provided by the Wisconsin Department of Natural Resources; and information provided by local naturalists familiar with the Region.

Potential Natural Area Sites

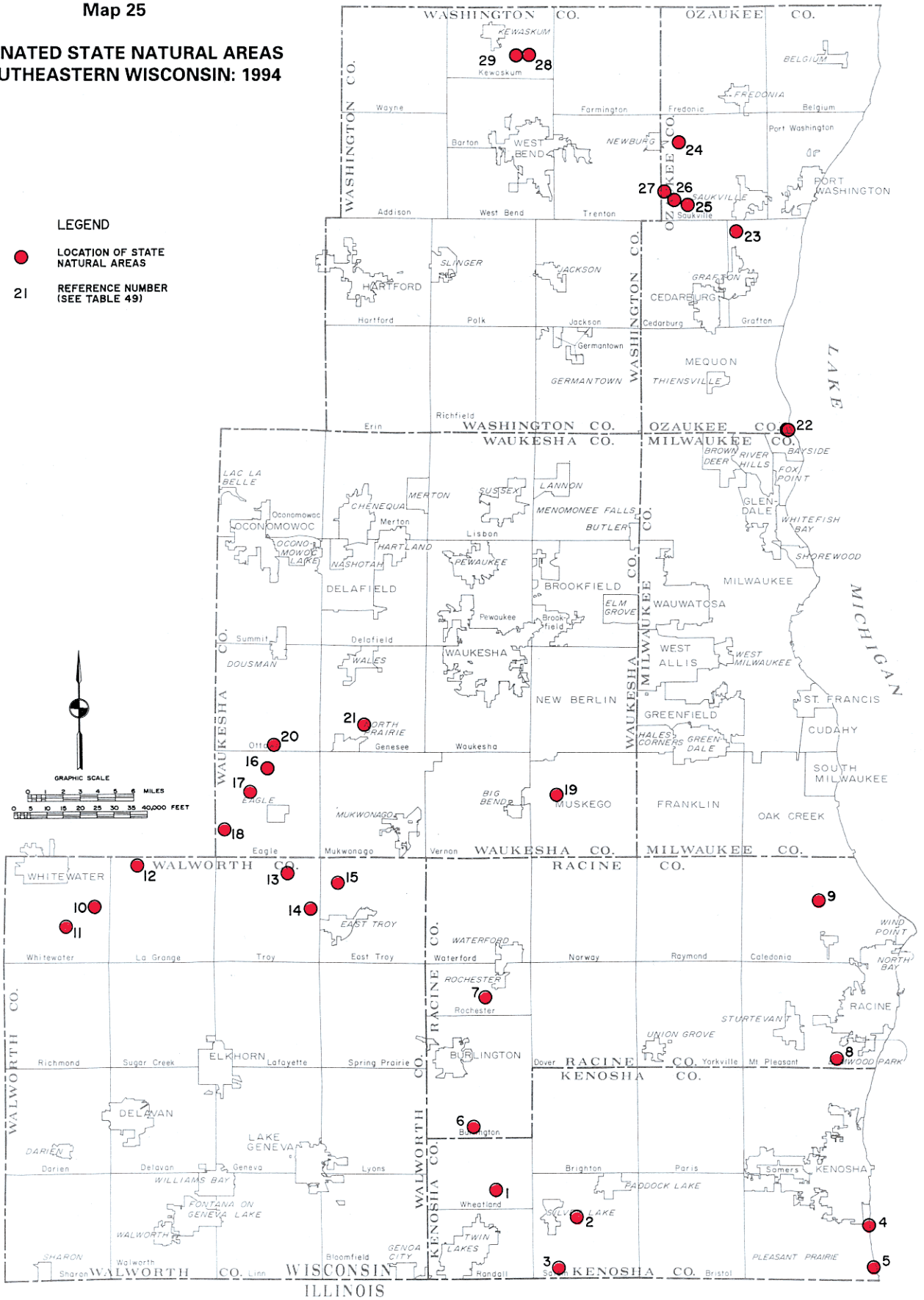
A wealth of information on potential natural areas in the Region was found in the Natural Heritage Program files of the Bureau of Endangered Resources of the Wisconsin Department of Natural Resources. This information included data on the 29 formally designated State Natural Areas in Southeastern Wisconsin (see Table 49 and Map 25) as well as on numerous other sites of lesser ecological significance.

In addition, previously published Commission reports provided inventories of known natural areas in certain subareas of the Region. These reports included:

- SEWRPC Planning Report No. 26, A Comprehensive Plan for the Menomonee River Watershed, October 1976
- SEWRPC Planning Report No. 35, A Comprehensive Plan for the Pike River Watershed, June 1983
- SEWRPC Planning Report No. 36, A Comprehensive Plan for the Oak Creek Watershed, August 1986
- SEWRPC Community Assistance Planning Report No. 27, A Park and Open Space Plan for the Town of Eagle, Waukesha County, Wisconsin, April 1979
- SEWRPC Community Assistance Planning Report No. 42, A Park and Open Space Plan for the Town and Village of Pewaukee, Waukesha County, Wisconsin, October 1980
- SEWRPC Community Assistance Planning Report No. 66, A Park and Open Space Plan for the City of New Berlin, Waukesha County, Wisconsin, October 1981
- SEWRPC Community Assistance Planning Report No. 88, A Land Use Management Plan for the Chiwaukee Prairie-Carol Beach Area of the Town of Pleasant Prairie, Kenosha County, Wisconsin, February 1985
- SEWRPC Community Assistance Planning Report No. 104, A Park and Open Space Plan for the City of West Bend, Washington County, Wisconsin, June 1985

Map 25

DESIGNATED STATE NATURAL AREAS IN SOUTHEASTERN WISCONSIN: 1994



This map identifies those State Natural Areas located within Southeastern Wisconsin. State Natural Areas have been dedicated for preservation, and are formally designated by the Natural Areas Preservation Council, which is advisory to the Wisconsin Department of Natural Resources. They are selected from the best remaining natural areas that contain nearly intact plant and animal communities, or unique and significant geological or archaeological features.

Source: Wisconsin Department of Natural Resources and SEWRPC.

Table 49

DESIGNATED STATE NATURAL AREAS IN SOUTHEASTERN WISCONSIN: 1994

Map 25 Reference Number	Area Name	County	Location	Ownership
1	New Munster Bog-Island	Kenosha	T1N, R19E Sections 2, 3, 10, 11	Department of Natural Resources
2	Silver Lake Bog	Kenosha	T1N, R20E Section 16	Silver Lake Sportsmen's Club and other private
3	Peat Lake	Kenosha	T1N, R20E Section 32	Department of Natural Resources
4	Carol Beach Low Prairie and Panné	Kenosha	T1N, R23E Sections 18, 19	Department of Natural Resources, Village of Pleasant Prairie, and private
5	Chiwaukee Prairie	Kenosha	T1N, R23E Sections 31, 32	Department of Natural Resources, University of Wisconsin-Parkside, The Nature Conservancy, and other private
6	Karcher Springs	Racine	T2N, R19E Sections 21, 22	Department of Natural Resources
7	Cherry Lake Sedge Meadow	Racine	T3N, R19E Sections 10, 15	Department of Natural Resources
8	Sanders Park Hardwoods	Racine	T3N, R22E Section 36	Racine County
9	Renak-Polak Maple-Beech Woods	Racine	T4N, R22E Section 14	University of Wisconsin-Parkside
10	Bluff Creek Springs, Fens, and Oak Woods	Walworth	T4N, R15E Sections 14, 24 T4N, R16E Section 19	Department of Natural Resources
11	Clover Valley Fen	Walworth	T4N, R15E Sections 22, 27	Department of Natural Resources
12	Young Prairie	Walworth	T4N, R16E Section 5	Department of Natural Resources
13	Lulu Lake	Walworth	T4N, R17E Sections 1-3, 10, 11	Department of Natural Resources, The Nature Conservancy, and other private
14	Pickerel Lake Fen	Walworth	T4N, R17E Sections 13, 24	The Nature Conservancy and other private
15	Beulah Bog	Walworth	T4N, R18E Sections 7, 8	Department of Natural Resources
16	Kettle Moraine Fen and Low Prairie	Waukesha	T5N, R17E Sections 3, 4	Department of Natural Resources
17	Scuppernong Prairie	Waukesha	T5N, R17E Sections 16, 17	Department of Natural Resources
18	Eagle Oak Opening	Waukesha	T5N, R17E Section 30	Department of Natural Resources
19	Muskego Park Hardwoods	Waukesha	T5N, R20E Section 17	Waukesha County
20	Ottawa Lake Fen	Waukesha	T6N, R17E Section 34	Department of Natural Resources
21	Genesee Oak Opening and Fen	Waukesha	T6N, R18E Section 28	Department of Natural Resources
22	Fairy Chasm	Ozaukee, Milwaukee	T9N, R22E Section 33 T8N, R22E Sections 4, 5	The Nature Conservancy

Table 49 (continued)

Map 25 Reference Number	Area Name	County	Location	Ownership
23	Kurtz Woods	Ozaukee	T10N, R21E Section 1	The Nature Conservancy
24	Riveredge Creek and Ephemeral Pond	Ozaukee	T11N, R21E Sections 7, 8	Riveredge Nature Center
25	Cedarburg Bog	Ozaukee	T11N, R21E Sections 18, 29-32	Department of Natural Resources and University of Wisconsin-Milwaukee
26	Cedarburg Beech Woods	Ozaukee	T11N, R21E Section 30	University of Wisconsin-Milwaukee
27	Sapa Spruce Bog	Ozaukee	T11N, R21E Section 30	The Nature Conservancy
28	Milwaukee River Floodplain Forest	Washington	T12N, R19E Section 14	Department of Natural Resources
29	Kewaskum Maple-Oak Woods	Washington	T12N, R19E Section 15	Department of Natural Resources

Source: Wisconsin Department of Natural Resources and SEWRPC.

- SEWRPC Community Assistance Planning Report No. 122, A Park and Open Space Plan for the Town of Vernon, Waukesha County, Wisconsin, March 1985
- SEWRPC Community Assistance Planning Report No. 131, A Park and Open Space Plan for Kenosha County, November 1987
- SEWRPC Community Assistance Planning Report No. 132, A Park and Open Space Plan for Milwaukee County, November 1991
- SEWRPC Community Assistance Planning Report No. 133, A Park and Open Space Plan for Ozaukee County, July 1987
- SEWRPC Community Assistance Planning Report No. 134, A Park and Open Space Plan for Racine County, September 1988
- SEWRPC Community Assistance Planning Report No. 135, A Park and Open Space Plan for Walworth County, February 1991
- SEWRPC Community Assistance Planning Report No. 136, A Park and Open Space Plan for Washington County, March 1989
- SEWRPC Community Assistance Planning Report No. 137, A Park and Open Space Plan for Waukesha County, December 1989
- SEWRPC Community Assistance Planning Report No. 163, A Lake Michigan Shoreline Erosion Management Plan for Milwaukee County, Wisconsin, October 1989
- SEWRPC Community Assistance Planning Report No. 179, A Park and Open Space Plan for the Town of Caledonia, Racine County, Wisconsin, November 1989
- Des Plaines River Watershed Planning Program Prospectus, September 1991

Relevant information on potential natural area sites in these reports usually included a reference map; descriptions of location, acreage, ecological ranking, and ownership; and, in the more detailed reports, a brief written description of the natural areas. The Wisconsin Department of Natural Resources has also published an inventory of known natural area sites along the Lake Michigan coastal zone, an area defined for the inventory purposes as extending about six miles inland from the shoreline.[1] Pre-

[1]*William Tans and Raphael Dawson, Natural Area Inventory: Wisconsin's Great Lakes Coast, Office of Coastal Management, Wisconsin Department of Administration; Scientific Areas Section, Wisconsin Department of Natural Resources, Madison, Wisconsin, 1980.*

liminary countywide natural area inventories of the Department of Natural Resources were also consulted.

In addition, a number of master's theses and doctoral dissertations completed at the University of Wisconsin-Milwaukee were found to contain valuable information concerning potential natural area sites in the Region. These included:

- Larry S. Brumm, "The Vegetation of Ozaukee County: Past and Present," M.S. thesis, 1977
- Linda Wilson Curtis, "A Vegetation Analysis of Benedict Prairie-Kenosha County, Wisconsin," M.S. thesis, 1974
- Christopher P. Dunn, "Descriptions and Dynamics of Lowland Hardwood Forests of Southeastern Wisconsin," Ph.D. dissertation, 1985
- James Dunnum, "The Phytosociology of a Beech-Maple Woods in Ozaukee County, Wisconsin," M.S. thesis, 1972
- Linda M. Hoehne, "Groundlayer Vegetation Analysis of Thirty-one Wooded Islands in an Urban-Suburban Matrix," M.S. thesis, 1977
- Michael A. Kunowski, "Plantago cordata Lam. in Wisconsin: Documentation of the Habitat," M.S. thesis, 1983
- Lawrence A. Leitner, "An Alien Shrub in a Changing Landscape: The European Buckthorn (Rhamnus cathartica L.) in Southeastern Wisconsin," Ph.D. dissertation, 1985
- James B. Levenson, "Forested Woodlots as Biogeographic Islands in an Urban-Agricultural Matrix," Ph.D. dissertation, 1976
- Neil Thomas Luebke, "The Effects of Past Disturbance on the Vegetation of the Menomonee Falls Tamarack Swamp," M.S. thesis, 1976
- Frank Edward Mudrak, "Equilibrium Dynamics of Oak Islands in Southeastern Wisconsin," M.S. thesis, 1978
- Donald Mason Reed, "Composition and Distribution of Calcareous Fens in Relation to Environmental Conditions in Southeastern Wisconsin," M.S. thesis, 1985
- Bonnie P. Swartz, "A Management Plan for a Swamp Forest Based on Vegetation Analysis," M.S. thesis, 1977

Finally, scientific and other journals and reports were found to contain papers concerning individual natural area sites within the Region, including the Kenosha sand dunes,[2] the Cedarburg Bog,[3] and Waukesha County prairie remnants.[4]

Sources of Information on Native Plant Species of Southeastern Wisconsin

An invaluable reference tool for researchers dealing with the plant species of a specific area is a "flora," that is, a list of those species that grow wild, or without cultivation, in that area. The more detailed floras provide identification keys to species, habitat information, and indications as to species ranges, frequently through use of dot maps or brief written descriptions. Floras are botanical records, indicating occurrence and distribution patterns of species, and, as such, are useful for determining which critical species may be present in a region.

Unfortunately, as of January 1, 1994, there was no published, comprehensive, up-to-date flora for the State of Wisconsin. In lieu of such a flora, other sources had to be consulted to identify which species and, particularly, which critical species occur in Southeastern Wisconsin. The following sources, each of which provides partial information, were consulted for the planning effort:

- Preliminary Reports on the Flora of Wisconsin Since 1929, the Wisconsin Academy of Sciences, Arts and Letters has periodically

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[2]*Phil Sander, "A Buried Forest in Kenosha County," Wisconsin Academy Review, Vol. 9(2), 1962, pp. 49-51, and "Kenosha Sand Dunes," Wisconsin Academy Review, Vol. 16(3), 1969.*

[3]*Thomas Foster Grittinger, "Vegetational Patterns and Ordination in Cedarburg Bog, Wisconsin," Transactions of the Wisconsin Academy of Sciences, Arts and Letters, Vol. 59, 1971, pp. 70-106.*

[4]*Trelen Wilson, "A Plant Species Inventory and Evaluation of Some Prairie Remnants in Waukesha County, Wisconsin," in D. C. Glenn-Lewin and R. O. Landers, Jr. (eds.), Fifth Midwest Prairie Conference Proceedings: Iowa State University, Ames, Iowa, August 22-24, 1976, Iowa State University, Ames, Iowa, 1978, pp. 39-45.*

published reports on individual plant families of Wisconsin, presented in its annual Transactions. Later reports are more detailed, providing identification keys, species descriptions, and range maps indicating stations for each species. However, this series is limited in that not all of Wisconsin's plant families have been covered, and those families included in earlier reports need updating and revising.

- Floyd Swink and Gerould Wilhelm, Plants of the Chicago Region (4th Edition), Indiana Academy of Science, Indianapolis, Indiana, 1994
  Centered on Chicago, this flora includes within its boundaries the southernmost portion of the Region—Kenosha, Racine, and Walworth Counties. It provides identification keys, descriptions, and county-of-occurrence dot maps for all vascular plant species in the area and identifies community types and plant associations for each species. More specific site information is given for a few selected species.

- Norman C. Fassett, Spring Flora of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1976
  This flora covers Wisconsin's flowering plant species that bloom prior to June 15. Species ranges are indicated by brief and generalized written descriptions.

Specific groups of plants are covered in the following publications:

- Norman C. Fassett, The Leguminous Plants of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1939

- Norman C. Fassett, Grasses of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1951

- James H. Peck and W. Carl Taylor, "Check List and Distributions of Wisconsin Ferns and Fern Allies," The Michigan Botanist, Vol. 19(4), 1980, pp. 251-268

Finally, the Wisconsin Department of Natural Resources provided the Commission with the element occurrence files of the Bureau of Endangered Resources that pertain to the Region. These files provided specific occurrence records of critical species reported from Southeastern Wisconsin.

NATURAL AREA AND CRITICAL SPECIES HABITAT INFORMATION COLLECTION METHODS

The existing natural area sites and critical species habitat inventories and reports, while providing an important source of data for a comprehensive regional inventory, were incomplete and largely outdated. To complete the list of potential natural area sites and critical species habitats to be field-surveyed required reference to other sources. An important source of information was the Commission's ratioed and rectified, one-inch-equals-400-feet-scale black-and-white aerial photography of the Region, which, by the time of the performance of this data-collection step, was last taken in the spring of 1990. Frequently, specific community types, such as woodlands, oak openings, conifer swamps, bogs, and grasslands, may be discerned from their distinctive signatures on such photography. For example, potential locations of calcareous fens were detected using the aerial photography in conjunction with soil survey maps prepared for the Commission by the U. S. Department of Agriculture, Soil Conservation Service.

Using the various existing inventories and reports and an examination of all of the regional aerial photography, an initial list of 1,241 potential natural area sites and critical species habitats was compiled. Further inspection of these sites, as shown on the large-scale aerial photography, revealed that a number of the sites had been seriously degraded, and thus probably were not of natural area quality. For example, woodlands with an irregular tree pattern indicated a broken canopy, probably from past logging. Disturbance to wetlands was often apparent from ditches or invasion by areas of reed canary grass. A number of woodlands previously listed in natural area inventories were found to have been substantially reduced in size or to have been converted to residential subdivisions. Furthermore, during the winter season of 1991-1992, the Commission staff conducted a highway reconnaissance of the Region for the purpose of adding to the list of potential natural area sites areas that were not discernible on the aerial photography; to determine probable access routes into natural area sites; and to eliminate from consideration those potential natural area sites that were of less-than-natural-area quality because of disturbance. As a result, 353 sites, or 28 percent of the original total, were eliminated from further consideration as potential natural areas, leaving 888 areas to be further evaluated.

Field Inventory Procedure

The purpose of the field surveys conducted to collect information about potential natural area sites and critical species habitats within the Region was to provide factual information about historical and present conditions within such sites and habitats. Field investigations were conducted during that portion of the growing season that would yield optimal results; that is, that period during which the maximum number of plant species was identifiable for a given plant community type, or during which the presence of critical species would be most evident. Some sites were reinvestigated during another part of the season or during another season if the initial survey yielded information inadequate for an accurate evaluation of a given site. Breeding-bird censuses, which provided invaluable information regarding certain sites, particularly woodlands, were conducted by Wisconsin Department of Natural Resources personnel during May and June of field seasons.

In general, plant communities were surveyed during field seasons according to the following classification and chronology: 1) upland hardwood forests, late April through early June; 2) prairies, May and June, then again in July and August; 3) bogs and conifer swamps, June and July; 4) oak openings, July and August; 5) sedge meadows, July and August; 6) fens, September and October; and 7) lowland hardwood swamps, September and October.

Data obtained from the field investigations included: 1) a complete list of all vascular plant species observed; 2) a determination of dominant plant communities; 3) evidence of animal species present, including rare, threatened, and endangered species; 4) the presence and population sizes of critical species as observed; 5) the extent of invasion by weedy native or exotic species; 6) comments on the surface geology and physiography of each area; 7) evidence of natural or artificial disturbance, and degree of recovery from past disturbance; 8) potential threats to an area if apparent; and 9) a general impression of the quality of each area.

Voucher specimens of those plant species whose identity could not be determined in the field were collected for later identification, using the herbaria of the University of Wisconsin-Milwaukee and the Milwaukee Public Museum for such identification. In addition, specimens were collected of those species whose identity and location would add to the body of knowledge of the regional flora, which specimens were to be deposited in the regional herbarium maintained by the Milwaukee Public Museum.

The information recorded in field notes was transferred to individual site survey summary and community survey forms. The boundaries of each potential natural area site were delineated on 1990 Commission ratioed and rectified, one-inch-equals-400-feet-scale aerial photographs. The inventory records are maintained in the Commission offices, with copies provided to the offices of the Bureau of Endangered Resources of the Wisconsin Department of Natural Resources.

At the completion of four field seasons—1991, 1992, 1993, and 1994—it was concluded that the Region had been surveyed, and that a comprehensive inventory of known natural area sites and critical species habitats to date had been completed. Each community site was evaluated according to the SEWRPC natural area assessment scheme, described in Chapter II. These sites are listed numerically, by community type, in Tables 50, 51, 52, 53, 54, 55, 56, and 57, for, respectively, prairies, oak openings and lake dunes, upland woods, lowland hardwoods, tamarack relicts, bogs, fens, and miscellaneous wetlands, such as shrub-carrs, sedge meadows, and deep and shallow marshes. These data are summarized in Table 58.

Analysis of the data in Table 58 reveals that certain community types consistently achieved higher scores while other types consistently achieved lower scores. For example, fens and bogs, with average scores of 70 and 68, respectively, ranked substantially higher than the overall mean of 48. Conversely, upland woods and lowland hardwoods each averaged about 42, substantially less than the overall mean and the means for bogs and fens. A listing of all communities in descending numerical order by evaluation score shows that only six, or 8 percent, of the 77 sites scoring 70 or more could be classified as woodlands, and that only 30, or 17 percent, of the 175 sites scoring 60 or more could be so classified. Fens and bogs, on the other hand, totaled 54, or 70 percent, of the 77 sites scoring 70 or more, and 77, or 44 percent, of the 175 sites scoring 60 or more. These differing results become important if the numerical scores alone are relied upon as indicators of community value and, consequently, as guides to where to concentrate the application of protective measures. Fens and bogs would be disproportionately favored at the expense

Table 50

PRAIRIES SURVEYED IN SOUTHEASTERN WISCONSIN

Community Site	County	SEWRPC Evaluation Score
Chiwaukee Prairie State Natural Area	Kenosha	100
Young Prairie State Natural Area	Walworth	93
Carol Beach Low Prairie and Panné State Natural Area	Kenosha	90
Scuppernong Prairie State Natural Area	Waukesha	87
Kettle Moraine Low Prairie State Natural Area	Waukesha	84
Kenosha Dunes Low Prairie	Kenosha	83
Franksville Railroad Prairie—South	Racine	76
Kansasville Railroad Prairie No. 1	Racine	70
Carol Beach Prairie	Kenosha	70
Tobin Road Mesic Prairie	Kenosha	70
Eagle Railroad Prairie	Waukesha	68
Eagle Dry Prairie	Waukesha	67
Genesee Mesic Prairie	Waukesha	67
Kestol Dry Prairie	Walworth	67
Nature Road Dry Prairie	Walworth	67
104th Street Mesic Prairie	Kenosha	65
Barnes Creek Dunes and Panné	Kenosha	65
Tobin Road Dry Prairie	Kenosha	65
Tichigan Wet Prairie	Racine	65
Bloomfield Prairie	Walworth	65
Scuppernong Hill Prairie	Waukesha	65
Sylvania Railroad Prairie	Racine	64
59th Drive Railroad Prairie—East	Racine	64
59th Drive Railroad Prairie—West	Racine	64
Benedict Prairie	Kenosha	62
Pell Lake Railroad Prairie	Walworth	60
LaGrange Dry Prairie	Walworth	60
Birdsfoot Violet Dry Hill Prairie	Walworth	60
Carol Beach Estates Prairie	Kenosha	60
Eric's Prairie	Waukesha	60
Ottawa Dry Prairies	Waukesha	60
Trecker Dry Prairies	Waukesha	60
Kettle Moraine Sand Barrens	Waukesha	59
Scuppernong Springs Dry Prairie	Waukesha	57
Salt Box Road Railroad Prairie	Walworth	57
Marsh Road Railroad Prairie	Walworth	57
Duffin Road Prairie	Walworth	57
Kansasville Railroad Prairie No. 4	Racine	57
Rice Lake Dry Prairie	Walworth	55
North Nordic Trail Prairie	Walworth	55
South Nordic Trail Prairie	Walworth	55
Overlook Prairie	Walworth	55
Wind Lake Low Prairie	Racine	55
Kettle Moraine Mesic Prairie	Waukesha	55
STH 67 Dry Prairie	Waukesha	55
Pebble Creek Mesic Railroad Prairie	Waukesha	54
Root River Parkway Prairie	Milwaukee	54
Big Spring Road Prairie	Walworth	54
Mailman Road Railroad Prairie	Waukesha	53
North Prairie Railroad Prairie	Waukesha	53
Sugar Creek Wet-Mesic Prairie	Walworth	52
Whitewater Hill Prairie	Walworth	52
Kestol Prairie—Southwest	Walworth	52
Bain Station Road Prairie	Kenosha	52
Union Grove Railroad Prairie—West	Racine	50
Kansasville Railroad Prairie No. 3	Racine	50
Des Plaines River Prairie—East	Kenosha	50
Pleasant Railroad Prairie	Kenosha	50
Vernon Mesic Prairie	Waukesha	49
Glacial Hills Dry Prairie	Washington	49
Wilton Road Prairie	Waukesha	49
Lake Russo Prairie—Northeast	Kenosha	48
Union Grove Railroad Prairie—East	Racine	48
Doyles Lake Prairies	Walworth	48
STH 59 Dry Prairie	Waukesha	48
Bong Low Prairie Remnant	Kenosha	48
Paris Prairie Remnant	Kenosha	48
Cull Prairie	Waukesha	44
Ulrickson Road Cedar Glade	Waukesha	43
Road X Railroad Prairie	Waukesha	42
DOT Mesic Railroad Prairie	Waukesha	42
McMiller Dry Prairie	Waukesha	42
Luther Parker Cemetery Prairie	Waukesha	42
Hartland Railroad Prairie	Waukesha	42
Abrahamson Prairie	Waukesha	42
Kansasville Railroad Prairie No. 2	Racine	40
Pike River Prairie Remnant—East	Kenosha	39
Fox River Railroad Prairie	Racine	39
Franklin Prairie Remnant	Milwaukee	37
Cobblestone Road Prairie	Walworth	37
White River Railroad Prairie	Walworth	37
CTH D Railroad Prairie	Waukesha	37
Silver Lake Dry Prairie	Walworth	37
Wilmot Ski Hill Prairie	Kenosha	37
Dyer Lake Goat Prairie	Kenosha	37
DOT Quarry Prairie	Waukesha	37
CTH S Railroad Prairie	Waukesha	37
Burlington Railroad Prairie	Racine	36
Lyons Prairie	Walworth	34
English Settlement Prairie	Racine	34
Des Plaines River Prairie—West	Kenosha	34
Thumpers Prairie	Waukesha	34
Franksville Railroad Prairie—North	Racine	30
Windworks Prairie	Waukesha	30
CNW Railroad Prairie	Waukesha	30
LaGrange Hill Prairie	Walworth	29
Kansasville Railroad Prairie No. 5	Racine	27
Pike River Prairie Remnant—West	Kenosha	27
STH 67 Dry Prairie	Waukesha	27
Nagawaukee Cedar Glade	Waukesha	27
Pebble Creek Dry Railroad Prairie	Waukesha	25
Delavan Railroad Prairie	Walworth	25
Whitewater Railroad "Prairie"—East	Walworth	25
CNW Railroad Prairie No. 1	Waukesha	25
Stonegate Dry Prairie	Waukesha	23
Cobb Road Prairie	Walworth	22
STH 36 Dry Hill Prairie	Racine	22
CTH K Railroad Prairie	Walworth	20
Elkhorn Railroad Prairie	Walworth	20
STH 99 Dry Prairie	Waukesha	20
CTH DT Railroad Prairie	Waukesha	20

Source: SEWRPC.

of woodlands, few of which would score high enough to be given a high priority for protection. Protection of selected types of communities, while essentially disregarding other types because of apparently lower ecological value, would not serve to maintain regional biodiversity. This is not to say that fens and bogs do not deserve high scores. On the contrary, these are unique natural communities, usually of low acreage, with assemblages of rare and specialized species. The better examples should

Table 51

OAK OPENINGS AND LAKE DUNES SURVEYED IN SOUTHEASTERN WISCONSIN

OAK OPENINGS

Community Site	County	SEWRPC Evaluation Score
Genesee Oak Opening State Natural Area	Waukesha	85
Eagle Centre (Haffner) Oak Opening	Waukesha	64
Trecker Oak Opening	Waukesha	53
Holtz Oak Opening	Waukesha	37
Franklin Oak Opening	Milwaukee	35
Mukwonago Park Oak Opening	Waukesha	34
Eagle Dump Oak Opening	Waukesha	31

LAKE DUNES

Community Site	County	SEWRPC Evaluation Score
Kenosha Sand Dunes	Kenosha	69

Source: SEWRPC.

be protected. But it is difficult to compare different community types. It is more logical to make comparisons within community types rather than between types.

On average, upland woods achieved lower evaluation scores because few of the remaining woodlands in the Region are large enough to offer substantial amounts of forest interior habitat. Most of the xeric woods are fragmented and contain many exotic species. Therefore, they rank relatively low in native plant species diversity. Also, endangered or threatened plant species were found less frequently in these woods than in such restricted sites as prairies and fens. The woodlands within the rapidly urbanizing Region, in general, have suffered from fragmentation, past grazing, and selective cutting. Further, because the SEWRPC evaluation scheme relies primarily on analysis of vegetation, the animal species inhabiting woodlands play only a secondary role in the evaluation procedure, but these species also contribute significantly to biodiversity. A comprehensive, site-specific, regional inventory of endangered, threatened, rare, and uncommon animal species, as listed in Tables 42 through 46 in Chapter V of this report (see pages 156 through 159), is not presently available, nor is such a list necessary. In rapidly urbanizing regions, such as the Southeastern Wisconsin Region, as habitat is lost, so are the associated animal species. Therefore, the identification of plant community areas and specific wildlife habitat areas based upon plant community structure may be used to identify suitable habitat for the Region's wildlife, including rare, threatened, and endangered animal species. Data on invertebrates are particularly wanting.

Initially, emphasis in the inventory process and in the delineation of the natural area sites was on the evaluation of individual communities. Several factors favor considering broadening the site delineations so that more than single community types are considered as natural areas. These factors, some of which have been discussed in Chapter II, include: 1) maximization of the acreage of a given community; 2) inclusion of buffer zones; and 3) increased community diversity within natural areas.

The value of maximizing the acreage of distinct communities is particularly important for woodland areas, where greater area results in increased forest environment, critical for a large number of native breeding bird species. Larger areas have smaller edge-to-interior ratios. In general, large preserves can be protected and kept in a high-quality condition more easily than can small preserves. Large preserves tend to be less vulnerable to destruction by single disturbances than smaller areas. Further, it is usually easier to administer one large area than several small ones. Finally, management units may have an optimal size for reestablishing natural disturbances, such as fire or hydrologic changes.

Buffer zones, in themselves, are often not of natural area quality, but instead contribute to the quality, maintenance, and preservation of the natural area core. Buffers provide for stand integrity, potential for dynamic change, and greater species diversity. Protecting large areas may require that some parts of a preserve, although initially in less-than-natural-area condition, be restored. Buffers also may afford small areas some protection from disturbance. Thus, degraded habitat close to the preserve core should not be overlooked as buffers that could protect the core preserve from the negative effects of environmental disturbance or encroaching human development.

Perhaps most importantly, the stated goal of the natural areas and critical species habitat protection and management planning program is not so much to preserve separate, individual natural communities, but to protect natural areas, which include not only the component species and communities, but also the natural ecological processes and dynamics

Table 52

UPLAND WOODS SURVEYED IN SOUTHEASTERN WISCONSIN

Community Site	County	SEWRPC Evaluation Score
Renak-Polak Woods State Natural Area	Racine	87
Petrifying Springs Woods	Kenosha	71
Bluff Creek Woods	Walworth	69
Cedarburg Beech Woods State Natural Area	Ozaukee	69
Kewaskum Woods State Natural Area	Washington	68
Muskego Park Hardwoods State Natural Area	Waukesha	68
Ottawa Limestone Outcrop	Waukesha	65
Sanders Park Woods State Natural Area	Racine	64
Hookers Woods	Racine	64
Kurtz Woods State Natural Area	Ozaukee	64
Fredonia Woods	Ozaukee	64
North Branch Woods	Ozaukee	64
Muir Oak Woods	Walworth	63
Silverbrook Lake Woods	Washington	62
Huiras Lake Upland Woods	Ozaukee	62
Cudahy Woods	Milwaukee	61
Falk Park Woods	Milwaukee	61
Riveredge Upland Woods	Ozaukee	61
Pallottine Maple Woods	Walworth	61
Monches Woods	Waukesha	61
Glacial Trail Forest	Washington	60
Hunts Woods	Racine	58
Bristol Woods	Kenosha	58
Fairy Chasm State Natural Area	Ozaukee	58
Hoffman-Wolter Woods	Washington	58
St. Anthony Beech Woods	Washington	58
Cliffside Park Woods	Racine	57
Root River Canal Woods	Milwaukee	57
Lapham Peak Woods	Waukesha	57
Rawson Park Woods	Milwaukee	56
Mud Lake Woods—South	Washington	56
Power Plant Ravine Woods	Racine	55
Blue Hills Woods	Washington	55
Eagle Oak Opening State Natural Area	Waukesha	55
CTH Z Upland Woods	Washington	54
Ottawa Oak Woods	Waukesha	54
Grant Park—Old Growth	Milwaukee	53
St. Francis Seminary Woods	Milwaukee	53
Granzeau Woods	Walworth	53
Lange Hardwoods	Washington	53
Sugar Creek Woods—South	Walworth	52
Cedar Gorge—South	Ozaukee	52
Janik's Upland Woods	Ozaukee	52
Wychwood	Walworth	52
Kettle Moraine Drive Woods	Washington	52
Kettle Moraine Limestone Outcrop	Waukesha	52
Lauderdale Lake Woods	Walworth	51
Kimmel Woods	Racine	51
Fosters Woods	Waukesha	51
Zion Woods	Waukesha	51
Muth Woods	Washington	51
STH 28 Woods	Washington	51
Kurtz Woods—South	Ozaukee	50
Holy Hill Woods	Washington	50
Schoessow Woods	Washington	50
Riesch Woods	Washington	50
Zuba Woods	Waukesha	50
Island Woods	Walworth	50
LaGrange Oak Woods	Walworth	50
Root River Wet-Mesic Woods—West	Milwaukee	49
Donges Bay Gorge	Ozaukee	49
New Munster Upland Woods	Kenosha	48
Root River Woods—East	Milwaukee	48
Greenfield Park Woods	Milwaukee	48
Hales Corners Creek Woods	Milwaukee	48
Bradley Woods	Milwaukee	48
Blueberry Road Upland Woods	Ozaukee	48
Peters Woods	Waukesha	48
Ives Grove Woods	Racine	47
Seven Mile Road Woods	Racine	47
Franklin (Puetz Road) Woods	Milwaukee	47
Fitzsimmons Road Woods	Milwaukee	47
Rookery Woods	Milwaukee	47
Lulu Lake Oak Woods	Walworth	47
Wadewitz Woods	Racine	46
Darien Oak Woods	Walworth	46
Whitewater Springs Woods	Walworth	46
Lake Loraine Woods—East	Walworth	46
Tabor Woods	Racine	46
Ryan Creek Woods	Milwaukee	46
Bishops Woods	Waukesha	46
Held Maple Woods	Waukesha	46
St. Michael's Woods	Washington	46
Pike Lake Upland Woods	Washington	46
Schoenbeck Mesic Woods	Washington	45
St. Anthony Maple Woods	Washington	45
Rowntree Road Woods	Racine	44
Sugar Creek Woods—North	Walworth	44
Campbell Woods	Racine	44
Waubeesee Oak Woods	Racine	44
Foley Road Woods—West	Racine	44
Foley Road Woods—East	Racine	44
Merkt Woods	Kenosha	44
Parkside Woods	Kenosha	44
Elm Road Woods	Milwaukee	44
Root River Woods—Center	Milwaukee	44
Warnimont Park Woods	Milwaukee	44
Cambridge Avenue Woods	Milwaukee	44
Kletzsch Park Woods	Milwaukee	44
Pigeon Creek Maple Woods	Ozaukee	44
Cedar Grove—North	Ozaukee	44
Mueller Woods	Washington	44
Jackson Woods	Washington	44
Lizard Mound Woods	Washington	44
Section 11 Upland Woods	Kenosha	43
Root River Parkway Woods	Milwaukee	43
Jacobus Park Woods	Milwaukee	43
Highland Road Woods	Ozaukee	43
Pleasant Hill Woods	Washington	43
Ziegler Woods	Washington	43
Fox River Woods	Kenosha	43
Lone Tree Trail Oak Woods	Walworth	43
Burlington Hills Woods	Racine	42
Washington Park Woods	Racine	42
Spring Prairie Woods	Walworth	42
Zirbes Woods	Racine	41
Esch-Honadel Woods	Milwaukee	41
Root River Woods—West	Milwaukee	41
Harley-Davidson Woods	Milwaukee	41
Harbinger Woods	Milwaukee	41
Mee-Kwon Park Woods	Ozaukee	41
Hawthorn Hills Woods	Ozaukee	41
Paradise Springs Woods	Waukesha	41
Nelson Oak Woods	Waukesha	41
Lake Five Woods	Washington	41
Donegal Road Woods—East	Washington	41
River Bend Upland Woods	Racine	40
Thompson Woods	Kenosha	40
Golf Course Woods	Milwaukee	40
Oakwood Oak Woods	Milwaukee	40
Potter Forest	Milwaukee	40
Triple Woods	Ozaukee	40
Wood Creek Woods	Milwaukee	39
Nagawicka Woods	Waukesha	39
Donegal Road Woods—West	Washington	39
Heritage Trails Woods	Washington	39
Hamilton Woods	Kenosha	38
Blue Mound Country Club Woods	Milwaukee	38

Table 52 (continued)

Community Site	County	SEWRPC Evaluation Score
Blue Mound Country Club Woods	Milwaukee	38
STH 59 Oak Woods	Waukesha	38
Peninsula Woods	Walworth	38
Clarks Woods	Waukesha	38
Brighton-Dale Woods—West	Kenosha	37
Busse Woods	Waukesha	37
Maple Dale Woods	Washington	37
Cedar Lake Home Woods	Washington	37
Camp Pottawotamie Woods	Walworth	37
Alice Chester Oak Woods	Walworth	36
Oak Knoll Woods	Racine	36
Eagle Creek Woods	Racine	36
College Avenue Woods—South	Milwaukee	36
Franklin Oak Woods	Milwaukee	36
Elm Road Woods—North	Milwaukee	36
Pit Lake Woods	Ozaukee	36
Grafton Woods	Ozaukee	36
Cedar Creek Forest	Ozaukee	36
Lac Lawrann Upland Woods	Washington	36
Norris Oak Woods	Waukesha	36
Fox River Park Woods	Kenosha	35
Wil-O-Way Woods	Milwaukee	35
Martins Upland Woods	Waukesha	35
Faber-Pribyl Woods	Washington	35
Lake Loraine Woods—West	Walworth	34
Black Locust Woods	Walworth	34
Van Valin Woods	Racine	34
WEPCO Woods	Racine	34
Poerio Park Woods	Kenosha	34
Grant Park Woods—North	Milwaukee	34
Grant Park Woods—South	Milwaukee	34
Bender Park Woods	Milwaukee	34
Pigeon Creek Mesic Woods	Ozaukee	34
Kirchhayn Woods	Washington	34
High School Woods	Washington	34
STH 83 Woods	Walworth	34
River Oaks Woods	Waukesha	34
New Berlin Woods	Waukesha	34
Caddy Vista Woods	Racine	33
Four Mile Road Woods	Racine	33
Zinn Upland Woods	Washington	33
Sherman Road Woods	Ozaukee	33
Slinger Upland Woods	Washington	33
Brighton-Dale Woods—East	Kenosha	32
Wedge Woods—East	Milwaukee	32
College Avenue Woods—North	Milwaukee	32
Convent Woods	Milwaukee	32
Schlitz Audubon Center Woods	Milwaukee	32
Mud Lake Woods—North	Washington	32
Little Oconomowoc River Woods	Washington	32
Happy Hollow Woods	Walworth	31
Oster Woods	Walworth	31
Harris Oak Woods	Kenosha	31
Poisl Woods	Kenosha	31
Kaehlers Mill Woods	Ozaukee	31
Radio Tower Woods	Washington	31
Spring Lake Beech Woods	Ozaukee	31
Lake No. 10 Open Woods	Walworth	30
Crestview Woods	Racine	30
Ruhle Woods	Kenosha	30
Jaegers Woods	Milwaukee	30
Underwood Parkway Woods	Milwaukee	30
Brown Deer Park Woods	Milwaukee	30
Cedarburg Woods—East	Ozaukee	30
Marsh Road Woods	Racine	29
Lake Loraine Woods—Southeast	Walworth	29
Grobschmidt Park Woods	Milwaukee	29
Nabob Upland Woods	Washington	29
Pheasant Hill Woods	Waukesha	29
University Lake School Woods	Waukesha	29
CTH P Woods	Walworth	28
Cherry Lake Xeric Woods	Racine	28
Haskell Noyes Park Woods	Milwaukee	28
Golf Course Woods (Waukesha)	Waukesha	28
Turtle Creek Woods—East	Walworth	27
Flower Hill Oak Opening	Waukesha	27
Minooka Park Woods	Waukesha	27
Falk Woods	Waukesha	27
Nashotah Park Woods	Waukesha	27
STH 120 Woods	Walworth	26
Carver Road Woods	Walworth	26
Rochester Woods	Racine	25
Browns Lake Woods	Racine	25
Pritchard Park Woods	Racine	25
Zirbes Woods—North	Racine	25
Nashotah House Woods	Waukesha	25
Heritage Woods	Waukesha	25
Kettleview Drive Woods	Washington	25
Ela Woods	Racine	24
Monastery Woods	Milwaukee	24
Milky Way Road Woods	Waukesha	24
PPG Woods	Milwaukee	24
Smith Woods	Waukesha	24
Burlington Industrial Park Woods	Racine	22
Downer Woods	Milwaukee	21
Komm Woods	Waukesha	21
Bushnell Park Woods	Racine	20
Wehr Woods	Milwaukee	20
Masonic Oak Woods	Waukesha	20
Fussville Woods	Waukesha	20

Source: SEWRPC.

that cross community boundaries. Communities are but one element of natural diversity. Protection of a continuum of biotic community types within a natural area is desirable since such protection then encompasses different soil, topographic, bedrock, slope, and water regimes, resulting in a gradation of environmental conditions.[5] Certain species are not confined to a single community type. For example, many animal species require a combination of contiguous habitat types to meet life history needs, relying on distinctly different habitats for different activities or separate stages of their life cycles. Other organisms specialize in ecotones, or transition areas.

[5]*William Tans, "Priority Ranking of Biotic Natural Areas," Michigan Botanist, Vol. 13, 1974, pp. 31-39.*

Table 53

LOWLAND HARDWOODS SURVEYED IN SOUTHEASTERN WISCONSIN

Community Site	County	SEWRPC Evaluation Score
Riveredge Swamp and Creek State Natural Area	Ozaukee	76
Germantown Swamp	Washington	75
Kinnamon Swamp	Ozaukee	74
Reinartz Cedar Swamp	Washington	70
Thompson Swamp	Washington	66
Huiras Lake Low Woods	Ozaukee	62
Jackson Swamp	Washington	61
Milwaukee River Floodplain Forest State Natural Area	Washington	61
Martins Low Woods	Waukesha	61
Kowalske Swamp	Washington	59
County Line Riverine Woods	Racine	56
Big Bend Low Woods	Waukesha	56
Perkins Property	Waukesha	56
Wayne Swamp	Washington	56
Sandy Knoll Park Swamp	Washington	54
Schoenbeck Swamp	Washington	54
Harrington Beach Lacustrine Forest	Ozaukee	54
Caledonia Low Woods	Racine	51
Milwaukee River Swamp	Ozaukee	50
Pigeon Creek Low Woods	Ozaukee	48
Oconomowoc Swamp	Waukesha	46
Theater Swamp	Waukesha	46
Stockcar Swamp	Washington	45
Toland Swamp	Washington	44
Pike River Low Woods	Kenosha	44
Cedar Lane Low Woods	Washington	44
Pioneer Road Lowlands	Ozaukee	44
CTH Y Swamp	Ozaukee	44
Solar Heights Low Woods	Ozaukee	43
Six Mile Road Swamp	Racine	43
Stone Woods	Racine	43
Lisbon Low Woods	Waukesha	43
Sherman Road Swamp	Washington	43
Wayne Creek Swamp	Washington	43
43rd Street Floodplain Woods	Milwaukee	41
Fox River Lowlands	Kenosha	41
Mole Creek Swamp	Ozaukee	41
Menomonee Falls Hardwood Swamp	Waukesha	41
Aurora Road Swamp	Washington	41
STH 60 Swamp	Washington	41
Porter Low Woods	Waukesha	40
County Line Low Woods	Ozaukee	40
DNR Lowlands	Ozaukee	40
USH 41 Swamp	Washington	40
Allenton Swamp	Washington	40
Currie Park Low Woods	Milwaukee	39
Big Bend Swamp	Waukesha	38
Fellenz Hardwood Swamp	Washington	38
Sussex Swamp	Waukesha	37
Oak Creek Low Woods	Milwaukee	37
Root River Riverine Forest	Milwaukee	36
Five Corners Swamp	Ozaukee	36
Cedar-Sauk Low Woods	Ozaukee	36
Belgium Swamp—North	Ozaukee	36
Belgium Swamp—South	Ozaukee	36
Lac La Belle Lowlands	Waukesha	36
Brookfield Swamp	Waukesha	36
CTH J Swamp	Washington	36
Hawthorne Drive Forest	Ozaukee	36
Kohler Road Woods	Ozaukee	36
Cedar Valley Swamp	Ozaukee	35
Cedar Grove Swamp	Ozaukee	35
Menomonee River Swamp No. 6	Milwaukee	34
Ulao Lowland Forest	Ozaukee	34
Poplar Road Lacustrine Forest	Washington	33
Tichigan Low Woods	Racine	32
Ville du Parc Riverine Forest	Ozaukee	32
Wirth Swamp	Waukesha	32
Hoelz Swamp	Washington	32
Theresa Swamp	Washington	31
Lake Park Swamp	Washington	31
Wedge Woods—West	Milwaukee	29
Fox River Riverine Forest	Racine	27
Kleinman Swamp	Washington	27
Menomonee River Swamp No. 4	Milwaukee	25
Menomonee River Swamp No. 1	Milwaukee	25
Morgan Road Low Woods	Milwaukee	24
Menomonee River Swamp No. 3	Milwaukee	24
Menomonee River Swamp No. 2	Milwaukee	20
Menomonee River Swamp No. 5	Waukesha	20

Source: SEWRPC.

The best way to maintain ecological processes is by preserving habitat mosaics, within which hydrologic regimes, nutrient and energy transfer, and natural disturbances are allowed to function among communities. Organism, material, and energy transfer between communities occurs with least interference in large, intact sites. Ecological complexity is related to interactions within and among many different levels of organization. The patterns and processes that occur above the community level need to be addressed in a natural areas protection program. Focusing preservation efforts strictly at the community level of organization may mean that interactions among communities are excluded.

The natural functions noted above are all attributes of heterogeneous landscapes, and are important in assessing the ecological value of larger, multi-community natural areas. The identification and evaluation of individual communities is a necessary preliminary step toward evaluating natural areas, but an inventory system that concentrates solely on the community level may fail to adequately protect important ecological phenomena. The juxta-

Table 54

TAMARACK RELICTS SURVEYED IN SOUTHEASTERN WISCONSIN

Community Site	County	SEWRPC Evaluation Score
Alice Chester Tamarack Swamp	Walworth	84
Lakewood Tamarack-Fen	Waukesha	77
Thiede Road Tamarack Swamp	Walworth	71
South Conifer Swamp	Ozaukee	70
Friess Lake Tamarack Swamp	Washington	67
Dublin Road Tamarack Swamp	Washington	64
Abells Corners Tamarack Relict	Walworth	62
East Troy Tamaracks	Walworth	62
Gilbert Lake Tamarack Swamp	Washington	61
Thousand Oaks Tamarack Relict	Waukesha	60
Tri-County Tamaracks	Walworth, Racine	59
Wind Lake Tamarack Swamp	Racine	58
Mud Lake Tamarack Swamp	Washington	57
Coney River Tamarack Relict	Washington	54
Raasch Tamarack Swamp	Waukesha	54
Lake Geneva Tamarack Relict	Walworth	54
Potter Lake Tamaracks	Walworth	51
CTH Z Tamarack—Shrub-Carr	Washington	49
Chanequa Tamarack Relict	Waukesha	49
Amy Bell Tamarack Relict	Washington	46
Wowitan Tamarack Swamp	Washington	46
Swan Lake Tamaracks	Walworth	46
East Troy Airport Tamarack Relict	Walworth	44
Paradise Drive Tamarack Swamp	Washington	43
Nelson Tamarack Relict	Waukesha	39

Source: SEWRPC.

Table 55

BOGS SURVEYED IN SOUTHEASTERN WISCONSIN

Community Site	County	SEWRPC Evaluation Score
Cedarburg Bog State Natural Area	Ozaukee	100
Sapa Spruce Bog State Natural Area	Ozaukee	87
St. Aemilian's Bog	Washington	82
Ducks Limited Bog	Ozaukee	82
Lulu Lake Bog	Walworth	81
Beulah Bog State Natural Area	Walworth	79
Big Cedar Lake Bog	Washington	79
Silver Lake Bog	Kenosha	77
Daniel Boone Bog—North	Washington	77
Kettle Moraine Drive Bog	Washington	77
Henrietta Lake Bog	Waukesha	76
Cranberry Road Bog	Walworth	74
Nagawicka Lake Bog	Waukesha	74
Max's Bog	Ozaukee	72
Daniel Boone Bog—South	Washington	72
Beekeeper Bog	Ozaukee	70
Wolf Bog	Washington	66
Hacker Road Bog	Washington	66
Bellin Bog	Washington	66
Huiras Lake Bog	Ozaukee	65
Heritage Trails Bog	Washington	65
Genesee Lake Road Bog	Waukesha	62
Alice Chester Bog	Walworth	58
Crossroads Bog	Waukesha	57
Knollwood Road Bog	Ozaukee	54
Meadowbrook School Bog	Waukesha	51
Muir Bogs	Walworth	51
Honey Lake Leatherleaf Bog	Racine	51
Hults Bog	Washington	51
Mukwonago Leatherleaf Bog	Waukesha	46
Parry Road Leatherleaf Bog	Waukesha	46

Source: SEWRPC.

position, ecotones, and ecological interactions of communities may be just as important as their internal content, and should be recognized in natural area evaluations.[6]

A prime example of a "combined" natural area in Southeastern Wisconsin is Lulu Lake, which includes several distinct community types, including bog, fen, sedge meadow, stream, lake, marsh, dry prairie, upland woods, and oak savanna, all of which are administered and managed as a unit. However, although larger, multi-community natural areas are necessary if regional diversity and natural processes are to be represented adequately, the extent of urban development in Southeastern Wisconsin has meant that many community types exist only in small, isolated fragments. Such fragments represent all that remain of once-significant communities. Once widespread, as shown in Chapter V, the extensive deep-soil mesic prairies of presettlement Racine and Kenosha Counties were found to be ideally suited to intensive agricultural use and were rapidly converted to such use. Today, the flora and fauna and the natural soil profiles of these prairies are found only in small, isolated roadside stands or in narrow strips bordering railway rights-of-way. These small, remaining stands cannot be significantly expanded nor reproduced and therefore have become an invaluable and irreplaceable resource linked to the past. Thus, while protection of large, multi-community natural areas should be a goal whenever possible, the small size and isolation of such critical communities should not prevent them from being granted natural area status whenever warranted.

[6]*Reed F. Noss, "From Plant Communities to Landscapes in Conservation Inventories: A Look at The Nature Conservancy (USA)," Biological Conservation, Vol. 41, 1987, pp. 11-38.*

LEGEND

OW	OAK WOODS
PP	PINE PLANTATION
UG	UPLAND GRASS
WL	WETLAND

GRAPHIC SCALE
0 400 800 1200 FEET
DATE OF PHOTOGRAPHY: APRIL 1995

The Lulu Lake Natural Area, shown above, is a prime example of a "combined" natural area, as it includes several distinct community types, including bog, fen, sedge meadow, stream, lake, marsh, dry prairie, upland woods, and oak savanna. All of the community types are administered and managed as a unit.

Source: The Nature Conservancy and SEWRPC.

Bogs, such as the Lulu Lake bog shown above, are wetland communities of characteristic plants such as sphagnum moss, leatherleaf, cranberry, and pitcher plants which grow on water-logged, acid peat soils. While bogs are common in the northern portions of the State, this community type becomes quite rare in Southeastern Wisconsin.

Source: Wisconsin Department of Natural Resources.

Calcareous fens are a very rare type of wet-grassland-to-low-shrub community growing on wet and springy sites that have an internal flow of groundwater rich in calcium and magnesium bicarbonates. Such fens are characterized by calcium-tolerant plants known as calciphiles. Frequently, calcareous fens are located on hillsides overlooking existing or extinct glacial lake beds and drainageways.

Source: Donald M. Reed.

Table 56

FENS SURVEYED IN SOUTHEASTERN WISCONSIN

Community Site	County	SEWRPC Evaluation Score
Pickerel Lake Fen State Natural Area	Walworth	93
Ottawa Lake Fen State Natural Area	Waukesha	93
Bluff Road Fen-Meadow	Walworth	89
Aurora Road Fen	Washington	88
Spring Grove Fen	Walworth	88
Stopa Fen	Kenosha	88
Pewaukee Lake Access Fen	Waukesha	88
Bluff Creek Fens State Natural Area	Walworth	85
Smith Lake Fen	Washington	82
Spring Prairie Fen	Walworth	82
Clover Valley Fen State Natural Area	Walworth	82
Karcher Springs State Natural Area	Racine	82
Cherry Lake Fen	Racine	82
Leda Lake Fen	Racine	82
Yatzek's Fen	Waukesha	82
Brock Lake Fen	Racine	81
Paradise Lake Fen	Washington	79
Delavan Prairie-Fen	Walworth	77
Lake Ivanhoe Fen—East	Walworth	77
Lake Ivanhoe Fen—West	Walworth	77
Sugar Creek Fen and Spring	Walworth	77
Lulu Lake Fen State Natural Area	Walworth	77
Adams Fen	Walworth	77
Honey Creek Fen	Walworth	77
Vernon Tamarack-Fen	Waukesha	77
Falk Fen	Waukesha	77
Duffin Road Fen	Walworth	72
Eagle Shrub-Fen	Waukesha	72
Eagle Fen and Spring	Waukesha	72
Kettle Moraine Fen State Natural Area	Waukesha	72
Vernon Prairie-Fen	Waukesha	71
Tichigan Fen	Racine	70
Warnimont Park Fen—South	Milwaukee	70
Comus Lake Fen—North	Walworth	70
Peterson Fen	Walworth	70
Grotjans Fen	Waukesha	70
Vernon Fen	Waukesha	70
Fruits Pond Fen	Waukesha	70
Colgate Fen-Meadow	Washington	69
Sugar Creek Fen—North	Walworth	67
Troy Fen	Walworth	66
Warnimont Park Fen—North	Milwaukee	65
Fontana Prairie and Fen	Walworth	65
Spring Valley Fen	Walworth	65
Connelly Fen	Walworth	65
Lein's Road Fen	Walworth	65
Wowitan Fen	Washington	65
Mukwonago Fen	Waukesha	65
Scuppernong Fen	Waukesha	65
University Fen	Washington	64
Eagle Spring Lake Shrub-Fen	Waukesha	61
Wind Lake Shrub-Fen	Racine	60
Turtle Creek Fen	Walworth	60
Sugar Creek Fen-Meadow	Walworth	60
Brown's Fen	Waukesha	60
Dunlop Fen	Waukesha	57
Cambridge Avenue Fen	Waukesha	57
Jericho Creek Fen	Waukesha	55
Creek Road Fen	Walworth	47
STH 67 Fen	Waukesha	46
Patzke Fen	Racine	40
Abell's Corners Fen	Walworth	38
Rainbow Springs Fen	Waukesha	34
Genesee Creek Fen	Waukesha	34
Minooka Park Fen	Waukesha	34

Source: SEWRPC.

Table 57

MISCELLANEOUS WETLANDS SURVEYED IN SOUTHEASTERN WISCONSIN

Community Site	County	SEWRPC Evaluation Score
Lake Keesus Fen-Meadow	Waukesha	79
Bluff Road Sedge Meadow—East	Walworth	72
Spring Lake Sedge Meadow	Waukesha	69
Mud Lake Meadow	Washington	69
Honey Lake Sedge Meadow	Walworth, Racine	67
Rock Shrub-Fen	Walworth	66
Breen's Bay Sedge Meadow	Waukesha	64
Norris Marsh and Slough	Racine	63
Tichigan Marsh—South	Racine	63
Beaver Dam Lake	Waukesha	62
Malek Wetland	Waukesha	61
Mukwonago Sedge Meadow	Waukesha	61
Bloomfield Sedge Meadow	Walworth	61
Nature Road Sedge Meadow	Walworth	61
Bluff Road Sedge Meadow—West	Walworth	61
Silver Lake	Walworth	61
Silverbrook Lake Sedge Mat	Washington	61
Lac Lawrann Wetlands	Washington	61
Tichigan Marsh—North	Racine	61
Mud Lake Sedge Meadow	Kenosha	61
CTH NN Sedge Meadow	Kenosha	61
Loew's Lake Wetland Complex	Washington	61
Turtle Creek Sedge Meadow	Walworth	60
New Munster Sedge Meadow	Kenosha	59
Friendship Lake Marsh	Kenosha	58
Harris Marsh	Kenosha	58
Fur Farm Pond	Waukesha	58
Brown Lake Sedge Meadow	Waukesha	57
Lake Como Wetlands	Walworth	56
Dam Road Sedge Meadow	Walworth	56
Baywood Road Sedge Meadow	Walworth	56
Alice Chester Sedge Meadow	Walworth	56
Caledonia Wildlife Area	Racine	56
Lulu Lake Sedge Meadow	Walworth	56
Cherry Lake Sedge Meadow	Racine	56
Sugar Creek Sedge Meadow—East	Walworth	55
Duffin Road Sedge Meadow	Walworth	55
Hafs Road Marsh	Walworth	54
Whitewater Lake Spring	Walworth	54
Pike Lake Sedge Meadow	Washington	54
Des Plaines River Sedge Meadow	Kenosha	54
Dyer Lake Sedge Meadow—Shrub-Carr	Kenosha	54
Peterson Creek Sedge Meadow	Kenosha	54
Elizabeth Lake Lowlands	Kenosha	53
Schroeder Road Marsh	Kenosha, Racine	53
Brock Lake Sedge Meadow-Marsh	Racine	53
Leda Lake Sedge Meadow-Marsh	Racine	53
Little Cedar Lake Wetlands	Washington	53
Beck Lake Fen-Meadow	Washington	53
Doyles Lake Wetland	Walworth	53
Bark River Marsh	Waukesha	53
Camp Lake Marsh	Kenosha	52
Peat Lake State Natural Area	Kenosha	51
Dublin Road Sedge Meadow	Washington	51
Phantom Lake Wetlands	Waukesha	51
Larkin Lake	Waukesha	51
Williams Bay Lowlands	Walworth	50
Colgate Shrub-Carr	Washington	49
Lake Ivanhoe Sedge Meadow	Walworth	49
CTH P Sedge Meadow	Walworth	49
Hilburn Sedge Meadow	Walworth	48
Erin Sedge Meadow	Washington	48
St. Augustine Road Sedge Meadow	Washington	48
Hubertus Road Sedge Meadow	Washington	48
Rubicon Lowlands	Washington	48
CTH B-CTH AH Sedge Meadow	Kenosha	48
Oconomowoc Sedge Meadow	Waukesha	48

Community Site	County	SEWRPC Evaluation Score
Casper Creek Sedge Meadow	Waukesha	48
Hanson's Lake Wetland	Ozaukee	46
Bohner Lake Lowlands	Racine	46
Hults Marsh	Washington	46
George Williams Sedge Meadow	Walworth	46
Daisy Road Marsh	Walworth	46
Lake Lawn Wetlands	Walworth	46
Spring Prairie Lowlands	Walworth	46
Muskego Lake Marsh	Waukesha	46
Pebble Creek Wetlands	Waukesha	46
Chenequa Wetland	Waukesha	46
Spring Lake Marsh	Walworth	46
New Munster Shrub-Carr	Kenosha	45
Ranger Mac Fen	Racine	45
Albecker Park Wetlands	Washington	44
Delavan Sedge Meadow	Walworth	44
Lake Ivanhoe Sedge Meadow	Walworth	44
Swamp Angel Marsh	Walworth	44
Camp Whitcomb Lowland	Waukesha	44
Silver Lake Marsh	Waukesha	43
Warbler Trail Wetlands	Walworth	42
Ore Creek Sedge Meadow	Walworth	42
Island Road Shrub-Carr	Walworth	42
Section 11 Wetlands	Kenosha	41
Mission Hills Wetlands	Milwaukee	41
Vandenboom Road Marsh	Racine	41
CTH E Sedge Meadow	Washington	41
Bay Road Sedge Meadow	Walworth	41
Prairie Road Sedge Meadow	Walworth	41
Spring Creek Sedge Meadow	Walworth	41
North Lake Marsh	Walworth	41
Sugar Creek Lowlands	Walworth	41
Spring Creek Lowlands	Walworth	41
Eagle Sedge Meadow	Waukesha	41
Oakdale Sedge Meadow	Waukesha	41
National Avenue Lowlands	Waukesha	41
Hartland Marsh	Waukesha	41
Pewaukee Sedge Meadow	Waukesha	41
Capitol Drive Sedge Meadow	Waukesha	41
Pewaukee Park Sedge Meadow	Waukesha	41
Lisbon Marsh	Waukesha	41
Menomonee Falls Marsh	Waukesha	41
Eagle Lake Manor Wetlands	Racine	41
Sunset Park Wetlands	Washington	41
Sandy Knoll Wetlands	Washington	41
Silver Creek Marsh	Washington	41
Mequon Wetland	Ozaukee	41
Dover Wildlife Area Wetlands	Racine	40
Railroad Lowland	Walworth	39
Abells Corners Sedge Meadow	Walworth	39
Glacial Hills Sedge Meadow	Washington	39
Amy Bell Shrub-Carr	Washington	39
Wehmhoff Park Sedge Meadow	Racine	39
Spring Prairie Road Sedge Meadow	Racine	39
Des Plaines River Wetlands	Kenosha	39
Raasch Sedge Meadow	Waukesha	39
Bark River School Sedge Meadow	Waukesha	39
Army Lake Lowlands	Walworth	38
CTH C Lowland	Walworth	37
Lyons Lowlands	Walworth	37
Turtle Creek Springs	Walworth	37
Hodunk Road Wetland	Walworth	36
Sugar Creek Sedge Meadow—West	Walworth	36
Clover Valley Wildlife Area Sedge Meadow	Walworth	36
Hillside Road Wetlands	Washington	36
Allenton Sedge Meadow	Washington	36
Western Road Marsh	Washington	36
Goldenthal Shrub-Carr	Washington	36

Table 57 (continued)

Community Site	County	SEWRPC Evaluation Score
Grobschmidt Park Wetlands	Milwaukee	36
Silver Lake Park Lowlands	Kenosha	36
Hooker Lake Marsh	Kenosha	36
Montgomery Lake Marsh	Kenosha	36
Salem Road Marsh	Kenosha	36
Smith Lowlands	Waukesha	36
Oconomowoc River Marsh	Waukesha	36
Lake Keesus Wetland	Waukesha	36
Monastery Lake Wetlands	Milwaukee	34
Pebble Creek Sedge Meadow—East	Waukesha	34
Oconomowoc River Swamp	Waukesha	32
Church Road Lowlands	Racine	29
Karcher Sedge Meadow—Shrub-Carr	Racine	29

Source: SEWRPC.

Community Site	County	SEWRPC Evaluation Score
Hospital Road Sedge Meadow	Walworth	29
Bowers Road Sedge Meadow	Walworth	29
Sugar Creek Sedge Meadow	Walworth	29
Coolings Sedge Meadow	Waukesha	29
Yench Road Sedge Meadow	Waukesha	29
Nelson Sedge Meadow	Waukesha	29
Wind Lake Lowlands	Racine	29
Rock River Marsh	Walworth	29
Vernon Marsh	Waukesha	27
Peterson Pond	Kenosha	24
Hargraves Road Sedge Meadow	Walworth	23
Eagle Lake Lowlands	Racine	22
Peck Station Wetland	Walworth	20

Source: SEWRPC.

Table 58

SUMMARY OF NATURAL COMMUNITY SITE EVALUATIONS IN SOUTHEASTERN WISCONSIN: 1994

	County														Region	
	Kenosha		Milwaukee		Ozaukee		Racine		Walworth		Washington		Waukesha			
Community Type	Number	Mean Score	Number	Mean Score	Number	Mean Score	Number	Mean Score	Number	Mean Score	Number	Mean Score	Number	Mean Score	Number	Mean Score
Upland Woods	16	41.2	51	40.1	26	46.7	36	40.7	30	41.9	41	44.3	37	38.6	237	41.7
Lowland Hardwoods	2	42.5	11	30.4	22	44.0	6	42.0	0	--	26	46.4	14	42.0	81	42.4
Tamarack Relicts	0	--	0	--	1	70.0	1	58.0	9	59.2	9	54.1	5	55.8	25	57.1
Bogs	1	77.0	0	--	7	75.7	1	51.0	5	68.6	10	70.1	7	58.9	31	68.2
Oak Openings	0	--	1	35.0	0	--	0	--	0	--	0	--	6	49.0	7	47.0
Miscellaneous Wetlands	21	48.0	3	37.0	2	43.5	18	43.1	54	46.0	25	47.2	38	45.3	161	45.8
Fens	1	88.0	2	67.5	0	--	7	71.0	26	71.8	6	74.5	23	64.4	65	69.5
Prairies	21	57.1	2	45.5	0	--	18	49.5	29	48.5	1	49.0	40	46.5	111	49.5
Dunes	1	69.0	0	--	0	--	0	--	0	--	0	--	0	--	1	69.0
Total Number–Mean Score	63	50.6	70	39.3	58	49.4	87	45.9	153	51.6	118	49.9	170	47.5	719	48.2

Source: SEWRPC.

Recognizing, then, that it is logical and beneficial to maximize acreage, buffer, and community diversity of preserves, it becomes apparent that a higher level of biotic organization, beyond the community, is being considered—the natural area. Just like communities, though, natural areas differ in ecological value, and need to be assessed with regard to preservation priorities. Certain limitations become associated with the SEWRPC assessment scheme at the analytical stage of the inventory process. The SEWRPC assessment scheme was not designed to evaluate multi-community natural areas. In addition, while the numerical scores can be used to comparatively rank similar types of natural areas, such scores cannot comprise the sole basis for comparatively ranking dissimilar types of natural areas.

The SEWRPC assessment scheme is suited and, in fact, designed to evaluate relatively homogeneous stands, that is, individual communities. However, once the communities have been aggregated into natural areas, application of the assessment scheme becomes difficult because higher levels of biotic organization must then be considered with different standards for the various component communities. The assessment scheme includes such community attributes as species diversity, species composition, populations, rare species, and growth forms. Species diversity at the community level of biological organization is an expression of community structure.

Linking levels of organization is difficult; differences in criteria for organization and dynamic behavior make simple aggregation of lower levels insufficient

to explain higher levels.[7] For example, a fen and the surrounding upland oak forest may have been considered as a single natural area. Being a unique community with uncommon species, the fen by itself would be expected to achieve a high numerical score. The moderate-quality oak woods in the area, a common community type with no critical species, would probably achieve a much lower score. The fen could contain a diverse flora while the woodland may be comparatively depauperate. The fen may be relatively undisturbed while the forest may have had a history of grazing and selective cutting. However, from a resource-management perspective, it is altogether logical to link the two sites into a larger natural area. But it is nonetheless difficult to evaluate the aggregated natural area on the same terms as each of its individual communities.

As demonstrated above, any given community should only be compared to other communities of the same type. Therefore, even if numerical scores could be assigned to multi-community natural areas, the preserves could not be compared because the numerical rankings would be based on dissimilar component communities. Listing all sites in the inventory regardless of evaluation score would mean that a number of sites not fitting the criteria for a "natural area," as defined in Chapter I, would be included. These sites were surveyed in the field, species lists were generated, and evaluation scores were calculated. However, there is no procedure to exclude them from this report. Thus, if the procedure is to list all sites regardless of quality, then a number of sites of only marginal ecological value would perforce be included, sites which, in the professional judgment of the evaluators, do not meet the standards of a "natural area." It was determined initially and arbitrarily to exclude all communities with scores of less than 20, thus eliminating about 2 percent of the communities surveyed from further consideration. Yet a significant number of marginal sites remain. Establishing a higher score as the cutoff point would be just as arbitrary, and would exclude several areas that should be included in the inventory. Any decision about which areas to include or exclude must therefore in the final analysis be based on sound professional judgment by experienced biologists, not solely on a numerical score.

Even if all marginal sites could be excluded, and all remaining sites considered as natural areas, listing by numerical score alone does not provide a sound basis for ranking sites in any order of priority with regard to their need for protection. Some natural areas have higher ecological value, and are thus more deserving of protection, than others.

The natural areas protection planning program is intended to identify significant natural areas in the Region and set protection priorities. If, as demonstrated, the SEWRPC assessment scheme, using a numerical scale, is not applicable to natural areas consisting of multiple community types, an additional system must be employed to compare the ecological value of natural areas. A classification system that permits discrimination between categories of natural areas is required. This is exactly what the Natural Areas, or NA, system, traditionally used in Wisconsin to distinguish between natural areas of different quality, was designed to do. Countywide inventories of natural areas compiled by the Wisconsin Department of Natural Resources have classified sites as Natural Areas of statewide, regional, or local importance (NA-1, NA-2, or NA-3 areas) on this basis, using the following as established guidelines:

1. NA-1
   NA-1 areas are of statewide significance. These areas contain excellent examples of nearly complete and relatively undisturbed plant and animal communities which are believed to closely resemble those present during pre-European-settlement times.

2. NA-2
   NA-2 areas are native biotic communities judged to be of lower than NA-1 significance, perhaps on a county or multi-county basis. NA-2 areas are probably so designated because of evidence of a limited amount of human disturbance. They may also be of the highest biotic quality, but be of less than minimum size for NA-1 ranking. In the future, some NA-2 sites may become of higher significance due to recovery from past dis-

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[7] *T. F. H. Allen, R. V. O'Neill, and T. W. Hoekstra, Interlevel Relations in Ecological Research and Management: Some Working Principles from Hierarchy Theory, U. S. Department of Agriculture Forest Service General Technical Report RM-110, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado, 1984.*

turbance, or because of a sudden substantial decrease in the acreage of a once-common type, or after a more detailed inventory.

3. NA-3
   NA-3 sites are substantially altered by human activities, but are of local natural area significance. They often contain excellent wildlife habitat, and also provide refuge for a large number of native plant species which no longer exist in the surrounding region due to land use activities.

Those sites which do not meet the criteria for any NA ranks are excluded from the inventory. Thus, the NA system supplements certain limitations of the SEWRPC assessment scheme by allowing multi-community natural areas and processes to be compared and given priority rankings. The SEWRPC assessment scheme provides the first essential step in the natural area assessment process. By its very nature, it compels the evaluator to consider all pertinent aspects of sites, lending objectivity to the evaluation process. The assignment of preservation priorities to the array of sites, however, as already indicated, in the final analysis must be based upon a value judgment.

Upon completion of the inventory and assignment of the SEWRPC assessment scheme scores, Commission and Wisconsin Department of Natural Resources, Bureau of Endangered Resources, staff biologists jointly reviewed the inventory data for all of the natural area sites investigated. Mutual agreements on final site area delineations and classifications were achieved. During that review, it was sometimes decided to combine several sites that were in physical proximity into larger designated "Natural Areas." While the final Natural Area inventory indicates only the combined areas, data for each individual site were retained in the Commission files. Confidence in the final results is increased by the fact that seldom was there disagreement among the evaluators about the Natural Area rank assigned to a particular natural area.

Of the 888 potential sites surveyed in the field, 760, or 86 percent, were determined to be of Natural Area quality. Combination of various sites reduced this total to 447 designated Natural Area sites in Southeastern Wisconsin. Of the 128 field-surveyed sites determined not to be of Natural Area quality, 111 were found to contain critical species habitats. Thus, of the original 1,241 potential natural area sites and critical species habitats considered, 370, or 30 percent, were discarded either as not of Natural Area quality, or as not containing critical species habitat.

LOCATIONS OF NATURAL AREA AND CRITICAL SPECIES HABITAT SITES

Natural Area Sites

The locations and descriptions of the 447 designated Natural Area sites in Southeastern Wisconsin are listed, by county, in Tables 59 through 65. The map reference numbers in these tables refer to numbers on Maps 26 through 32, which correspond to the seven county tables. Table 66 lists the designated Natural Area sites, by county, according to the predominant community types.

Table 67 summarizes the inventory data for Southeastern Wisconsin. Of the 447 designated regional Natural Areas, the greatest number, 105, or 23 percent, were located within Waukesha County, while the lowest number, 39, or 9 percent, were located in Kenosha County. A total of 40 of the 447 regional Natural Areas were ranked as Natural Areas of statewide or greater significance (NA-1). Nine of these 40 areas were located within Waukesha County. Racine, Walworth, and Washington Counties each contained seven NA-1 Natural Areas, Kenosha County contained six NA-1 Natural Areas, Ozaukee County contained five NA-1 Natural Areas, and Milwaukee County contained a portion of one such site.

Of the 122 sites identified as Natural Areas of countywide or regional significance (NA-2), 27 percent of the 447 designated Natural Areas in the Region, Waukesha County contained the greatest number, 30, while Milwaukee County, with nine, contained the fewest. The 285 Natural Areas of local significance (NA-3) comprised 64 percent of the total number of sites. As with the NA-1 and NA-2 sites, Waukesha County contained the greatest number of NA-3 sites, having a total of 66. Kenosha County, with 17 NA-3 sites, contained the fewest.

The identified Natural Area sites had a combined total area of 57,649 acres, or 3.3 percent of the total area of the Region. Four Natural Areas extended outside of the Region, into Sheboygan, Fond du Lac, and Jefferson Counties, adding 113 acres to the areal total. Washington County contained the largest Natural Area acreage, 15,970 acres, or 5.8 percent of the total area of the County. Second was

Table 59

KNOWN NATURAL AREAS IN KENOSHA COUNTY: 1994

Map 26 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
1	Silver Lake Bog State Natural Area	NA-1 (SNA, RSH)	T1N, R20E Section 16 Town of Salem	Silver Lake Sportsmen's Club and other private	18	Lacking many of the typical northern bog species, this area nevertheless remains one of the better acid bogs in the Region. Few bogs of this quality occur this far south. Typical species include tamarack, pitcher plant, round-leaved sundew, cranberry, winterberry, and bog buckbean
2	Peat Lake State Natural Area	NA-1 (SNA)	T1N, R20E Section 32 Town of Salem	Department of Natural Resources and private	140	One of the few undeveloped lakes in Kenosha County, isolated from roads and houses. Shallow and somewhat alkaline, it is bordered by a wide belt of shallow marsh and sedge meadow. Important nesting and feeding refuge for waterfowl
3	Carol Beach Low Prairie and Panné State Natural Area	NA-1 (SNA, RSH)	T1N, R23E Sections 18, 19 Village of Pleasant Prairie	Department of Natural Resources, Village of Pleasant Prairie, and private	39	A rich low prairie and calcareous fen on dune-and-swale topography. A number of rare plant species, including the State-designated endangered smooth phlox (Phlox glaberrima), are present
4	Chiwaukee Prairie State Natural Area	NA-1 (SNA, RSH)	T1N, R23E Sections 31, 32 Village of Pleasant Prairie	Department of Natural Resources, The Nature Conservancy, University of Wisconsin-Parkside, and other private	309	Extremely rich prairie and marsh on gentle swell-and-swale topography created when the level of glacial Lake Michigan was lowered in stages. The resulting different micro-environments help support great species diversity. Over 400 plant species have been documented in the prairie, some of which are very rare in the State. Scattered oaks in portions of the site give it a savanna-like aspect locally. An incomparable site, it is a National Natural Landmark
5	Stopa Fen	NA-1 (RSH)	T1N, R20E Section 31 Town of Salem	Wilmot Ski Hills	9	High-quality fen with both seeping and bubbling springs, located adjacent to the Fox River. A large number of unusual species are present, such as beaked spike-rush (Eleocharis rostellata), tussock bulrush (Scirpus cespitosus), Ohio goldenrod (Solidago ohioensis), false asphodal (Tofieldia glutinosa), and common bog arrow-grass (Triglochin maritimum). Threatened by ski-hill operations

Table 59 (continued)

Map 26 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
6	Kenosha Sand Dunes and Low Prairie	NA-1 (RSH)	T1N, R23E Sections 7, 8 City of Kenosha	The Nature Conservancy, City of Kenosha, and other private	99	One-half mile of Lake Michigan frontage containing well-developed dunes and dune succession patterns (fore dunes to swale to wet prairie). The dunes are disturbed by off-road vehicle use, and the shore has been riprapped. An ancient hardwood forest lies beneath the dunes. This is one of the few dune systems in Southeastern Wisconsin. Several uncommon species are present, including sea rocket (Cakile edentula), sand reed (Calamovilfa longifolia), seaside spurge (Euphorbia polygonifolia), common bugseed (Corispermum hyssopifolium), smooth phlox (Phlox glaberrima), and marsh blazing-star (Liatris spicata)
7	New Munster Shrub-Carr and Tamarack Relict	NA-2 (SNA, RSH)	T1N, R19E Sections 2, 3, 10, 11 Town of Wheatland	Department of Natural Resources and private	384	Wetland complex of shrub-carr, sedge meadow, relict tamaracks, and stream, with an upland dry-mesic wooded island. Site is recovering from past disturbance. Some northern relicts, such as winterberry, yellow birch, and starflower are present. Many species of nesting birds use the area
8	Elizabeth Lake Lowlands	NA-2	T1N, R19E Section 31 Town of Randall Section 32 Village of Twin Lakes	Private	48	Good-quality wetland complex at the southwest end of Elizabeth Lake, consisting of sedge meadow, shallow marsh, and shrub-carr. The wetland continues south into Illinois
9	Camp Lake Marsh	NA-2	T1N, R20E Sections 20, 21, 28, 29, 32, 33 Town of Salem	Department of Natural Resources and private	293	Deep and shallow marsh dominated by cattails and softstem bulrush. The lake itself is especially rich in aquatic plant species, including a large population of ditch-grass (Ruppia maritima), a coastal plain plant of brackish waters. The marsh has been extensively ditched
10	Merkt Woods	NA-2	T1N, R21E Sections 8, 17 Town of Bristol	Private	91	A relatively large, good-quality dry-mesic woods, dominated by oaks but with numerous smaller ashes, basswoods, and yellow-bud hickories. The ground flora is diverse. One of the larger intact woods in this part of the Region
11	Benedict Prairie	NA-2 (RSH)	T1N, R21E Section 11 Town of Bristol	University of Wisconsin-Milwaukee	6	A small, but rich, wet-mesic to mesic prairie remnant located along an abandoned railway right-of-way. The site is burned periodically to reduce weedy invaders

Table 59 (continued)

Map 26 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
12	Bristol Woods	NA-2 (RSH)	T1N, R21E Sections 21, 22 Town of Bristol	Kenosha County and private	182	The largest block of woods remaining in this part of the Region. This is a rich and diverse xeric to dry-mesic woods that is recovering from past grazing and selective cutting. Important as nesting habitat for forest-interior-breeding birds
13	Mud Lake Sedge Meadow	NA-2 (RSH)	T1N, R21E Sections 32, 33 Town of Bristol	Private	51	Good-quality wetland complex consisting of shallow marsh, sedge meadow, low prairie, fresh (wet) meadow, and shrub-carr. Species diversity is good, including a number of uncommon ones
14	104th Street Mesic Prairie	NA-2 (RSH)	T1N, R23E Section 19 Village of Pleasant Prairie	Department of Natural Resources and private	11	Good-quality patch of mostly mesic prairie, with good species diversity. Critical plant species are present
15	Carol Beach Prairie	NA-2 (RSH)	T1N, R23E Sections 19, 20, 29, 30 Village of Pleasant Prairie	Department of Natural Resources, Village of Pleasant Prairie, and private	71	A rich complex of low to dry prairie, with fresh (wet) meadow, sedge meadow, shrub-carr, and shallow marsh communities on dune-and-swale topography. Critical plant species are present
16	Barnes Creek Dunes and Panné	NA-2 (RSH)	T1N, R23E Section 20 Village of Pleasant Prairie	Village of Pleasant Prairie, Department of Natural Resources, and private	8	An unusual mixture of dry prairie and calcareous fen plant species on dune-and-swale topography, adjacent to Barnes Creek. Several critical species are present
17	Tobin Road Prairie	NA-2 (RSH)	T1N, R23E Sections 29, 30 Village of Pleasant Prairie	Department of Natural Resources and private	14	A portion of the northern Chiwaukee Prairie area containing rich low and dry prairies on dune-and-swale topography
18	Friendship Lake Marsh	NA-2	T2N, R20E Sections 11, 12, 13, 14 Town of Brighton	Private	119	Large cattail marsh and sedge meadow surrounding a small, but good-quality, kettle lake. Valuable feeding and nesting habitat for a variety of marshland birds. Recent shoreline construction activities have lowered the ecological value
19	CTH NN Sedge Meadow	NA-2	T2N, R20E Section 31 Town of Brighton	Private	60	Good-quality sedge meadow, with little evidence of past disturbance and few exotic species. A good example of this community type
20	Harris Marsh and Oak Woods	NA-2	T2N, R20E Section 36 Town of Brighton T2N, R21E Section 31 Town of Paris T1N, R20E Section 1 Town of Salem	University of Wisconsin-Parkside and private	225	A large, good-quality marsh adjacent to Brighton Creek. A grazed former oak opening forms the eastern upland border

Table 59 (continued)

Map 26 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
21	Petrifying Springs Woods	NA-2 (RSH)	T2N, R22E Sections 2, 11 Town of Somers	Kenosha County, University of Wisconsin-Parkside, and private	145	A rich southern mesic to dry-mesic hardwood forest dominated by white and red oaks, white ash, sugar maple, and basswood. The undulating topography is covered by a very diverse spring flora, including a large population of twinleaf (Jeffersonia diphylla), a State-designated species of special concern. One of the better woodland areas remaining in Southeastern Wisconsin
22	Powers Lake Tamarack Relict	NA-3	T1N, R19E Sections 8, 9 Town of Wheatland	Private	152	A large but disturbed wetland complex of marsh, sedge meadow, shrub-carr, and relict tamaracks. Agriculturel use on the periphery has adversely affected the area
23	Hooker Lake Marsh	NA-3	T1N, R20E Section 11 Town of Salem	Private	48	Deep and shallow cattail marsh on the northwest side of Hooker Lake
24	Montgomery Lake Marsh	NA-3	T1N, R20E Sections 12, 13 Town of Salem	Private	43	Cattail-dominated deep and shallow marsh bordering Montgomery Lake
25	CTH B-CTH AH Sedge Meadow	NA-3	T1N, R20E Section 20 Town of Salem	Private	12	Located near the intersection of CTH B and CTH AH, this small but good-quality sedge meadow contains a large number of native species. Disturbance is limited to the wetland borders
26	Des Plaines River Wetlands	NA-3	T1N, R21E Sections 12, 13, 14 Town of Bristol	Private	66	A one-mile stretch of the Des Plaines River west of IH 94. Wetlands include sedge meadow, shallow marsh, and lowland hardwoods
27	Salem Road Marsh	NA-3	T1N, R21E Section 18 Town of Bristol	Conservation Club of Kenosha	27	Shallow, cattail-dominated marsh
28	Lake Russo Prairie Remnant	NA-3 (RSH)	T1N, R22E Section 7 Village of Pleasant Prairie	Private	6	A small, moderate- to good-quality wet-mesic prairie remnant that is suffering disturbance by local residents
29	Des Plaines River Lowlands	NA-3 (RSH)	T1N, R22E Sections 17, 18, 19, 20 Village of Pleasant Prairie	The Nature Conservancy, Village of Pleasant Prairie, and other private	411	Extensive wetland and upland complex along the Des Plaines River, significant because of its open space and wildlife habitat. Contains xeric oak woods, mesic and wet-mesic prairie, fresh (wet) meadow, and riverine forest. The State-designated endangered prairie white-fringed orchid (Platanthera leucophaea) has been found here
30	Bain Station Railroad Prairie	NA-3 (RSH)	T1N, R22E Section 9 Village of Pleasant Prairie	Private	5	A small, moderate- to good-quality mesic to wet-mesic prairie remnant along an abandoned railway right-of-way. Dominated by big bluestem, Indian grass, prairie dock, and goldenrods

Table 59 (continued)

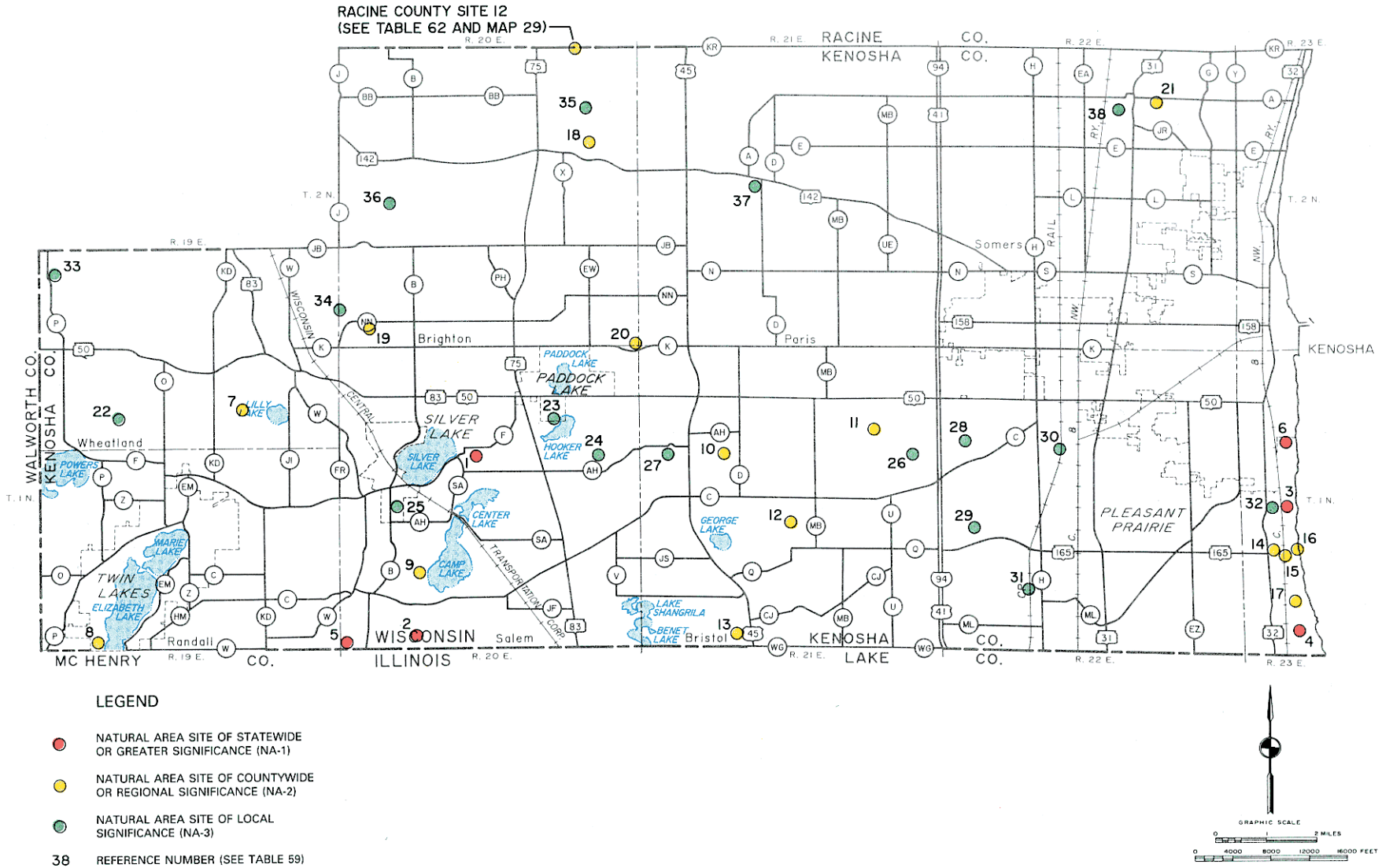
Map 26 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
31	Pleasant Railroad Prairie	NA-3 (RSH)	T1N, R22E Sections 29, 32 Village of Pleasant Prairie	Private	5	Discontinuous remnants of the once-extensive wet-mesic prairie of southern Kenosha County, bordering double tracks. Small patches are of good quality, containing some regionally uncommon species
32	Carol Beach Estates Prairie	NA-3 (RSH)	T1N, R23E Section 19 Village of Pleasant Prairie	The Nature Conservancy and other private	10	A rich wet to wet-mesic prairie on sandy soils that is threatened by shrub invasion. Critical plant species are present
33	Dyer Lake Sedge Meadow	NA-3	T2N, R19E Section 30 Town of Wheatland	Kenosha Boy Scouts and other private	40	Good-quality wetland complex on west side of Dyer Lake. Consists of sedge meadow, shrub-carr, and deep and shallow marsh. The site is somewhat alkaline. Good native species diversity
34	Peterson Creek Sedge Meadow	NA-3	T2N, R19E Section 36 Town of Wheatland T2N, R20E Section 31 Town of Brighton	Private	69	This moderate- to good-quality wetland complex bordering Peterson Creek consists of sedge meadow and cattail marsh. The highest-quality area lies southeast of the creek, where calciphilic species are present
35	Section 11 Wetlands and Oak Woods	NA-3	T2N, R20E Sections 11, 12 Town of Brighton	Private	130	A moderate-quality wetland complex, consisting of sedge meadow and cattail marsh, bordered by a disturbed oak woods
36	Bong Low Prairie	NA-3 (RSH)	T2N, R20E Sections 19, 20 Town of Brighton	Department of Natural Resources	2	A series of small patches of remnant low prairie within the Bong State Recreation Area. Disturbance history varies, but the two areas adjacent to north-south road are of good quality. Good display of the marsh blazing-star (Liatris spicata)
37	Paris (Ehlen) Prairie Remnant	NA-3 (RSH)	T2N, R21E Section 16 Town of Paris	Private	1	A small but generally good-quality remnant of the once-extensive mesic prairie that formerly occupied central Kenosha County. Critical plant species are present
38	Pike River Low Woods	NA-3 (RSH)	T2N, R22E Sections 3, 10 Town of Somers	Hawthorn Hollow Nature Sanctuary and private	68	Good-quality wet-mesic forest in lowlands and dry-mesic forest on uplands bordering the Pike River. Contains a rich and diverse ground flora. A small prairie remnant is present within the Hawthorn Hollow Nature Sanctuary. This is probably the most natural remaining stretch of the Pike River

[a] *NA-1 identifies Natural Area sites of statewide or greater significance*
NA-2 identifies Natural Area sites of countywide or regional significance
NA-3 identifies Natural Area sites of local significance
SNA, or State Natural Area, identifies those sites officially designated as State Natural Areas by the State of Wisconsin Natural Areas Preservation Council
RSH, or Rare Species Habitat, identifies those sites which support rare, threatened, or endangered animal or plant species officially designated by the Wisconsin Department of Natural Resources

Source: Wisconsin Department of Natural Resources and SEWRPC.

Map 26

KNOWN NATURAL AREAS IN KENOSHA COUNTY: 1994



LEGEND

- NATURAL AREA SITE OF STATEWIDE OR GREATER SIGNIFICANCE (NA-1)
- NATURAL AREA SITE OF COUNTYWIDE OR REGIONAL SIGNIFICANCE (NA-2)
- NATURAL AREA SITE OF LOCAL SIGNIFICANCE (NA-3)
- 38 REFERENCE NUMBER (SEE TABLE 59)

This map identifies the known Natural Areas in Kenosha County. Natural Areas are tracts of land or water so little modified by human activity, or sufficiently recovered from the effects of such activity, that they contain intact native plant and animal communities believed to be representative of the pre-European-settlement landscape. Natural Area classification is based upon consideration of the structure and integrity of the native plant or animal communities; the extent of artificial disturbance; the commonness of the plant and animal communities present; the presence of critical plant or animal species; the diversity of plant and animal species; and the size of the area.

Source: Wisconsin Department of Natural Resources and SEWRPC.

Table 60

KNOWN NATURAL AREAS IN MILWAUKEE COUNTY: 1994

Map 27 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
1	Root River Canal Woods	NA-2 (RSH)	T5N, R21E Section 34 City of Franklin T4N, R21E Section 3 Town of Raymond	Milwaukee County and private	121 (plus 158 in Racine County)	A mixture of good-quality dry-mesic and lowland hardwood forest along the Root River Canal. One of the largest intact forested tracts in this part of the Region. Extends south into Racine County
2	Root River Wet-Mesic Woods—West	NA-2 (RSH)	T5N, R21E Sections 35, 36 City of Franklin	Milwaukee County and private	260	Mixture of medium-aged lowland and upland hardwoods that is recovering well from past disturbance. The ground flora is particularly rich and diverse, including good populations of several rare species. This is an important part of the Root River environmental corridor
3	Rawson Park Woods	NA-2 (RSH)	T5N, R22E Section 2 City of South Milwaukee	Milwaukee County and City of Milwaukee	23	Despite heavy human use, especially from the adjacent high school, this site contains probably the best remaining example of beech-maple forest in Milwaukee County. The north half is in best condition. The rich ground flora contains a good population of blue-stemmed goldenrod (Solidago caesia), a State-designated endangered species
4	Cudahy Woods	NA-2 (RSH)	T5N, R22E Section 4 City of Oak Creek	Milwaukee County	47	An upland hardwood forest containing two major forest types separated by a small stream. To the north is a dry-mesic forest of oak, cherry, and hickory; southward is an old-growth mesic forest of sugar maple, beech, and red oak. One of the best forests of its kind in the vicinity; there is a history of past scientific research
5	Falk Park Woods	NA-2 (RSH)	T5N, R22E Section 7 City of Oak Creek	Milwaukee County and private	77	This is a diverse, relatively large north-south stand of woods. Consists mostly of good-quality dry-mesic uplands, with mesic stands of beech end sugar maple at the north end, and low areas of ephemeral ponds, wet-mesic hardwoods, and stream interspersed throughout. Past disturbances appear minimal
6	Root River Wet-Mesic Woods—East	NA-2 (RSH)	T5N, R22E Section 32 City of Oak Creek T4N, R22E Section 5 Town of Caledonia	Milwaukee County and Racine County	50 (plus 2 in Racine County)	Wet-mesic and mesic woods bordering a gravel-bottom stream that is a tributary of the Root River. Contains a rich, diverse flora, including several rare species
7	Greenfield Park Woods	NA-2 (RSH)	T6N, R21E Section 6 City of West Allis	Milwaukee County	52	A good stand of southern dry-mesic hardwoods dominated by red and white oaks, sugar maple, and basswood. Includes ephemeral ponds and a lowland hardwood swamp

Table 60 (continued)

Map 27 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
8	St. Francis Seminary Woods	NA-2 (RSH)	T6N, R22E Sections 14, 15 City of St. Francis	St. Francis Seminary	37	This southern mesic forest features mature basswood, sugar maple, beech, red oak, and paper birch. The site is divided by a gravel road, a small stream tributary to Lake Michigan, and numerous trails. The relatively diverse ground flora includes the State-designated endangered blue-stemmed goldenrod (Solidago caesia)
9	Warnimont Park Fens	NA-2 (RSH)	T6N, R22E Section 36 City of Cudahy	Milwaukee County	2	Clay bluffs with spring seepage along Lake Michigan support calcareous fens which contain an unusual flora. Regionally uncommon plants include buffaloberry (Shepherdia canadensis), variegated scouring-rush (Equisetum variegatum), purple false oats (Trisetum melicoides), Ohio goldenrod (Solidago ohioensis), small fringed gentian (Gentiana procera), and false asphodel (Tofieldia glutinosa), a State-designated threatened species
10	Grobschmidt Park Wetlands and Upland Woods	NA-3 (RSH)	T5N, R21E Sections 1, 2 City of Franklin	Milwaukee County and private	80	A combination of moderate-quality deep and shallow marsh, sedge meadow, shrub-carr, and disturbed dry-mesic woods. Site contains a restored prairie
11	Root River Parkway Woods	NA-3 (RSH)	T5N, R21E Section 4 Village of Greendale	Milwaukee County	53	Dry-mesic forest on undulating topography, dominated by relatively large red oaks. Ground layer is sparse. The woods contains hiking and ski trails
12	Whitnall Park Woods—South	NA-3 (RSH)	T5N, R21E Sections 5, 8 City of Franklin T6N, R21E Section 32 Village of Hales Corners	Milwaukee County and private	137	Site consists of several more-or-less connected stands of dry-mesic upland woods. The area of highest quality is surrounded by golf links. Here, mature red oaks and sugar maples provide a canopy over a representative ground flora that includes two State-designated special concern species: American gromwell (Lithospermum latifolium) and black haw (Viburnum prunifolium)
13	Monastery Lake Wetlands	NA-3 (RSH)	T5N, R21E Section 8 City of Franklin	Nature Foundation and private	45	A diverse wetland plant community complex consisting of deep and shallow marsh, sedge meadow, fresh (wet) meadow, shrub-carr, and the last surviving tamaracks in Milwaukee County
14	Mission Hills Wetlands	NA-3	T5N, R21E Sections 16, 17 City of Franklin	Private	38	Complex of sedge meadow, shallow marsh, and wet prairie
15	Franklin (Puetz Road) Woods	NA-3 (RSH)	T5N, R21E Sections 23, 24 City of Franklin	Wisconsin Department of Transportation	28	Situated along the headwaters of Oak Creek, this site consists of mature dry-mesic hardwoods, lowland hardwoods, and stands of younger growth. The rich and diverse flora includes black haw (Viburnum prunifolium), a State-designated special concern species

Table 60 (continued)

Map 27 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
16	Fitzsimmons Road Woods	NA-3 (RSH)	T5N, R21E Section 25 City of Franklin	Milwaukee County and private	42	The south and east portions of this dry-mesic woods are mostly second-growth; the west portion is less disturbed, with larger, mature trees. In the northwest are several ephemeral ponds where the State-designated endangered hoplike sedge (Carex lupuliformis) is found
17	Oakwood Park Oak Woods	NA-3 (RSH)	T5N, R21E Sections 25, 26 City of Franklin	Milwaukee County and private	22	This is a small dry-mesic oak woods of moderate quality, with a large population of black haw (Viburnum prunifolium), a State-designated special concern species
18	Root River Parkway Prairie	NA-3	T5N, R21E Section 27 City of Franklin	Milwaukee County	27	Wet-mesic prairie located within the Root River Parkway wetland complex. Characteristic species include big bluestem, saw-toothed sunflower, Virginia mountain mint, prairie cordgrass, leadplant, azure aster, bottle gentian, prairie dock, and slender ladias'-tresses orchid. It is the largest prairie remaining in Milwaukee County
19	Ryan Creek Woods	NA-3	T5N, R21E Section 28 City of Franklin	Private	87	One of the larger woodlots remaining in Milwaukee County, this is a dry-mesic woods of varying quality that is recovering from past disturbance. An east-west stream crosses the south end
20	Franklin Oak Woods and Oak Savanna	NA-3	T5N, R21E Section 29 City of Franklin	Milwaukee County	76	The entire site is a former oak savanna, but only the north portion retains this appearance. Here are large, scattered, open-grown bur oaks, but the understory consists mainly of weeds, with a few prairie species persisting. The south portion has degraded further into a dense shrubland. This site, especially the north portion, would be a prime candidate for savanna restoration
21	Elm Road Woods	NA-3 (RSH)	T5N, R21E Section 36 City of Franklin	Private	20	A small, mostly second-growth woodlot of southern mesic forest and lowland hardwoods. American beech is present at the western edge of its range. Contains good populations of two State-designated special concern species: American gromwell (Lithospermum latifolium) and black haw (Viburnum prunifolium)
22	Grant Park Woods—South	NA-3	T5N, R22E Sections 1, 12 City of South Milwaukee	Milwaukee County	45	A remnant of the once more-widespread beech-maple mesic woods along Lake Michigan, this is a narrow wooded strip of moderate quality in Grant Park. Bordered on the west by golf course

Table 60 (continued)

Map 27 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
23	Grant Park Woods—Old Growth	NA-3 (RSH)	T5N, R22E Section 1 City of South Milwaukee	Milwaukee County	38	Dissected by ravines, this site has long been used as a park. Despite the heavy human influence, this beech-maple woods, which is a remnant of the original Lake Michigan forest, retains some of its pre-settlement character. The rich ground flora includes the State-designated endangered blue-stemmed goldenrod (Solidago caesia)
24	Esch-Honadel Woods	NA-3 (RSH)	T5N, R22E Section 18 City of Oak Creek	Private	72	A patchy mix of low woods, second-growth upland forest, and relatively undisturbed beech woods. Integrity of the woods is threatened by encroaching residential development
25	Wood Creek Woods	NA-3 (RSH)	T5N, R22E Section 20 City of Oak Creek	Private	35	This is a patchy mixture of mature mesic and dry-mesic upland woods, regenerating forest, wet-mesic forest, stream, and ephemeral ponds. Quality varies throughout. The site is threatened by future residential development
26	Wedge Woods	NA-3 (RSH)	T5N, R22E Section 23 City of Oak Creek	Private	19	A small, disturbed woods consisting of lowland hardwoods at the low, wet west end, and dry-mesic woods at the drier east end. Contains one of the largest populations of the State-designated endangered blue-stemmed goldenrod (Solidago caesia) in the State. Threatened by residential development
27	Oak Creek Low Woods	NA-3 (RSH)	T5N, R22E Sections 26, 27 City of Oak Creek	Milwaukee County and private	68	Moderate-quality wet-mesic woods, with small areas of mesic woods
28	Root River Riverine Forest	NA-3 (RSH)	T5N, R22E Sections 31, 32, 33, 34 City of Oak Creek T4N, R22E Sections 3, 4, 5, 6 Town of Caledonia	Milwaukee County, Racine County, Wisconsin Department of Transportation, and private	140 (plus 184 in Racine County)	A significant portion of the Root River corridor. Extends south into Racine County
29	Whitnall Park Woods—North	NA-3 (RSH)	T6N, R21E Section 32 Village of Hales Corners	Milwaukee County	82	Stands of dry-mesic and lowland hardwoods within Whitnall Park. Contains forked aster (Aster furcatus), a State-designated threatened species
30	Menomonee River Swamp—South	NA-3 (RSH)	T7N, R21E Section 6 City of Wauwatosa	Milwaukee County, City of Milwaukee, and Wisconsin Department of Transportation	39	A portion of the Menomonee River bordered by lowland hardwood forest and dry-mesic upland woods. Contains American gromwell (Lithospermum latifolium), a State-designated special concern species
31	Harley-Davidson Woods	NA-3 (RSH)	T7N, R21E Section 6 City of Wauwatosa	Harley-Davidson, Inc.	11	A small southern mesic hardwoods dominated by sugar maple and basswood, with a rich ground flora

Table 60 (continued)

Map 27 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
32	Currie Park Low Woods	NA-3 (RSH)	T7N, R21E Section 8 City of Wauwatosa	Milwaukee County	27	A portion of the Menomonee River bordered by disturbed lowland hardwoods and wet-mesic hardwoods. The ground flora is rich, including such rare species as the State-designated threatened forked aster (Aster furcatus)
33	Blue Mound Country Club Woods	NA-3 (RSH)	T7N, R21E Section 17 City of Wauwatosa	Milwaukee County and private	16	A small patch of southern dry-mesic woods containing critical species habitat
34	Wil-O-Way Woods	NA-3	T7N, R21E Section 20 City of Wauwatosa	Milwaukee County	41	Moderate-quality southern dry-mesic hardwoods containing a representative ground flora
35	Jacobus Park Woods	NA-3 (RSH)	T7N, R21E Section 27 City of Wauwatosa	Milwaukee County	11	A small remnant of the original southern dry-mesic forest on bluffs overlooking the Menomonee River. Contains several populations of the State-designated threatened forked aster (Aster furcatus), as well as other regionally rare species
36	Downer Woods	NA-3	T7N, R22E Section 10 City of Milwaukee	University of Wisconsin-Milwaukee	13	A disturbed southern dry-mesic hardwood forest where scattered large oaks and smaller ashes and basswoods dominate the tree stratum. There is a thick shrub layer of natives and exotics. One of the few undeveloped woods within this part of the County
37	Bradley Woods	NA-3 (RSH)	T8N, R21E Saction 9 City of Milwaukee	Milwaukee County and private	35	An old-growth southern mesic forested island, dominated by sugar maple, beech, and basswood. One of the few remnants of the original forest remaining in northern Milwaukee County. The western portion, owned by the County, is least disturbed
38	Brown Deer Park Woods	NA-3	T8N, R21E Section 13 Village of Brown Deer	Milwaukee County	40	Small islands of remnant southern mesic hardwoods within a golf-course matrix, dominated by beech and sugar maple
39	Harbinger Woods	NA-3 (RSH)	T8N, R21E Section 18 City of Milwaukee T8N, R20E Section 13 Village of Menomonee Falls	Milwaukee County and private	34 (plus 13 in Waukesha County)	Mesic upland woods and lowland hardwoods bordering the Menomonee River that extend into Waukesha County. The spring flora of the mesic woods is rich and diverse, including American gromwell (Lithospermum latifolium), a State-designated special concern species
40	Menomonee River Swamp—North	NA-3	T8N, R21E Sections 19, 30 City of Milwaukee T8N, R20E Section 24 Village of Menomonee Falls	Milwaukee County and private	74 (plus 4 in Waukesha County)	Discontinuous patches of disturbed floodplain forest bordering the Menomonee River
41	Haskell Noyes Park Woods	NA-3	T8N, R21E Section 21 City of Milwaukee	Milwaukee County	20	Disturbed southern mesic hardwood forested island with a substantial amount of beech. Best old-growth remnant is near center of woods. Pond and wetlands are present at south end

Table 60 (continued)

Map 27 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
42	Schlitz Audubon Center Woods and Beach	NA-3 (RSH)	T8N, R22E Sections 9, 10 Village of Bayside	Schlitz Audubon Center and Milwaukee County	54	Site includes Lake Michigan sand beach and disturbed mesic woods bordering a steep ravine. On the beach was found sea rocket (Cakile edentula), a State-designated special concern species
43	Kletzsch Park Woods	NA-3 (RSH)	T8N, R22E Section 19 City of Glendale	Milwaukee County	13	A disturbed remnant of southern mesic to dry-mesic forest on the west bank of the Milwaukee River. The diversity of habitats (upland woods, ravine, flood-plain, and slope) has resulted in a diverse ground flora, including the State-designated threatened forked aster (Aster furcatus)

[a]NA-1 identifies Natural Area sites of statewide or greater significance
NA-2 identifies Natural Area sites of countywide or regional significance
NA-3 identifies Natural Area sites of local significance
SNA, or State Natural Area, identifies those sites officially designated as State Natural Areas by the Stete of Wisconsin Natural Areas Preservation Council
RSH, or Rare Species Habitat, identifies those sites which support rare, threatened, or endangered animal or plant species officially designated by the Wisconsin Department of Natural Resources

Source: Wisconsin Department of Natural Resources and SEWRPC.

Waukesha County, with 13,721 acres, or 3.7 percent of the total area of the County. Of the remaining counties, Milwaukee County contained the smallest Natural Area acreage, 2,284 acres, or 1.5 percent of the total area of the County.

The mean size of all Natural Area sites in the Region was 129 acres, declining from the NA-1 sites, which had a mean size of 218 acres, to the NA-2 sites, which had a mean area of 174 acres, to the NA-3 sites, which had a mean area of 97 acres. The Natural Area sites ranged in size from one acre to 2,009 acres. In terms of mean size, Washington County contained the largest Natural Areas, with an average area size of 175 acres, while Milwaukee County contained the smallest areas, with an average area size of 52 acres.

Regionally, a total of 8,700 acres, or 0.5 percent of the total area of the Region, was contained within the boundaries of NA-1 Natural Areas. Ozaukee County contained not only the largest amount of NA-1 area at 2,282 acres, but also the greatest percentage of county area within NA-1 areas, 1.5 percent, and the largest average NA-1 size, 456 acres. This was largely due to the presence of the 2,009-acre Cedarburg Bog State Natural Area. Next in total NA-1 acreage were Waukesha and Walworth Counties, with 1,779 acres and 1,745 acres, respectively. At the other extreme, only 33 acres of Milwaukee County were included within an NA-1 boundary.

Of the 21,191 acres in the Region classified as NA-2 sites, comprising 1.2 percent of the total area of the Region, Washington County contained the greatest proportion of such acreage, 6,350 acres, representing 2.3 percent of the total area of the County. The smallest NA-2 acreage was in Milwaukee County, at 669 acres.

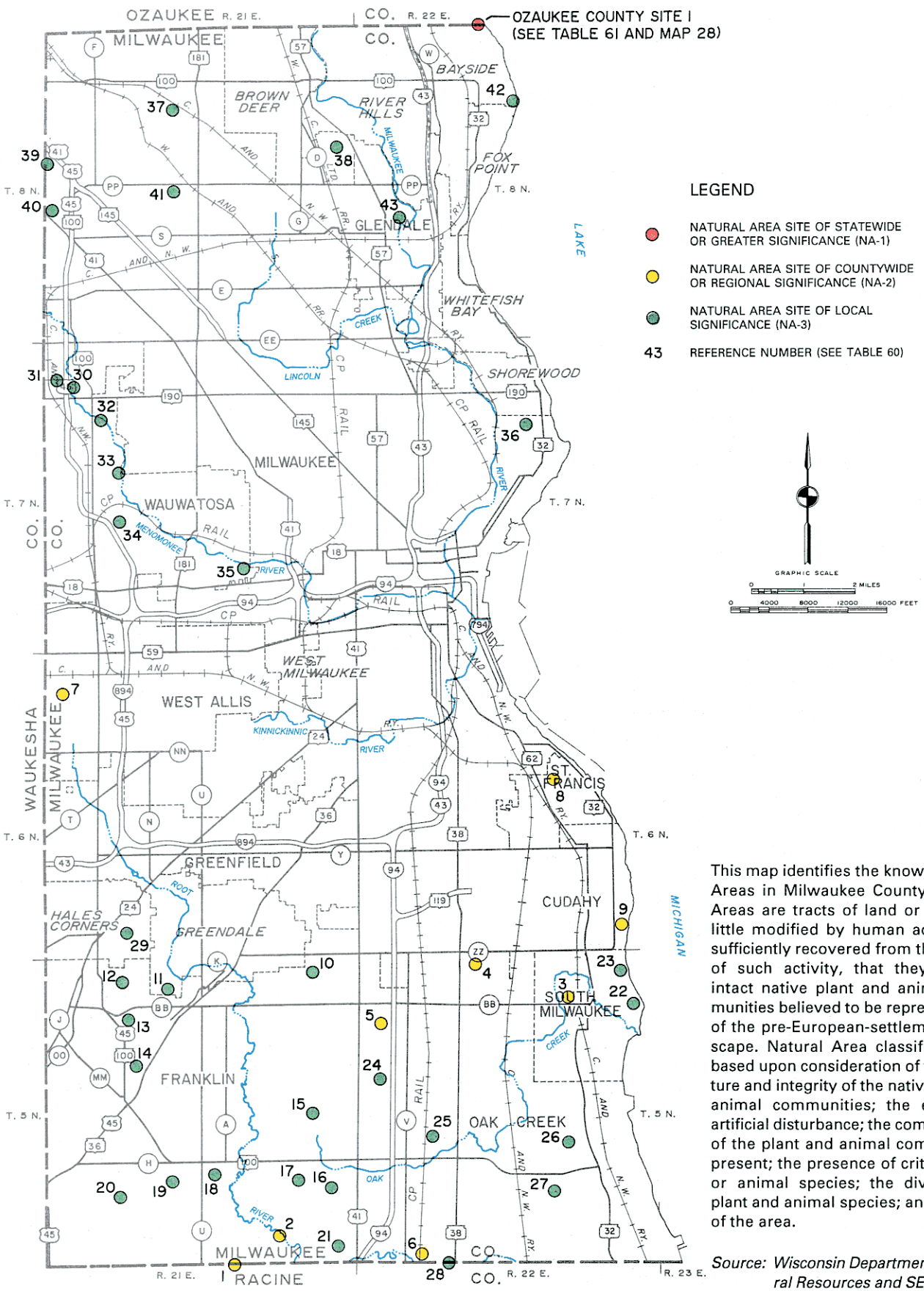
Of the 27,758 acres in the Region classified as NA-3 areas, comprising 1.6 percent of the total area of the Region, Washington County contained the greatest proportion, 7,961 acres, or 2.9 percent of the County, followed by Waukesha County, with 7,053 acres, or 1.9 percent of the County. The smallest NA-3 acreage was found in Kenosha County, with 1,095 acres, or 0.6 percent of the County.

Critical Plant Species Habitat Sites

Of the 304 vascular plant species that are listed on the "Wisconsin Rare Vascular Plant Working List" of the Bureau of Endangered Resources, Wisconsin

Map 27

KNOWN NATURAL AREAS IN MILWAUKEE COUNTY: 1994



This map identifies the known Natural Areas in Milwaukee County. Natural Areas are tracts of land or water so little modified by human activity, or sufficiently recovered from the effects of such activity, that they contain intact native plant and animal communities believed to be representative of the pre-European-settlement landscape. Natural Area classification is based upon consideration of the structure and integrity of the native plant or animal communities; the extent of artificial disturbance; the commonness of the plant and animal communities present; the presence of critical plant or animal species; the diversity of plant and animal species; and the size of the area.

Source: Wisconsin Department of Natural Resources and SEWRPC.

Table 61

KNOWN NATURAL AREAS IN OZAUKEE COUNTY: 1994

Map 28 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
1	Fairy Chasm State Natural Area	NA-1 (SNA, RSH)	T9N, R22E Sections 32, 33 City of Mequon T8N, R22E Sections 4, 5 Village of Bayside	The Nature Conservancy and other private	47 (plus 33 in Milwaukee County)	An 80- to 100-foot-deep wooded ravine which extends approximately 1.25 miles west from its confluence with Lake Michigan. The steep slopes support white pine, white cedar, and yellow birch on the north-facing slopes and dry-mesic hardwoods on the more exposed south-facing slopes. The ravine has special significance because cold air drainage enables several plant species with more northerly affinities to occur this far south. The flora includes the State-designated endangered pine-drops (Pterospora andromedea). The area extends south into Milwaukee County
2	Kurtz Woods State Natural Area	NA-1 (SNA, RSH)	T10N, R21E Section 1 Town of Grafton	The Nature Conservancy and other private	70	A mature southern mesic hardwoods that is a remnant of the once-extensive pre-settlement forest which covered this part of the Region. Dominated by sugar maple, beech, and white ash, with a moderately rich ground flora. Several small, dry kettle depressions are present. The woods have been undisturbed for at least 60 years. The younger woods to the southeast are important as a buffer
3	Riveredge Creek and Ephemeral Pond State Natural Area	NA-1 (SNA, RSH)	T11N, R21E Sections 7, 8 Town of Saukville	Riveredge Nature Center and other private	97	Second-order streams of exceptionally high water quality, fed by three first-order branches, all of which are spring-fed. Contains a stable, well-balanced, diverse fauna. Surrounding vegetation is a complex of second-growth northern wet-mesic forest, conifer swamp, shrub-carr, alder thicket, and young maple-beech and aspen woods. Contains a good population of the forked aster (Aster furcatus), a State-designated threatened species
4	Cedarburg Bog State Natural Area	NA-1 (SNA, RSH)	T11N, R21E Sections 19, 20, 21, 28, 29, 30, 31, 32, 33 Town of Saukville	Department of Natural Resources, University of Wisconsin-Milwaukee, and private	2,009	One of the largest and least disturbed bogs in eastern Wisconsin, containing an extensive conifer swamp forest, open bog, a shallow hard-water drainage lake, and masic woods on isolated islands. A portion of the area contains a string bog, characterized by noticeable ridges running perpendicular to water flow. This is the southernmost example in the world. The very high species diversity includes a large number of regionally rare species, many of which are northern relicts. A National Natural Landmark

Table 61 (continued)

Map 28 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
5	Sapa Spruce Bog State Natural Area	NA-1 (SNA, RSH)	T11N, R21E Section 30 Town of Saukville	University of Wisconsin-Milwaukee and privete	59	High-quality acid bog dominated by black spruce at one of its southernmost locations in Wisconsin. The rich, diverse flora includes at least six species of sphagnum moss
6	Cedarburg Beech Woods State Natural Area	NA-2 (SNA, RSH)	T11N, R21E Section 30 Town of Saukville	University of Wisconsin-Milweukee and private	130	Good-quality, mature, beech- and sugar maple-dominated southern mesic forest in a moraine area of low gravelly hills and kettle holes. Disturbance, including past selective logging and grazing, appears to be minimal. Grades into lowland forest to north end northeast. Historically a site of scientific research
7	Pigeon Creek Low and Mesic Woods	NA-2 (RSH)	T9N, R21E Section 10 City of Mequon	Private	81	A combination of lowland hardwoods, wet-mesic woods, and upland mesic woods, much of which borders the cold, clear, fast waters of Pigeon Creek. On the grounds of a former fox farm. Contains the State-designated endangered heart-leaved plantain (Plantago cordata), as well as the State-designated threatened snow trillium (Trillium nivale) and forked aster (Aster furcatus)
8	Donges Bay Gorge	NA-2 (RSH)	T9N, R22E Section 33 City of Mequon	Private	22	A deep, steep-sided clay ravine on the Lake Michigan shore, containing a white pine and beech forest. Northern relict species are present. The area has suffered from erosion, encroaching residential development, and overgrazing by deer
9	Milwaukee River Mesic Woods	NA-2 (RSH)	T11N, R21E Section 3 Town of Saukville T12N, R21E Section 34 Town of Fredonia	Ozaukee County, Girl Scouts of Milwaukee Area, Inc., and other private	382	Morainal deposits along a two-mile stretch of the Milwaukee River support moderate- to good-quality upland mesic woods, with lowland herdwoods in depressions. Species diversity is generally good throughout
10	Ducks Limited Bog	NA-2	T11N, R21E Section 5 Town of Saukville	Ducks Limited and other private	21	Good-quelity sphagnum bog on north side of a shallow lake and bordered by a deep moat. Typical acid-bog species present include leatherleaf, round-leaved sundew, snake-mouth orchid, grass-pink orchid, bog rosemary, blueberry, winterberry, pitcher plant, and cranberry. Area south of lake is more disturbed

Table 61 (continued)

Map 28 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
11	Riveredge Mesic Woods	NA-2 (RSH)	T11N, R21E Sections 6, 7 Town of Saukville	Riveredge Nature Center and other private	212	Good-quality regenerating stand of mesic woods and lowland hardwoods bordering the Milwaukee River. Trees are medium-aged. A variety of habitats supports a rich species complement, including several uncommon species. Disturbed by highway and residences in the southern portion of the woods. Area north of Milwaukee River is wetter and more disturbed. Much of woods owned by Riveredge Nature Center
12	Kinnamon Conifer Swamp	NA-2 (RSH)	T11N, R21E Sections 18, 19 Town of Saukville	Privete	382	A large wooded lowland, containing a combination of good-quality northern wet-mesic forest of white cedar and northern hardwoods swamp of black ash. Low glacial ridges within the swamp support mesic upland woods. Past disturbance appears, overall, to be minimal. The good, diverse northern understory includes a number of regionally uncommon species
13	South Conifer Swamp	NA-2	T11N, R21E Section 20 Town of Saukville	Private	52	Good-quality conifer swamp containing typical northern species. One of the few sites in the Region in which black spruce is present. Small lake is bordered by a narrow cattail fringe. Contains headwaters of Cedarburg Bog
14	Max's Bog	NA-2 (RSH)	T11N, R21E Section 20 Town of Saukville	Private	30	Two small, undeveloped, shallow lakes surrounded by good-quality bog mats. The area contains a number of species with more northern affinities
15	Huiras Lake Woods and Bog	NA-2	T12N, R21E Sections 8, 9, 10, 16 Town of Fredonia	Milwaukee Jewish Welfare Fund and other private	435	Large lowland and upland forested area that has been relatively undisturbed since last cut. A bog is located in the southern portion. Good diversity of tree and ground-layer species. The small, landlocked seepage lake is valuable for waterfowl migration and nesting. A number of northern relict species are present
16	Janik's Woods	NA-2 (RSH)	T12N, R21E Sections 29, 30 Town of Fredonia	Private	163	A relatively large, good-quality woodlot that is recovering from past disturbance. Southern portion is an upland containing medium-aged red oak, sugar maple, and basswood, with a diverse ground flora. Lowland hardwoods to the north contain scattered conifers

Table 61 (continued)

Map 28 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
17	Harrington Beach Lacustrine Forest	NA-2	T12N, R23E Section 19 Town of Belgium	Department of Natural Resources	178	Moderate- to good-quality mature second-growth northern wet-mesic forest, located just west of the shoreline beach ridge. Dominant trees include green and black ashes, basswood, and white cedar. This is a regionally rare community type, heavily used by migratory birds
18	Highland Road Woods	NA-3	T9N, R21E Section 11 City of Mequon	Private	53	Mesic woods of moderate quality dominated by sugar maple, beech, and basswood. Low areas contain ephemeral ponds
19	Pigeon Creek Maple Woods	NA-3 (RSH)	T9N, R21E Section 15 City of Mequon	Private	13	A small but good-quality mesic woods on sloping uplands above Pigeon Creek. Ground flora is very rich and diverse, including a large population of twinleaf (Jeffersonia diphylla), a State-designated special concern species
20	Solar Heights Low Woods	NA-3	T9N, R21E Sections 20, 21 City of Mequon	Private	114	Disturbed floodplain forest dominated by red and silver maples and yellow birch. Changing water levels and Dutch elm disease have altered the canopy. Native species diversity is low, and exotic species are proliferating
21	Triple Woods	NA-3	T9N, R21E Section 31 City of Mequon	Private	51	Upland mesic forest of sugar maple and beech. Despite past logging, the spring flora is relatively diverse. Offers protection to tributaries of the Little Menomonee River
22	Ville du Parc Riverine Forest	NA-3	T9N, R22E Sections 18, 19 City of Mequon	City of Mequon and private	111	One of the last remnants of riverine forest along this portion of the Milwaukee River. Contains old river channels. The woods is mostly second-growth, with a mixture of upland and lowland species
23	Mequon Wetland	NA-3	T9N, R22E Section 20 City of Mequon	Private	77	A mixed wetland area consisting of deep and shallow marsh, fresh (wet) meadow, shrub-carr, and young wet to wet-mesic lowland hardwoods. Wetland filling and water-level changes due to ditching and channel realignment have disturbed the area
24	Mole Creek Swamp	NA-3 (RSH)	T10N, R21E Section 2 Town of Cedarburg	City of Cedarburg, Town of Cedarburg, and private	89	Primarily a disturbed, low, wooded area bordering Mole Creek, dominated by green ash, alder, and red-osier dogwood
25	Cedar-Sauk Low Woods	NA-3	T10N, R21E Sections 5, 6 Town of Cedarburg T11N, R21E Section 31 Town of Saukville T11N, R20E Section 36 Town of Trenton	Private	204 (plus 14 in Washington County)	Lowland hardwood forest of silver maple, green and black ash, and American elm, with evidence of abundant past disturbances, including grazing, power-line right-of-way, and two highways. Stream flows through area from Cedarburg Bog

Table 61 (continued)

Map 28 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
26	Grafton Woods	NA-3 (RSH)	T10N, R21E Sections 13, 18 Town of Grafton	Private	18	Small mesic woods on east side of Milwaukee River. Despite history of grazing and selective cutting, has a good species diversity, including American gromwell (Lithospermum latifolium), a State-designated special concern species
27	Sherman Road Woods	NA-3	T10N, R21E Section 19 Town of Cedarburg	Private	72	Lowland hardwood forest with much second growth due to past grazing
28	Five Corners Swamp	NA-3	T10N, R21E Section 20 Town of Cedarburg	Private	173	A large lowland hardwood forest that is suffering from disturbance, including selective cutting and a network of wide trails. Dominant trees are red and silver maples and cottonwood. A windstorm in June 1991 snapped or uprooted a large number of mature trees
29	Cedar Creek Forest	NA-3 (RSH)	T10N, R21E Section 23 Town of Cedarburg	Private	23	Sugar maple and beech woods on west bank of Cedar Creek. Threatened by encroaching residential development
30	Cedar Heights Gorge	NA-3	T10N, R22E Section 3 Town of Grafton	Private	9	Disturbed, narrow, steep-sided gorge leading to Lake Michigan. Almost complete dominance by white cedar
31	Lions Den Gorge	NA-3	T10N, R22E Section 10 Town of Grafton	Private	20	Deep ravine on Lake Michigan shore. Dominated by white cedar and hardwoods, with a relatively good-quality herb layer, including a few northern relicts
32	Ulao Lowland Forest	NA-3	T10N, R22E Sections 4, 5, 8, 9, 17 Town of Grafton	Private	347	A large lowland hardwoods area, dominated by red and silver maples and black ash. Adversely affected by changing water levels, selective cutting, and Dutch elm disease, which have opened the canopy. Marshy stands occur throughout
33	Hansen's Lake Wetland	NA-3	T11N, R21E Section 4 Town of Saukville	Private	13	Small but good-quality lake surrounded by cattails, shrub-carr, and lowland hardwoods, with scattered tamaracks. Lake is stocked with bluegills
34	Knollwood Road Bog	NA-3	T11N, R21E Section 19 Town of Saukville	Private	9	Small lake surrounded by a sphagnum mat, shallow marsh, and lowland hardwoods
35	Hawthorn Drive Forest	NA-3	T11N, R22E Section 6 Town of Port Washington	Private	54	Wet-mesic red maple and American elm forest, with an upland forest of red oak, beech, and basswood to the south. Canopy has been opened by disease and logging
36	Spring Lake Marsh	NA-3	T12N, R21E Section 2 Town of Fredonia	Private	19	Good-quality wetland complex bordering a clear, shallow lake. Good habitat diversity includes shrub-carr, sedge meadow, shallow marsh, and cedar-tamarack swamp

Table 61 (continued)

Map 28 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
37	Spring Lake Beech Forest	NA-3	T12N, R21E Section 2 Town of Fredonia	Private	65	Small mesic hardwood forest dominated by small- to medium-sized beech, sugar maple, basswood, and white ash, with a long history of selective cutting
38	County Line Low Woods	NA-3	T12N, R21E Sections 4, 5 Town of Fredonia T13N, R21E Sections 32, 33 Town of Sherman	Private	214 (plus 58 in Sheboygan County)	Large but mostly young lowland hardwoods of mixed composition and having history of disturbance. Many openings in canopy allow dense undergrowth. Extends north into Sheboygan County
39	Beekeeper Bog	NA-3	T12N, R21E Section 5 Town of Fredonia	Ozaukee County and private	15	Good example of a typical kettle-hole bog with shallow water, shrub-carr, and northern wet-mesic white cedar forest. The southeastern portion has been ditched. Contains a good number of species with more northerly affinities
40	Department of Natural Resources Lowlands	NA-3	T12N, R21E Section 7 Town of Fredonia	Department of Natural Resources and private	186	Primarily a disturbed lowland hardwood forest with streams. Ponds have been dredged by Department of Natural Resources
41	Pioneer Road Lowlands	NA-3	T12N, R21E Sections 8, 17 Town of Fredonia	Private	94	A low, wet woodlot with a history of disturbance. North half contains a dense stand of tamarack, cedar, and black ash, with some large individual trees. South half has large scattered trees and thick undergrowth
42	Cedar Valley Swamp	NA-3	T12N, R21E Sections 10, 11, 15 Town of Fredonia	Private	141	An irregularly shaped lowland area disturbed by Dutch elm disease, logging, and water-level changes. Dominated by black ash, red maple, and white cedar, with small areas of tamarack. A small upland island in the center contains mature trees
43	Evergreen Road Bog	NA-3 (RSH)	T12N, R21E Section 14 Town of Fredonia	Private	44	Good-quality tamarack-cedar bog, with a large sedge-shrub area to the north and upland hardwoods to the southeast. Threatened by residential development
44	Kohler Road Woods	NA-3	T12N, R21E Sections 15, 22 Town of Fredonia	Private	124	Primarily a low, wet woods of medium-aged red and silver maples, yellow birch, and black ash. South half is younger, with many cut stumps
45	Waubeka Low Woods	NA-3	T12N, R21E Sections 31, 32 Town of Fredonia	Ozaukee County and private	161	Primarily a wooded lowland of tamarack, black ash, and yellow birch, but with glacial ridges containing upland trees. There is a history of disturbance
46	Cedar Grove Swamp	NA-3	T12N, R22E Sections 2, 3 Town of Belgium	Private	177	Extensive second-growth forest on ditched lacustrine flats with clayey soils. Dominated by red and silver maple, black ash, yellow birch, American elm, and swamp white oak. Repeatedly logged and encroached on by agriculture and ditching

Table 61 (continued)

Map 28 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
47	Belgium Swamp—North	NA-3	T12N, R22E Section 27 Town of Belgium	Private	150	An extensive, but young, lacustrine forest 2.5 miles from Lake Michigan, with American elm, black ash, and red and silver maples. Disease, logging, and windthrow have opened the canopy, permitting a brushy understory to develop
48	Belgium Swamp—South	NA-3	T12N, R22E Section 34 Town of Belgium	Private	148	Low, flat, wet forested area of black ash and silver and red maples, with some yellow birch and basswood. Old windfalls and dead standing trees are common. There is a history of disturbance, resulting in a very open and brushy appearance

[a]NA-1 identifies Natural Area sites of statewide or greater significance
NA-2 identifies Natural Area sites of countywide or regional significance
NA-3 identifies Natural Area sites of local significance
SNA, or State Natural Area, identifies those sites officially designated as State Natural Areas by the State of Wisconsin Natural Areas Preservation Council
RSH, or Rare Species Habitat, identifies those sites which support rare, threatened, or endangered animal or plant species officially designated by the Wisconsin Department of Natural Resources

Source: Wisconsin Department of Natural Resources and SEWRPC.

Department of Natural Resources, a total of 86, or 28 percent, were found growing as natives in Southeastern Wisconsin during the four-year course of the inventory, or were known to occur through reliable records dating back to 1970. Of the 86 critical plant species found, 16, or 19 percent, are classified as endangered; 20, or 23 percent, are classified as threatened; and 50, or 58 percent, are classified as special concern, or rare. A total of 818 critical species site occurrences were found within the Region, including 73 endangered, 187 threatened, and 558 rare species site occurrences (see Table 68). Of these, 689, or 84 percent, were located within the boundaries of Natural Area sites. The remaining 129 were found on 111 sites which, not meeting Natural Area criteria, were designated as Critical Plant Species Habitats (see Table 69 and Map 33). The scientific and common names of all species mentioned in this report are noted in Appendix A.

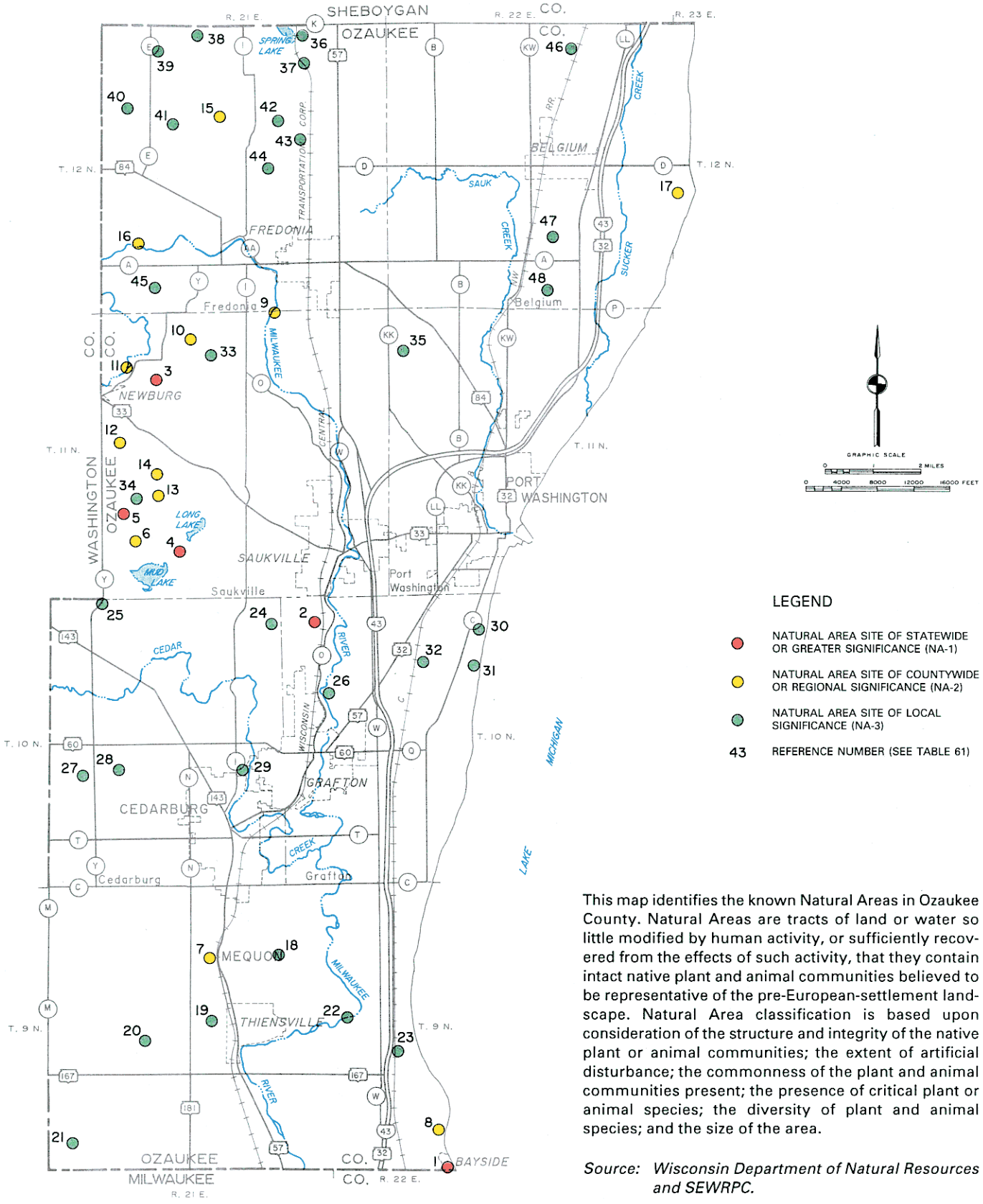
Among the Region's counties, the highest number of endangered species site occurrences, 22, was recorded in Kenosha County, while none was recorded in Washington County (see Table 68). The highest number of threatened species site occurrences, 55, was reported from Waukesha County, while Washington County, with four, had the lowest. The highest number of special concern, or rare, species site occurrences, 133, was recorded in Walworth County, while Ozaukee County had the lowest number, 46. Overall, the highest number of critical species site occurrences occurred in Walworth County, with 191, while Washington County had the lowest, with 51.

The distribution of locations of designated endangered and threatened plant species by Natural Area designation (see Table 70) shows that 22, or 55 percent, of the 40 NA-1 sites in the Region contained at least one such species; 40, or 33 percent, of the 122 NA-2 sites in the Region contained at least one such species; 37, or 13 percent, of the 285 NA-3 sites in the Region contained at least one such species; and 99, or 22 percent, of the 447 Natural Areas together contained at least one such species. Sixteen, or 40 percent, of all NA-1 sites contained two or more endangered or threatened species; seven, or 6 percent, of all NA-2 sites contained two or more such species; seven, or 2 percent, of all NA-3 sites contained two or more such species; and 30, or 7 percent, of all Natural Areas contained two or more such species.

The most frequently encountered endangered species in the Region was the blue-stemmed goldenrod (Solidago caesia), found at 23 sites, 13 of which were

Map 28

KNOWN NATURAL AREAS IN OZAUKEE COUNTY: 1994



LEGEND

- NATURAL AREA SITE OF STATEWIDE OR GREATER SIGNIFICANCE (NA-1)
- NATURAL AREA SITE OF COUNTYWIDE OR REGIONAL SIGNIFICANCE (NA-2)
- NATURAL AREA SITE OF LOCAL SIGNIFICANCE (NA-3)
- 43 REFERENCE NUMBER (SEE TABLE 61)

This map identifies the known Natural Areas in Ozaukee County. Natural Areas are tracts of land or water so little modified by human activity, or sufficiently recovered from the effects of such activity, that they contain intact native plant and animal communities believed to be representative of the pre-European-settlement landscape. Natural Area classification is based upon consideration of the structure and integrity of the native plant or animal communities; the extent of artificial disturbance; the commonness of the plant and animal communities present; the presence of critical plant or animal species; the diversity of plant and animal species; and the size of the area.

Source: Wisconsin Department of Natural Resources and SEWRPC.

Table 62

KNOWN NATURAL AREAS IN RACINE COUNTY: 1994

Map 29 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
1	Cherry Lake Sedge Meadow State Natural Area	NA-1 (SNA, RSH)	T3N, R19E Sections 10, 15 Town of Rochester	Department of Natural Resources and private	190	High-quality lowland complex of fen, wet prairie, sedge meadow, shrub-carr, shallow lake, and tamarack relict within a matrix of disturbed upland oak woods. A good combination of alkaline- and acid-loving plants is present. The irregular openings of water provide good nesting and escape cover for waterfowl, especially mallards, wood ducks, and blue-winged teals. The western border is a one-mile-long esker
2	Sanders Park Hardwoods State Natural Area	NA-1 (SNA, RSH)	T3N, R22E Section 36 Town of Mt. Pleasant	Racine County	56	Good-quality southern dry-mesic forest on two low ridges separated by a lowland swale. Good size-class distribution of tree species, including a number of large walnuts. The ground flora is rich and diverse, including several large patches of golden-seal (Hydrastis canadensis), a State-designated special concern species
3	Renak-Polak Maple-Beech Woods State Natural Area	NA-1 (SNA, RSH)	T4N, R22E Section 14 Town of Caledonia	University of Wisconsin-Parkside and private	138	Outstanding, mostly old-growth, low-lying southern mesic forest on east side of Root River. Wet-mesic hardwoods, shrub-carr, and shallow marsh lie along an intermittent stream which crosses the tract. Noted for spectacular displays of spring wildflowers. Probably the best such woods remaining in the Region
4	Kansasville Railroad Prairie	NA-1 (RSH)	T3N, R20E Sections 25, 26, 35, 36 Town of Dover T3N, R21E Section 30 Town of Yorkville	Private	14	Discontinuous remnants of mesic prairie located along railway right-of-way between Union Grove and Kansasville. Small sections are of very high quality, representing the best remaining examples of the once-extensive mesic prairie of central Racine and Kenosha Counties. Also included is a large old field which has been plowed but in which native prairie species have either persisted or are reinvading from the adjacent railway right-of-way. This latter area could be important for prairie reestablishment
5	Franksville Railroad Prairie	NA-1 (RSH)	T3N, R22E Sections 4, 9 Town of Mt. Pleasant	Private	4	A very rich and diverse remnant of mesic and wet-mesic prairie, located on west side of railway right-of-way. Contains some of the best such remnants in the Region. Regionally uncommon species include wild quinine (Parthenium integrifolium), prairie Indian plantain (Cacalia tuberosa), and marsh blazing-star (Liatris spicata)

Table 62 (continued)

Map 29 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
6	Elm Island Bog-Island Oak Woods	NA-1 (RSH)	T4N, R19E Sections 23, 24, 25, 26 Town of Waterford	Private	68	Two distinct plant communities of good quality are present—an upland wooded island dominated by red and white oaks without signs of past grazing or logging is bordered on the east by a sphagnum-tamarack bog with a number of characteristic bog species present
7	Tichigan Fen	NA-1 (RSH)	T4N, R19E Sections 21, 22 Town of Waterford	Department of Natural Resources and private	118	A fine example of springs and calcareous fen, with a number of uncommon species present. The site includes the lesser-quality upland woods to the south that protects the water sources of the springs
8	Karcher Springs State Natural Area	NA-2 (SNA, RSH)	T2N, R19E Section 21 Town of Burlington	Department of Natural Resources	23	Spring heads originating on east side of a wooded esker supply water for a clear, fast, cold, marl-bottomed stream. Along banks is found calcareous fen, habitat for a number of uncommon species
9	Brock Lake Fen	NA-2 (RSH)	T3N, R19E Sections 15, 16, 21 Town of Rochester	Department of Natural Resources and private	231	High-quality wetland complex of fen, shallow marsh, sedge meadow, and small, undeveloped lake. The rich native species complement includes a number of uncommon ones, such as beaked spike-rush (Eleocharis rostellata), Ohio goldenrod (Solidago ohioensis), common bog arrow-grass (Triglochin maritimum), and marsh blazing-star (Liatris spicata). An integral part of a long northeast-southwest lowland corridor
10	Leda Lake Fen-Meadow	NA-2 (RSH)	T3N, R19E Sections 20, 21, 29 Town of Burlington	Department of Natural Resources and private	221	Good-quality wetland complex of small, shallow, undeveloped lake, floating sedge mat, fen, sedge meadow, shrub-carr, and shallow cattail-bulrush marsh. Part of Cherry Lake-Brock Lake-Leda Lake environmental corridor
11	Rosewood Railroad Prairie	NA-2 (RSH)	T3N, R20E Sections 31-34 Town of Dover	Private	18	Discontinuous remnants of mesic prairie extending for three miles along deactivated railway right-of-way between Kansasville and Rosewood. Moderate quality overall, with small portions in better condition. Good diversity of native species, including a number of uncommon ones
12	Schroeder Road Marsh	NA-2	T3N, R20E Sections 35, 36 Town of Dover T2N, R20E Sections 1, 2 Town of Brighton	Private	77 (plus 111 in Kenosha County)	Large wetland area of shallow cattail marsh and sedge meadow that extends into Kenosha County. Perimeter has been disturbed but interior is intact

Table 62 (continued)

Map 29 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
13	Union Grove Railroad Prairie	NA-2 (RSH)	T3N, R21E Sections 25, 26, 27, 28, 29 Town of Yorkville	Private	32	Discontinuous remnants of mesic prairie along railway right-of-way, extending east from Union Grove to IH 94. Some small patches are of very good quality, containing such uncommon species as wild quinine (Parthenium integrifolium) and prairie Indian plantain (Cacalia tuberosa), both designated as threatened in Wisconsin
14	Norris Marsh and Slough	NA-2	T4N, R19E Sections 2, 3, 10 Town of Waterford T5N, R19E Sections 34, 35 Town of Vernon	Private	180 (plus 32 in Waukesha County)	Good-quality deep and shallow marsh along the Fox River
15	Tichigan Marsh	NA-2	T4N, R19E Sections 9, 10, 15, 16 Town of Waterford	Department of Natural Resources and private	447	Large, good-quality deep and shallow marsh with small patches of sedge meadow, bordering Tichigan Lake. Department of Natural Resources has excavated a series of ponds for wildlife
16	Tichigan Wetlands and Low Woods	NA-2	T4N, R19E Sections 10, 11 Town of Waterford	Department of Natural Resources and private	170	Wetland-upland complex consisting of good-quality deep and shallow marsh and sedge meadow bordered on north by older dry, dry-mesic, and wet-mesic woods, and regenerating woods and old field
17	Waubeesee Oak Woods and Tamarack Relict	NA-2	T4N, R20E Section 7 Town of Norway	Racine County and private	169	Relatively large and mostly intact oak woods on rough glacial topography, with intervening wetlands in depressions, some of which contain relict tamaracks. This is one of the few woods of such size remaining in this rapidly developing part of the Region
18	Wind Lake Tamarack Swamp	NA-2	T4N, R20E Sections 10, 11, 14, 15 Town of Norway	Department of Natural Resources and private	334	Large block of former tamarack swamp that is converting to lowland hardwoods due to hydrologic changes resulting from artificial drainage of surrounding agricultural land. This woods remains a refugium for many species with mora northerly affinities, such as starflower, goldthread, winterberry, dwarf raspberry, yellow birch, bunchberry, and blueberry
19	Wind Lake Shrub-Fen	NA-2 (RSH)	T4N, R20E Section 9 Town of Norway	Private	21	Good-quality wetland complex of fen and shrub-carr on south end of Wind Lake. Contains a good population of Ohio goldenrod (Solidago ohioensis)
20	County Line Riverine Woods	NA-2 (RSH)	T4N, R21E Section 1 Town of Raymond	Racine County and private	141	Good-quality riverine lowland hardwood forest along the Root River. Smaller upland to northwest contains mesic hardwoods with a rich ground flora. An integral part of the Root River environmental corridor

Table 62 (continued)

Map 29 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
21	Hunts Woods	NA-2 (RSH)	T4N, R22E Section 3 Town of Caledonia	Racine County and private	34	A small but undisturbed remnant of southern mesic hardwoods, dominated by mature beeches and sugar maples. The woods to the south and east are younger, while to the north are lowland hardwoods. The relatively rich ground flora includes the State-designated endangered blue-stemmed goldenrod (Solidago caesia)
22	Caledonia Wildlife Area	NA-2	T4N, R22E Section 21 Town of Caledonia	Town of Caledonia and private	166	An open wetland with seasonal ponds that attract a large number of migrating birds such as whistling swans, snow geese, golden plovers, and willets. The pond is one of the few secure stopover areas in the Region, and is a very good observation area
23	Cliffside Park Woods and Clay Banks	NA-2 (RSH)	T4N, R23E Sections 7, 8 Town of Caledonia	Racine County, Town of Caledonia, and private	55	Second-growth mesic woods, ravine, and steep clay banks along Lake Michigan harbor a rich and diverse flora, including such uncommon species as buffaloberry, yellowish gentian, stiff gentian, balsam poplar, and blue-stemmed goldenrod
24	Burlington Railroad Prairie	NA-3 (RSH)	T2N, R19E Section 6 Town of Burlington T2N, R18E Section 1 Town of Lyons	Private	4 (plus 1 in Walworth County)	One-quarter-mile stretch of mesic, dry-mesic, and dry prairie remnants bordering railway right-of-way
25	Burlington Hills Woods	NA-3 (RSH)	T2N, R19E Sections 5, 6, 7, 18 Town of Burlington T2N, R18E Sections 1, 12, 13 Town of Lyons	Private	557 (plus 80 in Walworth County)	Rough morainal ridges occupied by mature and second-growth oak woods, with small, scattered patches of dry hill prairie and disturbed openings. Largest remaining upland woods in Racine County; important for forest-interior-breeding birds. Currently threatened by sand and gravel mine expansion
26	Bohner Lake Lowlands	NA-3	T2N, R19E Sections 19, 20 Town of Burlington	Private	33	Moderate-quality combination of shallow marsh, sedge meadow, and shrub-carr
27	Wadewitz Woods	NA-3 (RSH)	T3N, R19E Sections 2, 3 Town of Rochester	Racine County and private	204	Large upland complex of disturbed oak woods and former oak openings, cedar glades, dry-mesic woods, small dry hill prairies, and older woods
28	Rowntree Road Woods	NA-3	T3N, R19E Sections 11, 12 Town of Rochester	Private	74	A typical xeric oak woods, with several wet areas containing lowland hardwoods. An active blue heron rookery is present
29	English Settlement Prairie	NA-3	T3N, R19E Section 13 Town of Rochester	Private	16	Moderate-quality wet-mesic prairie with a history of disturbance, including plowing and grazing
30	Eagle Creek Woods	NA-3	T3N, R19E Sections 13, 14 Town of Rochester	Private	84	Typical xeric oak woods—relatively large but with a history of grazing and selective cutting

Table 62 (continued)

Map 29 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
31	Fox River Prairie	NA-3	T3N, R19E Sections 14, 15 Town of Rochester	Private	2	Prairie remnants along former railway right-of-way, now county bicycle trail. Area consists of two separate patches—a hill to the south contains a small, depauperate dry prairie, while to the north a low area contains a larger and better-quality mesic and wet-mesic prairie
32	Honey Lake Leatherleaf Bog	NA-3	T3N, R19E Sections 19, 20 Town of Burlington	Private	69	A large monotypic leatherleaf bog relict, rare in the southern part of the Region
33	Wehmhoff Park Upland Woods and Wetlands	NA-3	T3N, R19E Section 29 Town of Burlington	Town of Burlington and private	73	Moderate-quality sedge meadow-shallow marsh wetlands, located within an upland matrix of disturbed oak woods and dry hill prairie on hilly glacial terrain
34	Fox River Riverine Forest	NA-3	T3N, R19E Sections 21, 22, 28 Town of Burlington	Racine County and private	131	Lowland and upland woods bordering the Fox River
35	Dover Wildlife Area Wetlands	NA-3 (RSH)	T3N, R20E Section 12 Town of Dover	Department of Natural Resources and private	39	Wetland complex maintained by Department of Natural Resources as wildlife refuge, consisting of shallow open water, shallow marsh, shrub-carr, and small wet-mesic prairie
36	Church Road Lowlands	NA-3	T3N, R20E Sections 16, 21 Town of Dover	Department of Natural Resources and private	25	Sedge meadow and shallow marsh on north shore of Eagle Lake
37	Eagle Lake Wetlands	NA-3	T3N, R20E Sections 27, 28 Town of Dover	Department of Natural Resources and private	46	Shallow marsh and shrub-carr on south shore of Eagle Lake. Disturbed by past ditching attempts
38	Vandenboom Road Marsh	NA-3	T3N, R20E Section 28 Town of Dover	Private	27	Shallow, cattail-dominated marsh
39	Ives Grove Woods	NA-3	T3N, R21E Section 12 Town of Yorkville	Racine County and private	164	Relatively large upland wooded island, consisting of dry-mesic woods to south and xeric woods to north. Much of south woods is part of Racine County park. The ground flora is rich and diverse. A small stream bisects the two woods
40	Sylvania Railroad Prairie	NA-3 (RSH)	T3N, R22E Sections 20, 30 Town of Mt. Pleasant	Private	7	Mesic prairie remnant extending one mile east of IH 94 along railway right-of-way. Moderate quality, with a good population of wild quinine (Parthenium integrifolium), a State-designated threatened species

Table 62 (continued)

Map 29 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
41	Campbell Woods	NA-3 (RSH)	T3N, R22E Sections 35, 36 Town of Mt. Pleasant	Private	72	Dry to dry-mesic hardwood forest of moderate quality on flat to somewhat rolling topography, with several small temporary ponds and intermittent streams, and a wetland complex to the east. The latter area includes hop-like sedge (Carex lupuliformis), a State-designated endangered species. This is one of the larger, relatively intact woods in this part of Racine County
42	Van Valin Woods	NA-3	T4N, R19E Section 2 Town of Waterford	Private	30	Moderate-quality dry-mesic woods dominated by white oak, shagbark hickory, white ash, and sugar maple. Threatened by encroaching residential development
43	Tichigan Wet Prairie	NA-3 (RSH)	T4N, R19E Section 10 Town of Waterford	Department of Natural Resources	15	Moderate- to good-quality combination of wet prairie, sedge meadow, and shallow marsh, with some calciphiles, such as Ohio goldenrod (Solidago ohioensis), present. Site is burned periodically to control shrubs
44	Wind Lake Wet Meadow	NA-3 (RSH)	T4N, R20E Section 4 Town of Norway	Private	12	A moderate-quality wetland complex of wet meadow, fen, shallow marsh, and sedge meadow on north shore of Wind Lake. Contains marsh blazing-star (Liatris spicata), a State-designated special concern species
45	Six Mile Road Swamp	NA-3	T4N, R21E Section 7 Town of Raymond	Private	55	Lowland hardwood forest of moderate quality, with a few northern relicts, such as tamarack (mostly dead), winterberry, paper birch, dwarf raspberry, and sphagnum. Dry-mesic upland woods border on the south
46	Kimmel Woods	NA-3 (RSH)	T4N, R21E Section 12 Town of Raymond	Private	40	Moderate-quality southern dry-mesic woods and lowland hardwoods bordering a small stream. Good, representative ground flora
47	Seven Mile Road Woods	NA-3 (RSH)	T4N, R22E Section 8 Town of Caledonia	Private	20	Second-growth maple-ash-oak woods of about 60 years of age that has been subjected to past selective cutting. Contains a rich and diverse ground flora. Low areas contain ephemeral ponds
48	Zirbes Woods	NA-3 (RSH)	T4N, R22E Section 9 Town of Caledonia	Private	13	A small but relatively undisturbed mesic woods dominated by basswood, white ash, red oak, and sugar maple, with a rich ground flora. Future high-grading is indicated by a number of the larger oaks which were marked

Table 62 (continued)

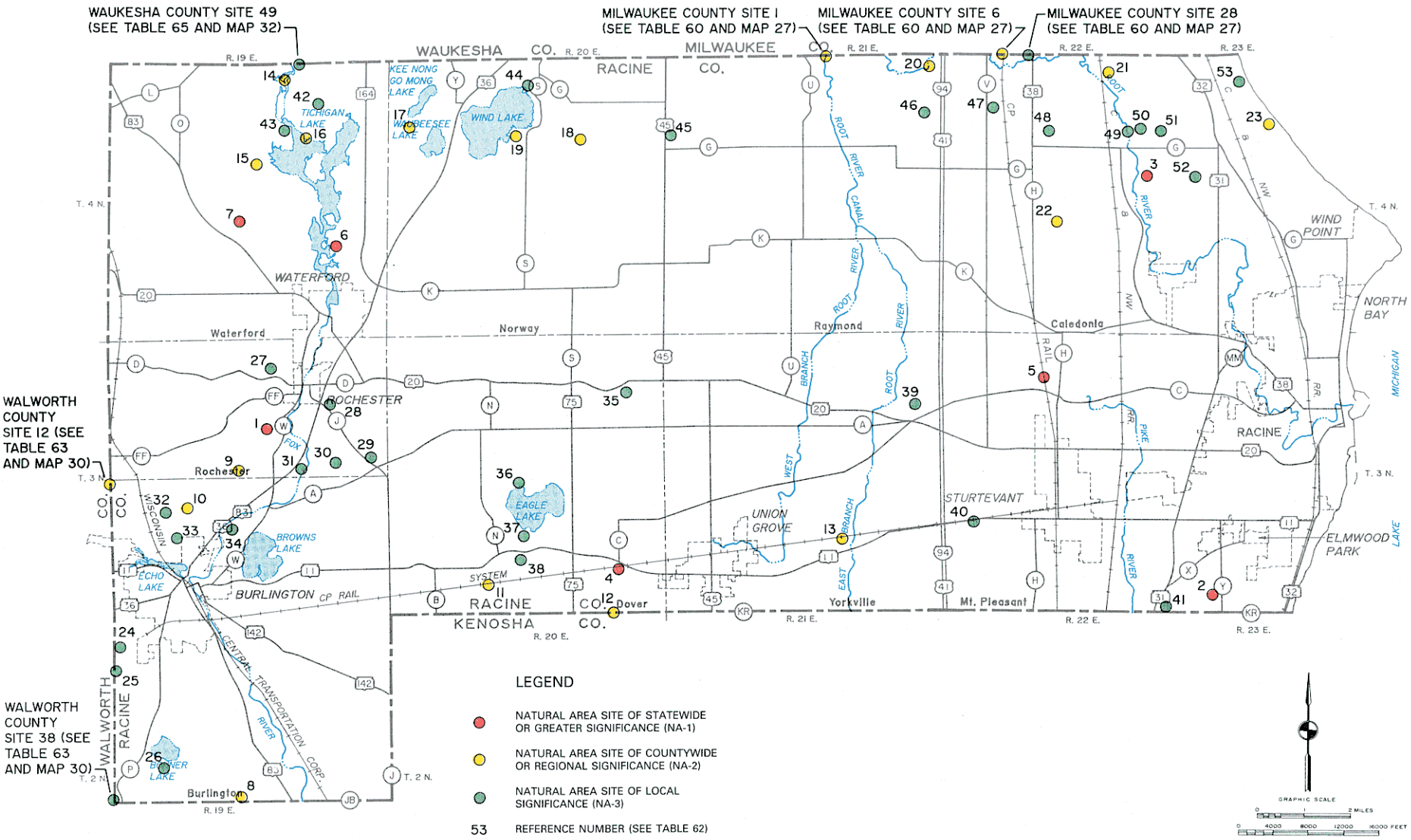
Map-29 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
49	Caledonia Low Woods	NA-3 (RSH)	T4N, R22E Sections 10, 11, 14 Town of Caledonia	Racine County and private	107	Moderate-quality lowland hardwoods bordering the Root River. Adjoining upland woods contains three State-designated special concern species: American gromwell (Lithospermum latifolium), red trillium (Trillium recurvatum), and black haw (Viburnum prunifolium)
50	Foley Road Woods—West	NA-3 (RSH)	T4N, R22E Section 11 Town of Caledonia	Private	19	Medium-age mesic and wet-mesic woods with a large population of black haw (Viburnum prunifolium)
51	Foley Road Woods—East	NA-3 (RSH)	T4N, R22E Section 11 Town of Caledonia	Private	24	Moderate-quality mesic woods with a rich ground flora; reportedly contains the State-designated endangered blue-stemmed goldenrod (Solidago caesia)
52	Tabor Woods	NA-3 (RSH)	T4N, R22E Sections 13, 14 Town of Caledonia	Private	107	Relatively large but irregularly shaped mesic, dry-mesic, and wet-mesic woods that have suffered various degrees of disturbance. Portions of the woods are dominated by beech. Threatened by increasing residential development in the area
53	Power Plant Ravine Woods	NA-3 (RSH)	T4N, R23E Section 6 Town of Caledonia	Private	32	Mesic woods bordering a steep ravine that leads to Lake Michigan. Although the woods has suffered from disturbance, it contains a rich flora, including a large population of the State-designated endangered blue-stemmed goldenrod (Solidago caesia). The exposed ravine slopes and Lake Michigan clay banks contain a number of unusual species

[a] *NA-1 identifies Natural Area sites of statewide or greater significance*
NA-2 identifies Natural Area sites of countywide or regional significance
NA-3 identifies Natural Area sites of local significance
SNA, or State Natural Area, identifies those sites officially designated as State Natural Areas by the State of Wisconsin Natural Areas Preservation Council
RSH, or Rare Species Habitat, identifies those sites which support rare, threatened, or endangered animal or plant species officially designated by the Wisconsin Department of Natural Resources

Source: Wisconsin Department of Natural Resources and SEWRPC.

Map 29

KNOWN NATURAL AREAS IN RACINE COUNTY: 1994



This map identifies the known Natural Areas in Racine County. Natural Areas are tracts of land or water so little modified by human activity, or sufficiently recovered from the effects of such activity, that they contain intact native plant and animal communities believed to be representative of the pre-European-settlement landscape. Natural Area classification is based upon consideration of the structure and integrity of the native plant or animal communities; the extent of artificial disturbance; the commonness of the plant and animal communities present; the presence of critical plant or animal species; the diversity of plant and animal species; and the size of the area.

Source: Wisconsin Department of Natural Resources and SEWRPC.

Table 63

KNOWN NATURAL AREAS IN WALWORTH COUNTY: 1994

Map 30 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description end Comments
1	Bluff Creek Fens	NA-1 (SNA, RSH)	T4N, R15E Sections 13, 14, 23, 24 Town of Whitewater	Department of Natural Resources	106	Excellent-quality springs and associated calcareous fens located at intervals along the headwaters of Bluff Creek. Portions of the stream have been ditched. Contains threatened and endangered species
2	Clover Valley Fen State Natural Area	NA-1 (SNA, RSH)	T4N, R15E Sections 22, 26, 27 Town of Whitewater	Department of Natural Resources and private	112	Prominent feature is a series of 11,000-year-old peat mounds that rise eight to 10 feet above the surrounding lowland, formed by accumulations of partially decayed vegetation around slowly flowing springs. A large number of characteristic fen plant species are present, including State-designated threatened and endangered ones
3	Bluff Creek Woods	NA-1 (SNA, RSH)	T4N, R15E Sections 13, 24 Town of Whitewater T4N, R16E Sections 18, 19 Town of LaGrange	Department of Natural Resources and private	338	Extensive dry-mesic woods on rough glacial terrain, dominated by mature red oaks. Best areas are of good quality, but some parts have been disturbed by trails and past grazing and selective logging
4	Young Prairie State Natural Area	NA-1 (SNA, RSH)	T4N, R16E Section 5 Town of LaGrange T5N, R16E Section 32 Town of Palmyra	Department of Natural Resources	53 (plus 9 in Jefferson County)	Very high-quality wet-mesic prairie, among the best and largest prairie remnants of its type in the Region. The showy flora includes State-designated threatened and endangered species. The area, which extends north into Jefferson County, includes old field that is reverting to prairie
5	Lulu Lake and Eagle Spring Lake Wetland Complex and Adjacent Uplands	NA-1 (SNA, RSH)	T4N, R17E Sections 1, 2, 3, 10, 11 Town of Troy T5N, R17E Section 35 Town of Eagle	Department of Natural Resources, The Nature Conservancy, and other private	791 (plus 179 in Waukesha County)	Among the most valuable natural areas in the State, containing a large concentration of elements of natural diversity. Uplands support oak woods, oak openings, and dry prairie; lowlands contain one of the State's finest wetland ecosystems, including bog, springs, fen, deep and shallow marsh, sedge meadow, stream, and high-quality lake communities
6	Pickerel Lake Fen State Natural Area	NA-1 (SNA, RSH)	T4N, R17E Sections 13, 24 Town of Troy	The Nature Conservancy and other private	273	Large, high-quality calcareous fen and associated seepage springs bordering shallow lake. A number of uncommon species are present, including a large population of the State-designated threatened beaked spike-rush (Eleocharis rostellata)

Table 63 (continued)

Map 30 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
7	Beulah Bog State Natural Area	NA-1 (SNA, RSH)	T4N, R18E Sections 7, 8 Town of East Troy	Department of Natural Resources and private	72	Outstanding acid sphagnum bog communities located in a series of four kettle holes. A small open-water bog lake is surrounded by a quaking mat and tamarack swamp. A wet, open moat separates bog from wooded and pastured uplands
8	Comus Lake Wetland Complex	NA-2 (RSH)	T2N, R16E Sections 5, 6, 7, 8 Town of Delavan	Private	291	A large wetland complex bordering Comus Lake and Turtle Creek that includes sedge meadow, deep and shallow marsh, shrub-carr, calcareous fens, and seeping and bubbling springs. Some of the fens and springs are of excellent quality, containing such uncommon species as beaked spike-rush (Eleocharis rostellata), a State-designated threatened species
9	Delavan Prairie-Fen	NA-2 (RSH)	T2N, R16E Section 30 Town of Delavan	Private	107	High-quality wet prairie-fen surrounded by sedge meadow and shrub-carr. Uncommon species include tussock bulrush (Scirpus caspitosus), a State-designated endangered species. Disturbances include past ditching attempts
10	Lake Ivanhoe Fen and Sedge Meadow	NA-2 (RSH)	T2N, R18E Sections 34, 35 Town of Lyons	Department of Natural Resources and private	93	Wetland complex on north side of Lake Ivanhoe, consisting of sedge meadow, shallow marsh, and high-quality calcareous fen communities. The fen contains a number of uncommon species, including the State-designated threatened beaked spike-rush (Eleocharis rostellata)
11	Spring Prairie Fen	NA-2 (RSH)	T3N, R18E Section 19 Town of Spring Prairie	Private	34	Wetland complex occupying shallow depression, consisting largely of high-quality calcareous fen-meadow, with areas of tamarack relict and shrub-carr. Very good species complement, including Ohio goldenrod (Solidago ohioensis) and common bog arrow-grass (Triglochin maritimum), both State-designated special concern species
12	Honey Lake Marsh and Sedge Meadow	NA-2 (RSH)	T3N, R18E Sections 13, 24 Town of Spring Prairie T3N, R19E Sections 17, 18, 19, 20 Town of Burlington	Department of Natural Resources, The Nature Conservancy, and other private	141 (plus 250 in Racine County)	Large, relatively undisturbed wetland complex, primarily consisting of good-quality sedge meadow and deep and shallow marsh, but also with smaller areas containing springs and calcareous fens. Nesting site for sandhill cranes
13	Kestol Dry Prairie	NA-2 (RSH)	T4N, R16E Section 4 Town of LaGrange	Department of Natural Resources	1	Good-quality dry hill prairie, containing good native species diversity. Characteristic species include big and little bluestem, prairie dropseed, purple prairie-clover, and yellow flax. Managed by burning

Table 63 (continued)

Map 30 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
14	LaGrange Oak Woods	NA-2	T4N, R16E Sections 8, 17, 18, 20 Town of LaGrange	Department of Natural Resources and private	698	Extensive southern dry forest dominated by large white, red, black, and bur oak on rough kettle moraine topography. One of the largest blocks of upland forest in the Southern Kettle Moraine, and, as such, is important for forest-interior-breeding birds
15	Muir Oak Woods and Duffin Road Fen	NA-2 (RSH)	T4N, R16E Sections 3, 4, 9, 10, 16 Town of LaGrange	Department of Natural Resources and private	664	Large complex of lowland and upland communities. The dry, morainal uplands support extensive oak woods and small patches of managed dry prairie. Depressions hold leatherleaf-dominated bogs, shallow marsh, and a high-quality fen along the western border. Important to maintain as a large, intact block
16	Upper Mukwonago River Wetland Complex	NA-2 (RSH)	T4N, R17E Sections 3, 9, 10 Town of Troy	The Nature Conservancy and other private	338	A large, good-quality wetland complex that includes seepage springs, calcareous fen, sedge meadow, shrub-carr, shallow marsh, and tamarack relict. Disturbance has been minimal, mostly confined to the bordering wooded uplands
17	Adams Lake Fen and Marsh	NA-2 (RSH)	T4N, R17E Section 19 Town of Troy	Private	65	Good-quality calcareous fen and seepage springs located at base of uplands on east side of lake. Shallow marsh surrounds lake, on the west side of which is a tamarack relict. Uncommon plant species include swamp agrimony (Agrimonia parviflora), a State-designated special concern species
18	Thiede Road Tamarack Swamp	NA-2	T4N, R18E Section 13 Town of East Troy	Private	48	Good-quality shallow bog lake, bog mat, and tamarack swamp, bordered by shrub-carr and lowland hardwoods
19	Swan Lake Wetland Complex	NA-2 (RSH)	T4N, R18E Section 18 Town of East Troy T4N, R17E Sections 12, 13 Town of Troy	Girl Scouts of Milwaukee Area, Inc., and other private	167	Good-quality wetland complex within an upland matrix of xeric oak woods. Lowland communities include bog, sedge meadow, shallow marsh, lake, and mature tamarack swamp. Contains a good population of showy lady's-slipper orchid (Cypripedium reginae), a State-designated special concern species
20	Salt Box Road Railroad Prairie	NA-3 (RSH)	T1N, R15E Sections 29, 30 Town of Sharon	Private	12	Approximately one-mile-long stretch of railroad prairie representing the best remaining example of mesic prairie in this intensely agriculturalized portion of the Region. Good species diversity. The highest-quality portion of this area is at its extreme eastern end

Table 63 (continued)

Map 30 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
21	Fontana Prairie and Fen	NA-3 (RSH)	T1N, R16E Section 15 Village of Fontana-on-Geneva Lake	Village of Fontana-on-Geneva Lake	10	A moderate-quality calcareous fen and wet-mesic prairie complex that is being actively managed. Several uncommon species are present, including the State-designated threatened beaked spike-rush (Eleocharis rostellata). Disturbances include groundwater-level changes resulting from highway construction
22	Wychwood	NA-3	T1N, R17E Sections 2, 3, 4 Town of Linn T2N, R17E Section 35 Town of Geneva	Private	226	A large tract of dry-mesic hardwoods occupying a terminal moraine on the north side of Geneva Lake. Generally good quality throughout, except for the large estates which occupy much of the woods
23	Peninsula Woods	NA-3 (RSH)	T1N, R17E Sections 5, 6 Town of Linn	Private	39	Dry-mesic hardwood stand on north side of Geneva Lake. Contains American gromwell (Lithospermum latifolium), a State-designated special concern species
24	Williams Bay Lowlands	NA-3 (RSH)	T1N, R17E Section 6 Village of Williams Bay	Village of Williams Bay	8	Moderate-quality complex of sedge meadow, shrub-carr, shallow marsh, wet prairie, and lowland hardwoods. Contains white lady's-slipper orchid (Cypripedium candidum), a State-designated threatened species
25	Hafs Road Marsh	NA-3	T1N, R18E Sections 1, 2, 11 Town of Bloomfield	Private	106	Deep and shallow marsh complex with much open water. Dominated by cattails and bulrushes
26	Lake Ivanhoe Sedge Meadow	NA-3	T1N, R18E Section 3 Town of Bloomfield	Department of Natural Resources and private	71	Moderate- to good-quality wetland complex of sedge meadow, shrub-carr, and tamarack relict
27	Bloomfield Sedge Meadow and Tamarack Relict	NA-3	T1N, R18E Sections 7, 8, 18 Town of Bloomfield	City of Lake Geneva, Department of Natural Resources, and private	171	Large wetland complex of good-quality sedge meadow, with shrub-carr and tamarack relict. Disturbances include past ditching attempts
28	Pell Lake Railroad Prairie	NA-3 (RSH)	T1N, R18E Sections 8, 17 Town of Bloomfield	Private	4	Small remnant of mesic and wet-mesic prairie along abandoned railway right-of-way. Floristically rich, with several regionally uncommon species
29	Bloomfield Prairie	NA-3 (RSH)	T1N, R18E Sections 26, 27 Town of Bloomfield	Private	4	Mesic prairie remnant situated between highway and abandoned railway right-of-way. Characteristic species include prairie dock, golden alexanders, big bluestem, rosinweed, Culver's-root, and prairie cordgrass. One of the best such remnants in this part of the Region
30	Darien Oak Woods	NA-3	T2N, R15E Sections 9, 10, 15, 16 Town of Darien	Private	348	A disturbed xeric oak woods that is included because of its size, which offers nesting habitat for forest-interior-breeding birds

Table 63 (continued)

Map 30 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
31	Turtle Creek Sedge Meadow and Fen	NA-3 (RSH)	T2N, R15E Sections 17, 18 Town of Darien	Department of Natural Resources and private	159	A large, generally disturbed wetland complex of sedge meadow and shrub-carr, with local areas of higher-quality calcareous fens. A documented queen snake hibernaculum is located here
32	Creek Road Fen	NA-3 (RSH)	T2N, R15E Section 21 Town of Darien	Department of Natural Resources	9	Moderate-quality fen, sedge meadow, and shrub-carr complex within the Turtle Creek lowlands. Disturbances include past ditching attempts
33	CTH P Sedge Meadow	NA-3	T2N, R16E Section 6 Town of Delavan T3N, R16E Section 31 Town of Sugar Creek	Private	18	Moderate-quality sedge meadow and shrub-carr
34	Marsh Road Railroad Prairie	NA-3	T2N, R16E Section 9 Town of Delavan	Private	4	Remnant of dry-mesic prairie along lightly used railway, with some good-quality segments. Characteristic species include leadplant, hoary puccoon, big bluestem, downy phlox, and heart-leaved golden alexanders
35	Lake Lawn Wetland Complex	NA-3	T2N, R16E Sections 13, 14, 23 Town of Delavan	Department of Natural Resources and private	276	A large wetland complex along Jackson Creek at the north end of Delavan Lake. Plant communities include deep and shallow marsh and sedge meadow
36	Warbler Trail Wetlands	NA-3	T2N, R17E Sections 26, 27 Town of Geneva	Department of Natural Resources and private	40	Shallow marsh, shrub-carr, sedge meadow, and lowland hardwoods along east shore of Lake Como
37	Lake Como Wetlands	NA-3	T2N, R17E Section 32 Town of Geneva	Geneva National	50	Deep and shallow marsh at west end of Lake Como. Has suffered recent disturbance from construction of adjacent resort
38	Tri-County Tamarack Swamp	NA-3	T2N, R18E Sections 24, 25 Town of Lyons T2N, R19E Section 19 Town of Burlington	Private	25 (plus 15 in Racine County)	Medium-aged tamarack swamp surrounded by dense shrub-carr. Extends into Racine County
39	Peterson Fen	NA-3 (RSH)	T2N, R18E Section 26 Town of Lyons	Private	2	Good-quality calcareous fen, shrub-carr, and sedge meadow along Ivanhoe Creek. Contains Ohio goldenrod (Solidago ohioensis) and small fringed gentian (Gentiana procera), both State-designated spacial concern species
40	Lake Geneva Tamarack Relict	NA-3	T2N, R18E Sections 28, 29 Town of Lyons	Private	160	Large tamarack relict-shrub-carr complex with small, shallow lakes in depressions. Adjacent development and past ditching attempts have disturbed the site
41	Ivanhoe Creek Fen	NA-3 (RSH)	T2N, R18E Section 35 Town of Lyons	Private	32	Wetland complex along Ivanhoe Creek, containing shrub-carr, shallow marsh, and good-quality calcareous fen

Table 63 (continued)

Map 30 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
42	Cranberry Road Bog	NA-3	T2N, R18E Sections 26, 35 Town of Lyons	Private	46	Large bog and marsh complex occupying a shallow depression, dominated by leatherleaf and glossy buckthorn. Young tamaracks are present near center of bog. Species diversity is low, but a large population of pitcher plant is present. This community occurs near the southern limits of its range
43	Lake Loraine Woods—West	NA-3	T3N, R15E Section 8 Town of Richmond	Private	86	Disturbed xeric oak woods on flat-to-undulating topography. North end is lower and somewhat more mesic. Included because of relatively large size
44	Lake Loraine Woods—East	NA-3	T3N, R15E Section 8 Town of Richmond	Private	75	Xeric woods containing scattered, mature oaks, and relatively intact shrub and herb layers. Disturbances include trails and past grazing and selective cutting
45	Lake Loraine Marsh	NA-3	T3N, R15E Sections 8, 9 Town of Richmond	Private	35	Good-quality deep and shallow marsh on developed lake
46	Lake No. 10	NA-3	T3N, R15E Section 10 Town of Richmond	Private	40	Small, undeveloped lake in a kettle depression, containing deep and shallow marsh
47	Lake Wandawega Marsh	NA-3	T3N, R16E Sections 2, 3, 11 Town of Sugar Creek	Private	82	A large deep and shallow marsh at west end of lake, with good complement of aquatic species. Much of lake upland is developed
48	North Lake Marsh	NA-3	T3N, R16E Section 6 Town of Sugar Creek	Private	67	Large marsh on west side of lake, with rich aquatic species complement. Lake upland heavily developed and grazed
49	Silver Lake	NA-3	T3N, R16E Sections 11, 14 Town of Sugar Creek	Private	86	Shallow lake that contains a rich complement of native aquatic species. Good water quality. A small dry prairie remnant is located on the north side of the lake
50	Granzeau Woods	NA-3	T3N, R17E Section 12 Town of Lafayette	Private	78	Good-quality dry-mesic hardwoods embedded in a matrix of more-disturbed woods. Dominated by red and white oaks and sugar maple. Currently threatened by logging activity
51	Pallottine Maple Woods	NA-3	T3N, R17E Sections 11, 14 Town of Lafayette	Pallottine Fathers	153	Moderate-quality mesic and dry-mesic hardwoods with good species diversity. Disturbances include a trail network and past selective cutting
52	Sugar Creek Fens, Springs, and Sedge Meadow	NA-3 (RSH)	T3N, R17E Section 15 Town of Lafayette	Private	36	Wetland complex along Sugar Creek that has suffered from past and current disturbances. Regionally uncommon species include Ohio goldenrod (Solidago ohioensis) and small fringed gentian (Gentiana procera), both State-designated special concern species

Table 63 (continued)

Map 30 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
53	Sugar Creek Wetlands	NA-3	T3N, R17E Section 17 Town of Lafayette	Private	74	Shallow cattail marsh and shrub-carr along Sugar Creek. Area has been disturbed by past ditching attempts
54	Abells Corners Sedge Meadow and Tamarack Relict	NA-3 (RSH)	T3N, R17E Section 18 Town of Lafayette	Private	42	Moderate-quality tamarack relict and sedge meadow, disturbed by groundwater-level changes
55	Spring Prairie Lowlands	NA-3	T3N, R18E Sections 10, 11, 14, 15 Town of Spring Prairie	Private	297	Large, basically good-quality wetland complex consisting of shallow marsh, shrub-carr, sedge meadow, and tamarack relict. Area has been disturbed by past ditching attempts
56	Lone Tree Trail Oak Woods	NA-3 (RSH)	T4N, R15E Sections 23, 24, 25, 26 Town of Whitewater	Department of Natural Resources and private	265	Former mosaic of xeric oak forest, open oak woodland, and oak savanna now overgrown with shrubs, situated on upper slopes of rough, gravelly interlobate moraine. Contains the State-designated threatened kittentails (Besseya bullii)
57	Whitewater Oak Woods	NA-3	T4N, R15E Sections 24, 25 Town of Whitewater	Department of Natural Resources and private	240	Xeric oak woodland that has suffered from fire suppression. Dry prairies on steep south-facing slopes are being actively managed through cutting and burning
58	Rice Lake Dry Prairie	NA-3 (RSH)	T4N, R15E Section 26 Town of Whitewater	Department of Natural Resources	1	Small dry prairie remnant, managed by burning
59	Rock Shrub-Fen	NA-3	T4N, R15E Sections 30, 31 Town of Whitewater	Private	46	Good-quality wetland complex, consisting of sedge meadow, shrub-carr, and small areas of marly fen
60	Duffin Road Prairie	NA-3	T4N, R16E Sections 4, 9 Town of LaGrange	Department of Natural Resources	8	Good-quality mix of mesic and wet-mesic prairie and shallow marsh. Dominated by big and little bluestem, prairie dock, and goldenrods. Quality has improved with burn management
61	Big Spring Road Prairie	NA-3	T4N, R16E Sections 6, 7 Town of LaGrange	Private	93	Degraded wet-mesic prairie used as pastures but offering excellent opportunity for prairie and pothole restoration. The small wetlands are good for amphibian breeding and migratory waterfowl
62	Connelly Fen	NA-3 (RSH)	T4N, R16E Section 8 Town of LaGrange	Private	2	Good-quality calcareous fen containing characteristic fen species
63	Nordic Trail Oak Woods	NA-3 (RSH)	T4N, R16E Sections 2, 3, 10, 11, 15 Town of LaGrange	Department of Natural Resources and private	483	Large but patchy mixture of disturbed oak woods, shallow lakes, and small areas of dry prairie
64	Island Woods	NA-3	T4N, R16E Section 26 Town of LaGrange	Private	46	Good-quality dry-mesic woods on rough terrain, situated on peninsula in Lauderdale Lakes

Table 63 (continued)

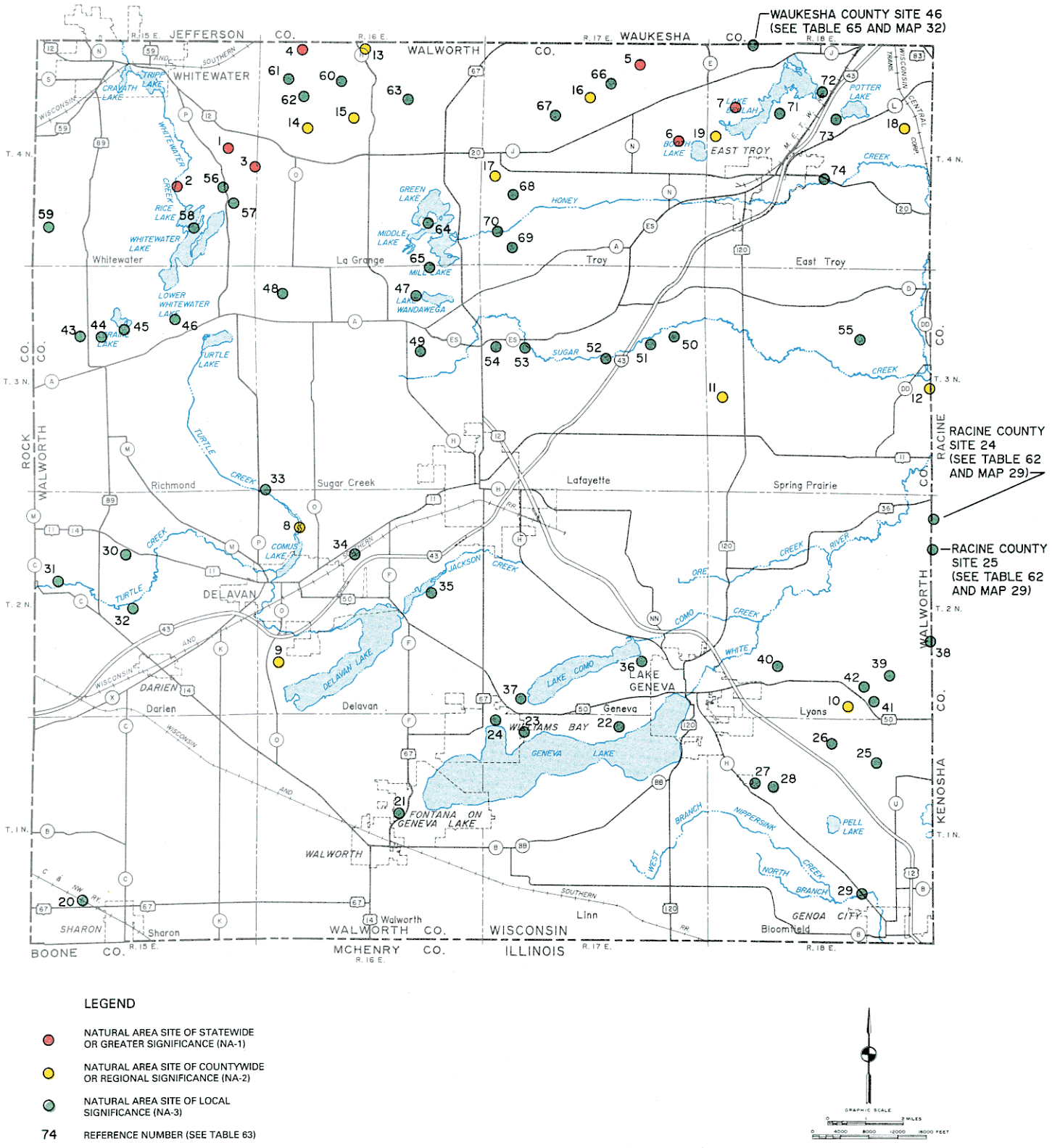
Map 30 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
65	Baywood Road Sedge Meadow	NA-3	T4N, R16E Section 35 Town of LaGrange T3N, R16E Section 2 Town of Sugar Creek	Private	29	Good-quality sedge meadow and shallow marsh complex with a strong influx of calciphilic species
66	George Williams Sedge Meadow	NA-3	T4N, R17E Sections 3, 10 Town of Troy	George Williams College	27	Sedge meadow-shallow marsh wetland disturbed by ditching along east edge
67	Doyles Lake Wetlands	NA-3	T4N, R17E Sections 8, 9. 16, 17 Town of Troy	Private	68	Undeveloped lake containing shallow marsh. Used by migrating waterfowl
68	Lein's Road Fen	NA-3 (RSH)	T4N, R17E Section 30 Town of Troy	Private	22	Degraded shrub-fen, disturbed by past grazing and groundwater-level changes from ditching
69	Troy Fen	NA-3	T4N, R17E Sections 31, 32 Town of Troy	Department of Natural Resources and private	13	Moderate-quality calcareous fen–shrub-carr–sedge meadow wetland. Disturbed by past ditching
70	Honey Creek Fen	NA-3 (RSH)	T4N, R17E Section 31 Town of Troy	Private	7	Moderate-quality wetland complex bordering Honey Creek, consisting of calcareous fen, sedge meadow, and shallow marsh. Contains beaked spike-rush (Eleocharis rostellata), a State-designated threatened species
71	Army Lake Lowlands	NA-3	T4N, R18E Sections 8, 9, 16 Town of East Troy	Private	92	Large deep and shallow marsh northwest of Army Lake
72	East Troy Tamaracks	NA-3	T4N, R18E Sections 9, 10 Town of East Troy	Department of Natural Resources	26	Acid sphagnum-tamarack relict, disturbed by groundwater-level changes from ditching attempts
73	Potter Lake Tamaracks	NA-3	T4N, R18E Sections 10, 15 Town of East Troy	Private	22	Disturbed tamarack relict on west side of Potter Lake
74	Hilburn Sedge Meadow	NA-3	T4N, R18E Sections 21, 22 Town of East Troy	Private	66	Sedge meadow and shallow marsh bordering Honey Creek

[a] *NA-1 identifies Natural Area sites of statewide or greater significance*
NA-2 identifies Natural Area sites of countywide or regional significance
NA-3 identifies Natural Area sites of local significance
SNA, or State Natural Area, identifies those sites officially designated as State Natural Areas by the State of Wisconsin Natural Areas Preservation Council
RSH, or Rare Species Habitat, identifies those sites which support rare, threatened, or endangered animal or plant species officially designated by the Wisconsin Department of Natural Resources

Source: Wisconsin Department of Natural Resources and SEWRPC.

Map 30

KNOWN NATURAL AREAS IN WALWORTH COUNTY: 1994



This map identifies the known Natural Areas in Walworth County. Natural Areas are tracts of land or water so little modified by human activity, or sufficiently recovered from the effects of such activity, that they contain intact native plant and animal communities believed to be representative of the pre-European-settlement landscape. Natural Area classification is based upon consideration of the structure and integrity of the native plant or animal communities; the extent of artificial disturbance; the commonness of the plant and animal communities present; the presence of critical plant or animal species; the diversity of plant and animal species; and the size of the area.

Source: Wisconsin Department of Natural Resources and SEWRPC.

Table 64

KNOWN NATURAL AREAS IN WASHINGTON COUNTY: 1994

Map 31 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
1	Kewaskum Maple-Oak Woods State Natural Area	NA-1 (SNA, RSH)	T12N, R19E Sections 10, 15 Town of Kewaskum	Department of Natural Resources and private	86	An extremely rich and relatively undisturbed southern mesic and dry-mesic forest, located just east of the Milwaukee River on undulating morainal topography. The northern two-thirds constitute a designated State Natural Area, which consists of two tracts separated by pine plantation. A number of regionally uncommon species are present. Kettle depressions hold water part of the year
2	Murphy Lake-McConville Lake Wetland Complex	NA-1 (RSH)	T9N, R18E Sections 21, 22, 27, 28, 33, 34 Town of Erin	The Nature Conservancy; Boy Scouts of America, Milwaukee County Council; and other private	890	Large wetland complex surrounding undeveloped hard-water seepage lakes that are located in a large glacial besin. The variety of plant communities includes shrub-carr, alder thicket, lowland hardwoods, sedge meadow, deep and shallow marsh, and both young and mature tamarack forest. Good to excellent quality overall
3	Germantown Swamp	NA-1	T9N, R20E Sections 1, 12 Village of Germantown	Village of Germantown and private	374	Locatad along the headwaters of the Menomonaa River, this is a large low-lying woods that has apparently suffered only minimal human disturbance, although ditching near the perimeter has had some effect. This is predominantly a southern lowland hardwoods of silver and red maple, green ash, American elm, and basswood, but with substantial inclusions of northern wet-mesic forest of yellow birch, tamarack, and white cedar. At the north end is an upland stand of sugar maple and beech. The ground flora contains a mixture of northern and southern elements. The large size of the woods, together with its relatively undisturbed nature and unique combination of species, makes this a valuable site. A severe windstorm in late June 1991 toppled a large number of trees, mostly yellow birch and silver maple
4	Aurora Road Fen	NA-1 (RSH)	T11N, R18E Section 35 Town of Addison	Private	22	High-quality calcareous fen, with sedge meadow and tamarack relict associated with cold trout stream that is tributary to the Rock River. Location of swamp metalmark, a State-designated threatened butterfly species. Threatened by surrounding incompatible land use

Table 64 (continued)

Map 31 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
5	Paradise Lake Fen	NA-1 (RSH)	T11N, R19E Sections 22, 27 Town of West Bend	Private	22	Undeveloped nine-acre lake with good-quality calcareous sedge mat and deep and shallow marsh
6	Milwaukee River Floodplain Forest State Natural Area	NA-1 (SNA)	T12N, R19E Sections 14, 15 Town of Kewaskum	Department of Natural Resources and private	135	One of the best riverine forests remaining in the Region. Quality varies, but some areas are relatively undisturbed. Upland "islands" contribute to a rich and diverse ground flora
7	Smith Lake and Wetlands	NA-1 (RSH)	T12N, R19E Sections 26, 35 Town of Barton	Private	130	Shallow lake rich in aquatics bordered by sedge meadow, tamaracks, and good-quality calcareous fens on northeast and east sides
8	Holy Hill Woods	NA-2	T9N, R18E Sections 2, 11, 14 Town of Erin	Carmelite Fathers and other private	256	Moderate- to good-quality, medium-aged southern mesic and dry-mesic woods located on gently sloping to steep interlobate kettle moraine topography. Dominated by sugar maple, red oak, red maple, white ash, white oak, and basswood. Total wooded area is large, but dissected by highways. However, it remains as one of the larger, better-quality upland hardwood forests locally
9	Toland Swamp	NA-2	T9N, R18E Sections 18, 19, 20 Town of Erin	Private	193	Large, wooded wetland mixture of shrub-carr, lowland hardwoods, and tamarack relict, with a history of disturbance
10	Loew's Lake Wetland Complex	NA-2 (RSH)	T9N, R18E Sections 24, 25, 26, 34, 35 Town of Erin	Department of Natural Resources and private	481	Undeveloped drainage lake and wetland corridor associated with the upper Oconomowoc River. The diverse wetland communities are in generally good condition, and include sedge meadow, lowland hardwoods, emergent aquatics, shrub-carr, and tamarack swamp. Swamp metalmark butterfly and queen snake have been documented
11	Daniel Boone Bogs	NA-2 (RSH)	T9N, R19E Sections 7, 8 Town of Richfield	Daniel Boone Conservation Club	21	A pair of good-quality, relatively undisturbed sphagnum bogs located within a dry-mesic forest matrix. A number of uncommon species are present, including common bog arrow-grass (Triglochin maritimum), a State-designated special concern species
12	Glacier Hills Park Bogs and Upland Woods	NA-2 (RSH)	T9N, R19E Sections 7, 17, 18 Town of Richfield	Washington County and private	60	Steep, interlobate kettle moraine topography supporting two good-quality bogs in kettle hole depressions. Southern mesic and dry-mesic hardwood forest covers the surrounding uplands, with small stands of dry hill prairie containing the State-designated threatened kittentails (Besseya bullii)

Table 64 (continued)

Map 31 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
13	Friess Lake Tamarack Swamp	NA-2	T9N, R18E Section 24 Town of Erin T9N, R19E Sections 18, 19 Town of Richfield	Private	228	Large, mostly wooded, wetland complex, consisting of young to medium-aged tamarack swamp, shrub-carr, and shallow marsh. South portion divided by high east-west crevasse fill
14	Colgate Fen-Meadow	NA-2 (RSH)	T9N, R19E Sections 26, 35 Town of Richfield	Private	23	Good-quality fen-sedge meadow complex, with tamarack relict, bordering the headwaters of the Bark River
15	Mud Lake Swamp	NA-2 (RSH)	T10N, R19E Section 1 Town of Polk T11N, R19E Section 35 Town of West Bend	Private and Wisconsin Department of Transportation	186	Good-quality, undeveloped calcareous headwater lake surrounded by lowland hardwoods and tamarack swamp. Fen and bog floral elements are present. Adversely affected by construction of USH 45
16	Big Cedar Lake Bog	NA-2	T10N, R19E Section 6 Town of Polk	Private	89	Good-quality, relatively large sphagnum bog, surrounded by a tamarack fringe. Regionally uncommon species are present. Some past attempts at ditching
17	Mud Lake Upland Woods	NA-2	T10N, R19E Section 19 Town of Polk	Private	54	Relatively undisturbed southern dry-mesic woods on rolling morainal topography. Dominated by red and white oaks, with an admixture of red maple, sugar maple, basswood, and white ash. Few exotics present. Threatened by encroaching residential development. A good example of this forest type
18	Mud Lake Meadow	NA-2 (RSH)	T10N, R19E Section 19 Town of Polk	Private	59	Good-quality open meadow to the east and north of a small, shallow, alkaline seepage lake. Dominated by wire-grass sedges. Fen elements are present, as well as a few scattered patches of tamaracks. A site of unusual species composition
19	Jackson Swamp	NA-2 (RSH)	T10N, R20E Sections 1, 2, 8, 9, 10, 14, 15, 16, 17 Town of Jackson	Department of Natural Resources and private	1,571	Large forested wetland, consisting mainly of disturbed lowland hardwood swamp with green ash and red and silver maples. There are smaller, higher-quality inclusions of white cedar-dominated northern wet-mesic forest. Changes in hydrology have allowed reed canary grass to invade canopy gaps. The large forest interior is invaluable for a number of native breeding birds
20	St. Anthony Beech Woods	NA-2	T11N, R18E Section 2 Town of Addison	Private	68	An old-growth remnant of the once-extensive mesic woods, dominated by mature beech and sugar maple. Located on a moderate, east-facing slope. Not undisturbed, but in good condition

Table 64 (continued)

Map 31 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
21	Lac Lawrann Conservancy Upland Woods and Wetlands	NA-2 (RSH)	T11N, R19E Sections 1, 12 Town of Barton	City of West Bend and private	101	A good-quality wet- and dry-mesic hardwood forest, with a deep and shallow marsh, shrub-carr, and floating sedge mat around a pond. The area contains a good example of kame and esker formation. Location of the State-designated threatened forked aster (Aster furcatus)
22	Blue Hills Woods	NA-2 (RSH)	T11N, R19E Section 3 City of West Bend, Town of Barton Section 10 Town of Barton	City of West Bend, Department of Natural Resources, and private	266	Relatively large, good-quality mesic and dry-mesic woods on glacial topography of significant relief. Recovering from past grazing and selective cutting. Recently disturbed by construction of USH 45 along east edge
23	Silverbrook Lake Woods	NA-2 (RSH)	T11N, R19E Sections 15, 21, 22, 27 Town of West Bend	Girl Scouts of Milwaukee Area, Inc., Washington County, Cedar Lakes Conservation Foundation, and other private	404	A large area surrounding Silverbrook Lake, consisting mainly of good-quality southern mesic to dry-mesic hardwoods. Fairly diverse ground flora. Low area contains tamaracks and lowland hardwoods. Residences are beginning to encroach on south and west. Important to preserve as an intact block of relatively contiguous woods
24	Gilbert Lake Tamarack Swamp	NA-2	T11N, R19E Sections 17, 20 Town of West Bend	Cedar Lakes Conservation Foundation and other private	130	A lightly developed lake surrounded by a wetland complex of tamarack swamp, bog, sedge meadow, and cattail marsh
25	Hacker Road Bog	NA-2	T11N, R19E Section 20 Town of West Bend	Department of Natural Resources	25	Good-quality sphagnum bog, bordered by sedge meadow, shallow marsh, and shrub-carr
26	Muth Woods	NA-2 (RSH)	T11N, R19E Section 24 City of West Bend	Private	30	A good-quality, medium-aged stand of southern mesic hardwoods, with an exceptionally rich and diverse ground flora that includes some uncommon species. A depression near the center of the woods contains lowland hardwoods
27	Little Cedar Lake Wetlands	NA-2	T11N, R19E Sections 32, 33 Town of West Bend	Cedar Lakes Conservation Foundation	137	Extensive wetlands at west end of Little Cedar Lake, containing good-quality deep and shallow marsh, sedge meadow, shrub-carr, tamarack relicts, and lowland hardwoods
28	Schoenbeck Woods	NA-2	T11N, R20E Sections 20, 29 Town of Trenton	Private	195	Relatively large, moderate- to good-quality forested tract, consisting of lowland hardwoods, shrub-carr, southern mesic forest, and southern dry-mesic forest
29	Bellin Bog	NA-2	T11N, R20E Section 33 Town of Trenton	Private	17	A good-quality sedge mat and tamarack swamp, with many fen elements, that border a shallow, undeveloped pond

Table 64 (continued)

Map 31 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
30	Reinartz Cedar Swamp	NA-2	T11N, R20E Sections 35, 36 Town of Trenton	Private	119	Good-quality northern wet-mesic forest, dominated by white cedar, tamarack, yellow and paper birch, red maple, and black ash. A number of species with more northerly affinities are present. Uplands to the east support a disturbed mesic woods
31	Wayne Swamp	NA-2	T12N, R18E Sections 13, 14, 23, 24 Town of Wayne T12N, R19E Sections 18, 19 Town of Kewaskum	Private	1,126	A large depression in rolling moraine supports several wetland communities, including second-growth lowland hardwoods, northern wet-mesic forest, shrub-carr, and tamarack-fen, with southern mesic forest on isolated uplands
32	Kettle Moraine Drive Bog	NA-2	T12N, R19E Section 1 Town of Kewaskum	Department of Natural Resources and private	39	A good-quality forested bog of tamarack and black spruce over a layer of ericads, with yellow and paper birch established in older areas. A number of regionally uncommon species are present
33	Glacial Trail Forest	NA-2	T12N, R19E Sections 11, 14 Town of Kewaskum	Department of Natural Resources and private	223	One of the largest intact tracts of contiguous southern mesic and dry-mesic forest remaining in the Region. Located on steep, irregular kettle moraine topography. Good overall quality; recovering from past selective cutting. Important to maintain as intact as possible
34	St. Michael's Woods	NA-2	T12N, R19E Sections 13, 14, 24 Town of Kewaskum	Department of Natural Resources and private	84	Rolling interlobate moraine supporting southern mesic to dry-mesic hardwoods, dominated by sugar maple, red oak, and basswood. Moderately rich ground flora. Relatively recent selective logging
35	North Branch Woods	NA-2	T12N, R20E Section 25 Town of Farmington	Private	96	Good-quality wooded tract bordering the North Branch of the Milwaukee River. Consists of southern mesic and wet-mesic hardwoods. Threatened by future logging operations
36	Myra Wetlands	NA-2	T11N, R20E Section 15 Town of Trenton	Private	69	Good-quality wetland complex of shallow lake, marsh, sedge meadow, shrub-carr, and lowland hardwoods
37	Hults Bog and Marsh	NA-3	T9N, R18E Sections 3, 10 Town of Erin	Private	14	Small, moderate-quality sphagnum bog-tamarack swamp and associated shallow marsh. Marsh is stopover spot for migrating waterfowl
38	CTH E Wetlands	NA-3	T9N, R18E Section 3 Town of Erin T10N, R18E Section 34 Town of Hartford	Private	28	Wetland complex of shrub-carr, sedge meadow, and shallow marsh that has suffered from past disturbance
39	Erin Sedge Meadow	NA-3	T9N, R18E Sections 4, 5 Town of Erin	Private	17	Moderate-quality sedge meadow

Table 64 (continued)

Map 31 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
40	Thompson Swamp	NA-3	T9N, R18E Section 10 Town of Erin	Private	182	Large but disturbed wetland complex of lowland hardwoods, shrub-carr, sedge meadow, and tamarack relict. Contains some northern species, including white pine
41	Donegal Road Woods	NA-3	T9N, R18E Sections 13, 24 Town of Erin T9N, R19E Section 18 Town of Richfield	Department of Natural Resources and private	137	Large, irregularly shaped dry-mesic woods on steep, southeast-facing slopes
42	St. Augustine Road Sedge Meadow	NA-3	T9N, R18E Section 24 Town of Erin	Private	11	Good-quality southern sedge meadow
43	Mason Creek Swamp	NA-3	T9N, R18E Sections 30, 31 Town of Erin	University of Wisconsin-Milwaukee and private	432	Large lowland hardwoods area
44	CTH J Swamp	NA-3	T9N, R19E Section 9 Town of Richfield	Kettle Moraine Audubon Society and other private	100	Moderate- to good-quality complex of shrub-carr, lowland hardwoods, and mesic hardwoods, with scattered spring seepages
45	Hubertus Road Sedge Meadow	NA-3	T9N, R19E Section 19 Town of Richfield	Private	7	Good-quality southern sedge meadow bordering the Oconomowoc River
46	Amy Bell Lake and Lowlands	NA-3	T9N, R19E Sections 24, 25 Town of Richfield	YMCA	20	Small, undeveloped lake with a narrow bog fringe, associated with a tamarack relict and shrub-carr that have suffered from past disturbance
47	Colgate Shrub-Carr	NA-3	T9N, R19E Sections 26, 35 Town of Richfield	Private	38	Shrub-carr surrounding small, shallow lake; disturbed by access road
48	Lake Five Woods	NA-3 (RSH)	T9N, R19E Sections 31, 32 Town of Richfield	Private	152	Low- to moderate-quality mesic, dry-mesic, and xeric woods on steep kettle moraine terrain on north side of Lake Five. Depression contains small seepage pond and disturbed wetland plant communities. Small patches of dry hill prairie are located within the xeric woods and contain the State-designated threatened kittentails (Besseya bullii). Threatened by surrounding development
49	Faber-Pribyl Woods	NA-3	T9N, R20E Sections 4, 9 Village of Germantown	Private	39	Small but good-quality remnant of mesic woods which still exhibits characteristics of an old-growth forest. Dominated by sugar maple and basswood, with some beech. Adjoining wet-mesic woods to north are of lesser quality
50	Hoelz Swamp	NA-3	T9N, R20E Sections 10, 11, 14, 15 Village of Germantown	Private	109	A moderate-quality lowland hardwoods within the headwaters area of the Menomonee River. Dominated by silver and red maple and yellow birch, with some northern forest understory elements. Valuable for watershed protection

Table 64 (continued)

Map 31 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
51	Lake Park Swamp	NA-3	T9N, R20E Sections 21, 22 Village of Germantown	Village of Germantown and private	54	A disturbed silver maple-dominated lowland hardwood forest, important for protection of two intermittent streams tributary to the Menomonee River
52	Schoessow Woods	NA-3 (RSH)	T9N, R20E Section 24 Village of Germantown	Private	51	A relatively small but good-quality mix of upland woods alternating with wet and wet-mesic woods in shallow depressions. Trees, mostly sugar maple, green ash, and basswood, are of medium age. Very good species diversity, including two State-designated special concern species: American gromwell (Lithospermum latifolium) and goldenseal (Hydrastis canadensis). Threatened by residential subdivisions
53	USH 41 Swamp	NA-3	T9N, R20E Sections 28, 33 Village of Germantown	Private	228	An extensive floodplain forest dominated by silver maple, with green ash, black ash, and American elm. Due to Dutch elm disease, dissection by USH 41-45, a logging history, and artificial drainage, its ecological value is low. Important for protection of Menomonee River tributaries
54	Kleinman Swamp	NA-3	T9N, R20E Section 29 Village of Germantown	State of Wisconsin and private	71	Lowland hardwood forest of silver maple and some yellow birch. Low ecological value
55	Rubicon Lowlands	NA-3	T10N, R18E Sections 15, 21, 22 Town of Hartford	Washington County and private	30	Moderate-quality southern sedge meadow along the Rubicon River
56	STH 60 Swamp	NA-3	T10N, R18E Sections 14, 23 Town of Hartford	Private	32	Lowland hardwood swamp of moderate quality, containing some northern elements. Dominated by yellow birch and black ash
57	Pike Lake Sedge Meadow	NA-3 (RSH)	T10N, R18E Section 23 Town of Hartford	Wisconsin Department of Transportation and private	14	Good-quality southern sedge meadow and shallow marsh at north end of Pike Lake
58	Pike Lake Woods	NA-3	T10N, R18E Section 24 Town of Hartford	Department of Natural Resources	131	Low- to medium-quality dry-mesic woods that has suffered from past disturbance, including grazing and selective logging. The irregular kettle moraine topography includes a prominent wooded kame at the southeast corner
59	Mueller Woods	NA-3	T10N, R19E Section 6 Town of Polk	State of Wisconsin and private	97	Relatively large dry-mesic woods of moderate quality, located on rolling moraine with some deep kettle holes. Evidence of past grazing and selective logging. Site has recently been disturbed by road and residence in interior, and highway construction along western border
60	Slinger Upland Woods	NA-3	T10N, R19E Sections 8, 9 Town of Polk	Private	196	Relatively large area of disturbed southern mesic and dry-mesic hardwoods on kettle and kame topography

Table 64 (continued)

Map 31 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
61	Heritage Trails Bog	NA-3	T10N, R19E Sections 20, 29 Town of Polk	Washington County and private	94	Relatively undisturbed tamarack bog within an interlobate morainal depression. Other associated communities include lowland hardwoods and shrub-carr
62	Kowalske Swamp	NA-3	T10N, R20E Section 22 Town of Jackson	Private	83	Young to medium-aged northern wet-mesic hardwoods, disturbed by past selective cutting and windthrow. The ground flora is relatively diverse. A knoll at the northeast corner supports upland mesic woods
63	Sherman Road Swamp	NA-3	T10N, R20E Section 25 Town of Jackson	Private	96	A lowland hardwood swamp dominated by red maple, green ash, and American elm on level terrain
64	Allenton Swamp	NA-3	T11N, R18E Sections 22, 26, 27, 28, 35 Town of Addison	Department of Natural Resources and private	1,091	Large, disturbed wetland complex along the Rock River, including southern sedge meadow, lowland hardwoods, shrub-carr, emergent aquatics, and relict tamaracks
65	Newark Road Wetland	NA-3	T11N, R19E Section 1 Town of Barton	Private	9	A kettle-hole wetland
66	Sunset Park Wetlands	NA-3	T11N, R19E Sections 2, 3 City of West Bend	Private	85	Disturbed wetland complex containing shallow marsh, fresh (wet) meadow, and a good stand of tag alder (Alnus rugosa)
67	Albecker Park Wetlands	NA-3	T11N, R19E Sections 9, 10 City of West Bend	Washington County and private	91	Shallow marsh and disturbed fresh (wet) meadow complex with some shrub-carr and scattered lowland hardwoods. Disturbances include water-level changes due to past draining efforts and filling
68	Silver Creek Marsh	NA-3	T11N, R19E Section 15 City of West Bend	Washington County and private	27	Good-quality deep and shallow marsh and sedge meadow
69	University Fen	NA-3 (RSH)	T11N, R19E Section 15 City of West Bend	University of Wisconsin Center-Washington County	1	A small, moderate-quality calcareous fen and lowland hardwood forest recently disturbed by adjacent highway construction
70	CTH Z Upland Woods and Wetlands	NA-3 (RSH)	T11N, R19E Sections 16, 17, 20, 21 Town of West Bend	Cedar Lake Conservation Foundation and other private	281	Mature mesic hardwood forest on rough interlobate moraine, dominated by sugar maple, red oak, beech, and basswood. The moderately rich herb layer includes several uncommon species. Threatened by ongoing logging operations. Adjacent large wetland complex of shrub-carr, sedge meadow shallow marsh, and tamarack relict is divided by CTH Z

Table 64 (continued)

Map 31 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
71	Ziegler Woods	NA-3	T11N, R19E Section 28 Town of West Bend	Private	170	Large tract of southern mesic to dry-mesic hardwoods, dominated by sugar maple and red oak, on irregular glacial terrain. Past disturbance includes grazing and selective logging; more recently, wide horse and all-terrain-vehicle trails have degraded the site, allowing a number of exotic species to invade
72	Sandy Knoll Swamp	NA-3	T11N, R20E Sections 4, 5 Town of Trenton T12N, R20E Section 33 Town of Farmington	Washington County and private	339	Large, patchy lowland hardwood forest with areas of tamarack. Some portions contain good-quality wet-mesic forest ground flora. Past disturbances include selective cutting and clear-cutting, and water-level changes due to ditching
73	Sandy Knoll Wetlands	NA-3	T11N, R20E Sections 5, 6 Town of Trenton	Washington County and private	47	A small but good-quality wetland complex containing tamaracks, lowland hardwoods, shrub-carr, shallow marsh, and sedge fen associated with a spring-fed stream
74	Poplar Road Lacustrine Forest	NA-3	T11N, R20E Sections 9, 10 Town of Trenton	Private	177	A disturbed lowland hard woods stand
75	Fellenz Hardwood Swamp	NA-3	T11N, R20E Section 16 Town of Trenton	Private	58	A southern wet to wet-mesic hardwood forest, located within the Milwaukee River floodplain. Disturbances include selective cutting and excessive siltation
76	Paradise Drive Tamarack Swamp	NA-3 (RSH)	T11N, R20E Sections 26, 35 Town of Trenton	Washington County and private	81	Northern wet-mesic forest, tamarack swamp, and shrub-carr of moderate quality
77	Camp Wowitan Wetlands	NA-3 (RSH)	T11N, R20E Sections 21, 22, 27, 28 Town of Trenton	YMCA and other private	109	Relatively undeveloped lake and wetland complex with a well-developed esker. A good-quality calcareous fen, tamarack swamp, and mesic forest occur on the site
78	Schalla Tamarack Swamp	NA-3	T11N, R20E Section 33 Town of Trenton	Private	16	A tamarack swamp
79	Theresa Swamp	NA-3	T12N, R18E Sections 17, 18, 19, 20, 29, 30 Town of Wayne	Department of Natural Resources and private	944	Lowland hardwood forest bordering the Rock River, composed of large silver maple, plus black ash, green ash, American elm, and swamp white oak. Canopy has been opened by Dutch elm disease
80	Wayne Creek Swamp	NA-3	T12N, R18E Sections 21, 22, 27, 28 Town of Wayne	Private	178	Disturbed lowland hardwood forest along Wayne Creek. Openings in canopy from Dutch elm disease
81	Stockcar Swamp	NA-3 (RSH)	T12N, R18E Sections 23, 24, 25, 26 Town of Wayne	Private	240	Forested wetland of northern lowland hardwoods, tamarack-fen, shrub-carr, and alder thicket, of moderately good quality. A number of uncommon species are present

Table 64 (continued)

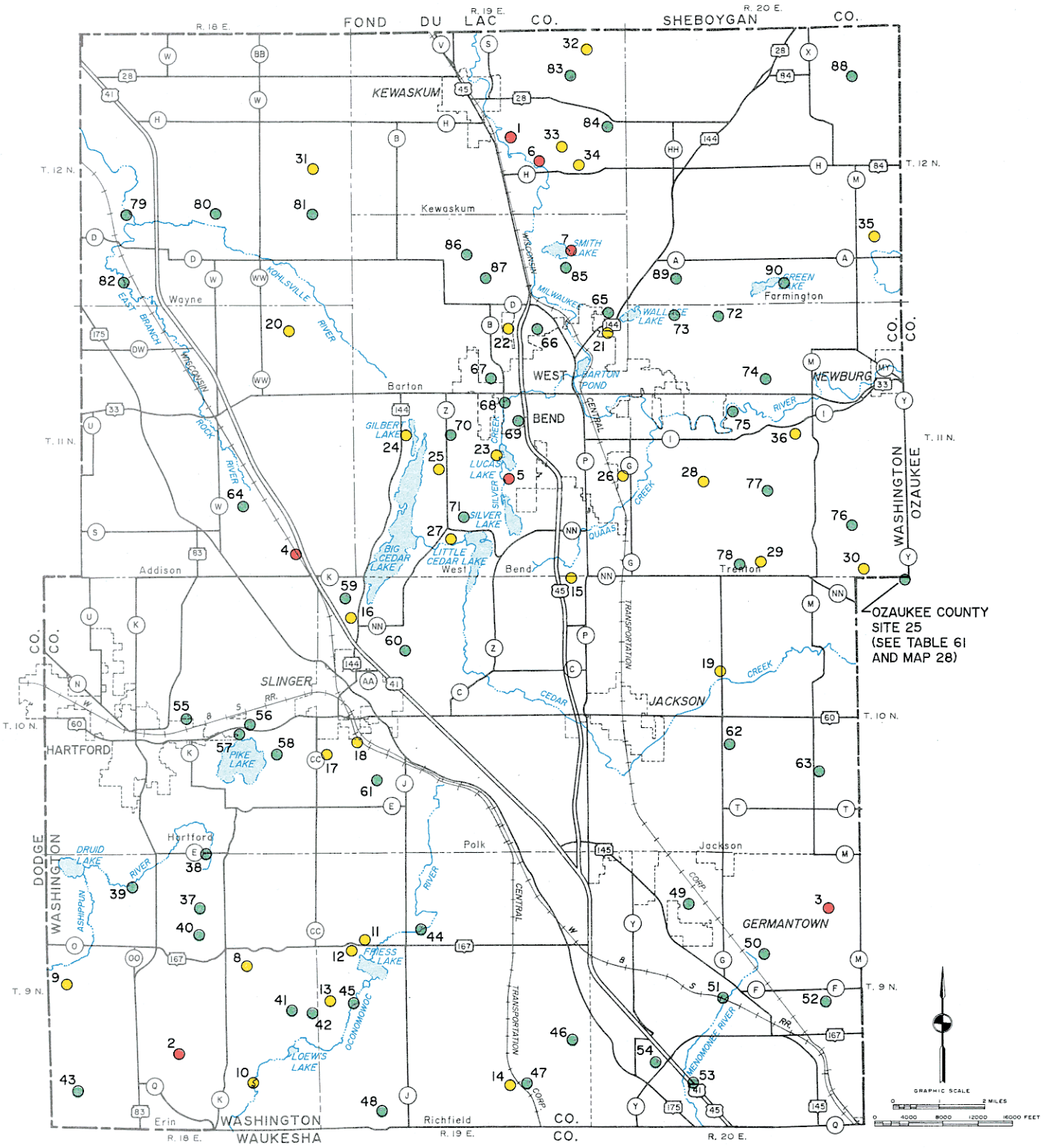
Map 31 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
82	Rock River Marsh	NA-3	T12N, R18E Sections 30, 31, 32 Town of Wayne	Department of Natural Resources and private	326	Shallow marsh within the Rock River floodplain, dominated by cattails. Bisected by railway right-of-way
83	Kettle Moraine Drive Woods	NA-3 (RSH)	T12N, R19E Sections 2, 11, 12 Town of Kewaskum T13N, R19E Section 35 Town of Auburn	Department of Natural Resources	287 (plus 30 in Fond du Lac County)	Long, north-south-trending, irregularly shaped southern mesic and dry-mesic forest that is recovering from past grazing and selective cutting. Loceted on steep-sided, gravelly ridges of the interlobate kettle moraine. Forest is mostly second-growth. Important as linkage between other large forest blocks to the north and south
84	STH 28 Woods	NA-3	T12N, R19E Sections 12, 13 Town of Kewaskum	Private	145	Good-quality southern mesic hardwoods, dominated by sugar maple, ironwood, and basswood, located on kettle moraine topography. Recent cutting, roads, trails, and new homesite construction are threatening the integrity of the woods
85	Smith Lake Swamp	NA-3	T12N, R19E Section 35 Town of Barton	Private	38	Mixed lowland hardwood and conifer swamp bordering Smith Lake
86	Lange Hardwoods	NA-3	T12N, R19E Section 28 Town of Barton	Private	53	Good-quality southern mesic hardwood forest on steep kettle moraine topography
87	Wildwood Hardwood Swamp	NA-3	T12N, R19E Sections 33, 34 Town of Barton	Private	98	A lowland hardwood forest area
88	Milwaukee River Swamp	NA-3	T12N, R20E Sections 1, 2, 11, 12 Town of Farmington	Private	546	A large but disturbed wetland complex of lowland hardwoods, northern wet-mesic forest, shrub-carr, and sedge meadow bordering the Milwaukee River
89	Lizard Mound Woods	NA-3	T12N, R20E Sections 31, 32 Town of Farmington	Washington County and private	28	Mature dry-mesic hardwoods dominated by sugar maple, red oak, basswood, white ash, beech, and white oak. Contains Indian effigy mounds of statewide significance
90	Green Lake Bog	NA-3	T12N, R20E Section 34 Town of Farmington	Private	19	Small but good-quality undeveloped bog lake bordered by sphagnum mat, conifer swamp, and mesic hardwoods

[a]*NA-1 identifies Natural Area sites of statewide or greater significance*
NA-2 identifies Natural Area sites of countywide or regional significance
NA-3 identifies Natural Area sites of local significance
SNA, or State Natural Area, identifies those sites officially designated as State Natural Areas by the State of Wisconsin Natural Areas Preservation Council
RSH, or Rare Species Habitat, identifies those sites which support rare, threatened, or endangered animal or plant species officially designated by the Wisconsin Department of Natural Resources

Source: Wisconsin Department of Natural Resources and SEWRPC.

Map 31

KNOWN NATURAL AREAS IN WASHINGTON COUNTY: 1994



LEGEND

- NATURAL AREA SITE OF STATEWIDE OR GREATER SIGNIFICANCE (NA-1)
- NATURAL AREA SITE OF COUNTYWIDE OR REGIONAL SIGNIFICANCE (NA-2)
- NATURAL AREA SITE OF LOCAL SIGNIFICANCE (NA-3)
- 90 REFERENCE NUMBER (SEE TABLE 64)

This map identifies the known Natural Areas in Washington County. Natural Areas are tracts of land or water so little modified by human activity, or sufficiently recovered from the effects of such activity, that they contain intact native plant and animal communities believed to be representative of the pre-European-settlement landscape. Natural Area classification is based upon consideration of the structure and integrity of the native plant or animal communities; the extent of artificial disturbance; the commonness of the plant and animal communities present; the presence of critical plant or animal species; the diversity of plant and animal species; and the size of the area.

Source: Wisconsin Department of Natural Resources and SEWRPC.

Table 65

KNOWN NATURAL AREAS IN WAUKESHA COUNTY: 1994

Map 32 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
1	Kettle Moraine Fen and Low Prairie State Natural Area	NA-1 (SNA, RSH)	T5N, R17E Sections 3, 4, 9, 10 Town of Eagle	Department of Natural Resources	109	Large, good-quality wet to wet-mesic prairie and fen complex that is recovering from past grazing, mowing, and fire suppression. Site is actively managed. A rich combination of species is present
2	Scuppernong Prairie State Natural Area	NA-1 (SNA, RSH)	T5N, R17E Sections 8, 9, 16, 17, 20 Town of Eagle	Department of Natural Resources and private	572	Wet to wet-mesic prairie and fen with a complete representation of low prairie plants, including a number of rare species. One of the best prairie remnants in the Region
3	Muskego Park Hardwoods State Natural Area	NA-1 (SNA, RSH)	T5N, R20E Section 17 City of Muskego	Waukesha County and private	73	Primarily an upland woods on a gentle southeast slope, with small woodland ponds. Characteristic trees include red and white oaks, sugar maple, basswood, and yellowbud hickory. The spring flora is exceptionally rich and diverse. Several uncommon species occur here, including the State-designated endangered crow-spur sedge (Carex crus-corvi) and the State-designated threatened blue ash (Fraxinus quadrangulata). The site has been disturbed by wide hiking and equestrian trails, and is currently threatened by subdivisions along the north and east borders
4	Ottawa Lake Fen State Natural Area	NA-1 (SNA, RSH)	T6N, R17E Section 34 Town of Ottawa	Department of Natural Resources	25	Two shallow depressions connected by deep marsh and shallow marl flats. The smaller, northern lake is undeveloped and supplied by numerous seepage springs, small boiling springs, and several cold inlet streams. Here are present an unusually large number of wetland and aquatic plant communities, including submerged aquatic, emergent aquatic, sedge meadow, shrub-carr, tamarack swamp, and extensive fen-marl flats which contain several rare species
5	Genesee Oak Opening and Yatzeck's Fen State Natural Area	NA-1 (SNA, RSH)	T6N, R18E Section 28 Town of Genesee	Department of Natural Resources and private	95	Classic bur oak opening on rolling interlobate morainal topography. Numerous small openings occur throughout, containing high-quality dry to dry-mesic prairies with side-oats grama, big bluestem, little bluestem, Indian grass, pasqueflower, prairie smoke, leadplant, and silky aster. Lowlands to east contain mesic and wet-mesic prairie, while to the south Yatzeck's Fen offers a series of high-quality springs and excellent fen

Table 65 (continued)

Map 32 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
6	Mukwonago Fen, Sedge Meadow, and Tamarack Relict	NA-1 (RSH)	T5N, R18E Sections 28, 33 Town of Mukwonago	Private	232	Large, good-quality, and relatively undisturbed wetland complex bisected by the Mukwonago River. North of the River, sedge meadow and shallow marsh grade into calcareous fen; south of the River, open wetland grades into tamarack swamp with northern relict species. An integral part of the Mukwonago River corridor
7	Upper Mukwonago River	NA-1 (RSH)	T5N, R18E Sections 31, 32, 33 Town of Mukwonago T5N, R17E Section 36 Town of Eagle	Private	172	High-quality stream reach between dam at Eagle Spring Lake and Phantom Lake
8	Monches Woods	NA-1 (RSH)	T8N, R18E Sections 3, 4, 10 Town of Merton	Waukesha County and private	322	Extensive dry-mesic and mesic hardwoods on rough morainal topography bordering the Oconomowoc River. The rich, diverse flora includes regionally uncommon species. The site is significant because of the high number of native breeding bird species that use the woods. An active great blue heron rookery is present
9	Eagle Oak Opening and Dry Prairies	NA-2 (SNA, RSH)	T5N, R17E Sections 20, 29, 30 Town of Eagle	Department of Natural Resources	466	Large, generally wooded area on rough glacial tarrain, containing oak woodland and former oak savanna interspersed with dry hill prairies, dry sand prairie, and sand barrens. One of only a few stations in the Region for prickly-pear cactus (Opuntia compressa)
10	Ulrickson Road Cedar Glade	NA-2 (RSH)	T5N, R17E Section 2 Town of Eagle	Department of Natural Resources	32	Cedar glade with good, local areas of dry prairie elements, including pasqueflower (Anemone patens), white camas (Zygadenus elegans), and the State-designated threatened kittentails (Besseya bullii). Managed by burning
11	Eagle Shrub-Fen	NA-2 (RSH)	T5N, R17E Sections 3, 4 Town of Eagle	Department of Natural Resources and private	69	Site consists of two separate plant communities divided by young woods. To the north is a shrubby fen. To the south is a somewhat better-quality wiregrass fen and tamarack-fen
12	Eagle Fen and Spring	NA-2	T5N, R17E Section 3 Town of Eagle T6N, R17E Section 34 Town of Ottawa	Department of Natural Resources and private	155	Large wetland complex of fen, sedge meadow, shrub-carr, and stream communities. The clear, fast-flowing stream emanates from a spring east of STH 67. Area has been disturbed by past ditching attempts and creation of fishing pond
13	Beaver Dam Lake	NA-2	T5N, R17E Section 6 Town of Eagle	Department of Natural Resources and private	121	Shallow marsh that is nesting and feeding area for black terns, yellow-headed blackbirds, and pied-billed grebes

Table 65 (continued)

Map 32 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
14	Kettle Moraine Limestone Outcrop	NA-2	T5N, R17E Section 10 Town of Eagle	Department of Natural Resources	4	Low, shaded limestone outcrop, an unusual community type in Southeastern Wisconsin. Smooth cliff brake (Pellaea glabella) and walking fern (Camptosorus rhizophyllus) are present
15	Eagle Railroad Prairie	NA-2 (RSH)	T5N, R17E Section 19 Town of Eagle	Department of Natural Resources	19	Wet-mesic prairie of good diversity, including two State-designated threatened plant species
16	Eagle Dry Prairie and Grotjans Fen	NA-2 (RSH)	T5N, R17E Sections 19, 20, 29, 30 Town of Eagle	Department of Natural Resources and private	79	Diverse combination of communities, including good-quality calcareous fen and springs, sedge meadow, dry sand prairie, sand barrens, and mesic railroad prairie. The sand prairies and barrens, rare community types in Southeastern Wisconsin, contain a number of regionally uncommon species
17	Fur Farm Pond	NA-2	T5N, R17E Section 31 Town of Eagle	Department of Natural Resources	69	Deep and shallow marsh and sedge meadow community containing some bog-affiliated species
18	Spring Lake Sedge Meadow and Fens	NA-2 (RSH)	T5N, R18E Sections 3, 4, 9 Town of Mukwonago	Private	219	Good-quality sedge meadow with areas of calcareous fen bordering Spring Lake. North half of lake is undeveloped; south half has residences
19	Vernon Tamarack-Fen	NA-2 (RSH)	T5N, R18E Section 12 Town of Mukwonago	Department of Natural Resources	16	Good-quality calcareous fen with medium-aged tamaracks. A number of uncommon species are present, including the State-designated threatened white lady's-slipper orchid (Cypripedium candidum)
20	Vernon Prairie-Fen	NA-2 (RSH)	T5N, R18E Sections 13, 14 Town of Mukwonago	Department of Natural Resources and private	37	Good-quality wet prairie, calcareous fen, and shrub-carr complex that has been affected by adjacent ditching. Contains beaked spike-rush (Eleocharis rostellata), a State-designated threatened species
21	Vernon Fen	NA-2 (RSH)	T5N, R18E Section 23 Town of Mukwonago	Department of Natural Resources	10	Good-quality calcareous fen and springs that are recovering from past disturbance. Two State-designated threatened plant species, false asphodel (Tofieldia glutinosa), and beaked spike-rush (Eleocharis rostellata), occur here
22	Lower Mukwonago River	NA-2 (RSH)	T5N, R18E Sections 25, 36 Town of Mukwonago Section 35 Village of Mukwonago	Village of Mukwonago, Wisconsin Department of Transportation, and private	23	Stretch of Mukwonago River below dam at Lower Phantom Lake contains large and diverse population of native fish species, including such rare species as starhead topminnow, longear sunfish, pugnose shiner, least darter, and lake chubsucker
23	Phantom Lake Wetlands	NA-2 (RSH)	T5N, R18E Sections 27, 34 Town of Mukwonago Village of Mukwonago	Private	187	Deep and shallow marsh and sedge meadow bordering Phantom Lake

Table 65 (continued)

Map 32 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
24	Brown Lake and Sedge Meadow	NA-2 (RSH)	T5N, R18E Section 30 Town of Mukwonago	Private	38	Calcareous sedge meadow associated with good-quality undeveloped lake
25	Big Bend Wet-Mesic Woods	NA-2 (RSH)	T5N, R19E Sections 22, 23 Town of Vernon	Waukesha County, Village of Big Bend, Waukesha County Land Trust, and other private	427	Relatively large wet-mesic hardwoods within the Fox River environmental corridor, with a rich and diverse flora. Characteristic trees include swamp white oak, American elm, white and green ash, and basswood. Includes the area historically known as Martin's Low Woods
26	Henrietta Lake Bog	NA-2	T6N, R17E Section 2 Town of Ottawa	Private	5	Good-quality sphagnum bog at south end of Henrietta Lake. Typical bog species include tamarack, pitcher plant, sundew, cranberry, and dense cotton-grass (Eriophorum spissum)
27	Ottawa Oak Woods and Dry Prairies	NA-2 (RSH)	T6N, R17E Sections 25, 26, 27, 34, 35, 36 Town of Ottawa T5N, R17E Sections 2, 3 Town of Eagle	Department of Natural Resources and private	996	Extensive oak woodland and former oak savanna on irregular morainal topography. Several openings scattered throughout the forested metrix contain moderate- to good-quality dry prairies and are being actively managed
28	Fosters Woods	NA-2	T6N, R19E Section 20 Town of Waukesha	Waukesha County and private	89	Good-quality xeric woods overlooking Fox River. Wetland on east side contains shallow marsh
29	Falk Fen and Woods	NA-2 (RSH)	T6N, R19E Sections 33, 34 Town of Waukesha	Waukesha County, School District of Waukesha, The Neture Conservancy, and other private	306	Large wetland complex, containing extensive fen, shrub-carr, and tamarack relict communities. The flora is rich and diverse, including a number of rare species. Redwing Creek flows through the area. The upland border to the south consists of an esker with dry-mesic woods that has a history of selective logging and grazing
30	Genesee Lake Road Bog	NA-2	T7N, R17E Sections 20, 29 Town of Summit	Private	13	Good-quality acid sphagnum bog lake and tamarack relict. Contains a number of species with more northern affinities
31	Nagawicka Lake Bog and Oak Woods	NA-2	T7N, R18E Sections 5, 8 City of Delafield	Department of Natural Resources and private	156	High-quality tamarack bog at north end of Nagawicka Lake. Relict species include pitcher plant, sundew, bogbean, moccasin-flower orchid, and starflower. Area includes good-quality dry-mesic hardwoods north of bog
32	Pewaukee Lake Access Fen	NA-2 (RSH)	T7N, R18E Section 22 Town of Delafield	Waukesha County	10	Good-quality calcereous fen on west side of Pewaukee Lake. Contains regionally uncommon plant species, including a good population of the State-designated threatened beaked spike-rush (Eleocharis rostellata). Site has improved with program of periodic burning

Table 65 (continued)

Map 32 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
33	Zion Woods	NA-2 (RSH)	T7N, R20E Section 14 City of Brookfield	City of Brookfield and private	55	A small but mature and relatively undisturbed dry-mesic hardwoods stand, located on a northeast-facing slope. Dominated by red oak, sugar maple, and basswood. Contains American gromwell (Lithospermum latifolium), a State-designated special concern species. Lowlands to east support a good-quality sedge meadow
34	Lake Keesus Fen-Meadow	NA-2 (RSH)	T8N, R18E Sections 10, 11, 14 Town of Merton	Private and Department of Natural Resources	141	Large, good-quality wetland complex west of Lake Keesus. Consists of shrub-carr, shallow marsh, sedge meadow, fresh (wet) meadow, and extensive calcareous wiregrass sedge meadow. A number of regionally uncommon species are present in this unique community. The area east of north-south road is of lesser quality
35	Held Maple Woods	NA-2	T8N, R20E Section 6 Village of Menomonee Falls	Private	40	Upland mesic hardwood forest dominated by sugar maple and basswood, with localized areas of beech. Outstanding diversity of herbaceous species. Small swamp forest adds to diversity. Threatened by residential subdivision
36	Menomonee Falls "Tamarack" Swamp	NA-2 (RSH)	T8N, R20E Sections 9, 10, 15, 21, 22, 27, 28 Village of Menomonee Falls	Village of Menomonee Falls and private	831	Extensive wetland complex with only a few of the once-dominant tamaracks remaining. At present, consists largely of lowland hardwood swamp, shrub-carr, alder thicket, sedge meadow, and shallow marsh. Ditching attempts and highway construction have resulted in altered water levels. Because of its large size, this remains a significant undeveloped natural area
37	Ashippun River Lowlands	NA-2	T8N, R17E Sections 9, 10, 15, 16 Town of Oconomowoc	Department of Natural Resources, Waukesha County, and private	244	Good-quality wetland complex bordering the Ashippun River
38	Road X Railroad Prairie	NA-3	T5N, R17E Sections 1, 12 Town of Eagle	Private	4	Moderate-quality, patchy mesic prairie remnant extending for approximately one mile along railway right-of-way
39	Jericho Creek Fen	NA-3 (RSH)	T5N, R17E Sections 12, 13 Town of Eagle	Private	8	Disturbed fen area, with only a few of the characteristic calciphiles present. Recent, extensive beaver activity has raised water levels by backing up Jericho Creek

Table 65 (continued)

Map 32 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
40	Mailman Road Railroad Prairie	NA-3 (RSH)	T5N, R17E Section 14 Town of Eagle	Private	6	Discontinuous mesic prairie remnants along one-half-mile-long railway right-of-way. Best prairie is on east side of tracks. Contains yellowish gentian (Gentiana flavida), a State-designated threatened species
41	Paradise Springs Woods	NA-3 (RSH)	T5N, R17E Sections 15, 16, 21 Town of Eagle	Department of Natural Resources, YMCA, and other private	97	Disturbed xeric woods on rough, gravelly terrain that contains forked aster (Aster furcatus) and kittentails (Besseya bullii), both designated as threatened in Wisconsin
42	STH 59 Oak Woods and Prairies	NA-3 (RSH)	T5N, R17E Sections 20, 21 Town of Eagle	Department of Natural Resources, Wisconsin Department of Transportation, and private	218	Complex of dry prairie, mesic prairie, dry oak woods, and shallow pond. The pond contains significant amphibian populations. Past disturbance includes excavation of gravel for highway construction
43	Eagle Centre (Haffner) Oak Opening	NA-3 (RSH)	T5N, R17E Section 22 Village of Eagle Section 27 Town of Eagle	Private	20	Broken, gravelly interlobate moraine containing large, scattered, open-grown oaks above a weedy herb layer interspersed with dry prairie openings. Has suffered from past grazing and fire suppression, and is currently threatened by residential subdivision. Contains a large population of the State-designated threatened kittentails (Besseya bullii)
44	Malek Wetland	NA-3	T5N, R17E Sections 32, 33 Town of Eagle	Privete	94	Large, generally good-quality wetland complex of sedge meadow, low prairie, deep and shallow marsh, and scattered shrub-carr. Some calcareous fen species are present. Disturbed by past ditching attempts
45	North Prairie Railroad Prairie	NA-3 (RSH)	T5N, R18E Section 6 Town of Mukwonago	Private	5	Discontinuous mesic and wet-mesic prairie remnants along railway right-of-way. Some portions are in good condition. Characteristic species include heart-leaved golden alexanders, prairie dock, big bluestem, and prairie cordgrass
46	Mukwonago Low Woods	NA-3	T5N, R18E Sections 31, 32 Town of Mukwonago T4N, R18E Sections 5, 6 Town of East Troy	Private	167 (plus 165 in Walworth County)	Large wooded wetland and upland complex. Extends south into Walworth County
47	River Oaks Woods and Wetlands	NA-3	T5N, R19E Sections 25, 26 Town of Vernon	Waukesha County and private	135	Disturbed xeric oak woods and adjacent open wetlands bordering the Fox River

Table 65 (continued)

Map 32 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
48	Porter Low Woods	NA-3	T5N, R19E Sections 20, 29, 30 Town of Vernon	Private	245	Good-quality wet-mesic woods and adjacent open wetlands bordering the Fox River. Characteristic tree species include black ash, swamp white oak, black walnut, and shagbark hickory. Aside from very light cutting decades ago, the stand has not been disturbed
49	Norris Oak Woods and Wetlands	NA-3	T5N, R19E Sections 26, 35 Town of Vernon T4N, R19E Section 1 Town of Waterford	Private	358 (plus 6 in Racine County)	Two separate disturbed oak woods and adjacent open lowlands bordering the Fox River
50	Muskego Lake Marsh	NA-3	T5N, R20E Sections 13, 14, 15, 21, 22, 23, 27, 28, 33, 34 City of Muskego	Private	1,061	Large cattail-dominated deep and shallow marsh around the perimeter of Muskego Lake. Has been disturbed by ditching, water-level changes, lake development, and powerboat activity
51	Luther Parker Cemetery Prairie	NA-3	T5N, R20E Section 25 City of Muskego	Private	1	Small pioneer cemetery containing a remnant of mesic prairie, an uncommon community type in this part of the Region. The rich native flora has been invaded by exotic species. Requires active menagement
52	Perkins Property	NA-3	T6N, R17E Sections 5, 6 Town of Ottawa T7N, R17E Sections 31, 32 Town of Summit	Izaak Walton League and other private	438	Complex of lowland hardwoods, upland oak woods, shallow marsh, sedge meadow, shrub-carr, and tamarack bog. Contains the State-designated threatened forked aster (Aster furcatus). Past history of water-level changes due to ditching of adjacent wetlands
53	Nelson Oak Woods and Lowlands	NA-3	T6N, R17E Sections 9, 10 Town of Ottawa	The Nature Conservancy and other private	91	Disturbed oak woods and adjacent lowlands containing sedge meadow and tamarack relict bordering the Bark River. The upland woods contains an active great blue heron rookery
54	Casper Creek Sedge Meadow	NA-3	T6N, R17E Section 14 Town of Ottawa	Private	16	Good-quality sedge meadow and shallow marsh along Casper Creek
55	Ottawa Limestone Outcrop	NA-3 (RSH)	T6N, R17E Sections 11, 14 Town of Ottawa	Ice Age Trail Foundation and other private	70	Disturbed xeric woods with local area of shaded limestone outcrop, containing walking fern (Camptosorus rhizophyllus)
56	Larkin Lake	NA-3	T6N, R17E Section 15 Town of Ottawa	Private	41	Very shallow, mostly undeveloped lake. The surrounding uplands have been grazed and plowed, and are threatened by future residential development
57	CTH ZC Lowlands	NA-3	T6N, R17E Sections 29, 31, 32 Town of Ottawa	Private	380	Extensive wetland complex, disturbed by past land use activities
58	Scuppernong Springs Dry Prairie	NA-3	T6N, R17E Section 34 Town of Ottawa	Department of Natural Resources	1	Dry sand prairie on exposed west-facing slope, containing regionally uncommon plant species

Table 65 (continued)

Map 32 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
59	Brown's Fen	NA-3 (RSH)	T6N, R18E Section 1 Town of Genesee	Waukesha County	2	Moderata-quality fen within Retzer Nature Center
60	CTH D Railroad Prairie	NA-3	T6N, R18E Sections 15, 22 Town of Genesee	Private	5	Patchy, moderate-quality dry-mesic prairie remnants along a one-half-mile-long stretch of railway right-of-way
61	Fruits Pond Fen	NA-3 (RSH)	T6N, R19E Section 4 City of Waukesha	Private	16	Moderate- to good-quality wetland complex of calcareous fen and sedge meadow, and shrub-carr. Disturbances include past filling and dumping. Contains two State-designated special concern species: Ohio goldenrod (Solidago ohioensis) and small fringed gentian (Gentiana procera)
62	Pebble Creek Railroad Prairie	NA-3	T6N, R19E Sections 7, 8 Town of Waukesha	Waukesha County	7	Good-quality mesic prairie and lesser-quality dry prairie along railway right-of-way. Requires active burn management
63	Pebble Creek Wetlands	NA-3	T6N, R19E Sections 8, 17 Town of Waukesha City of Waukesha	City of Waukesha and private	60	Moderate-quality wetlands bordering Pebble Creek. The area north of highway is in best condition. Consists of a combination of sedge meadow, shrub-carr, cattail marsh, and disturbed wet-mesic prairie
64	Minooka Park Woods	NA-3	T6N, R19E Section 13 City of Waukesha Town of Waukesha	Waukesha County	89	A relatively large but disturbed xeric woods dominated by white and red oaks and red maple. Past grazing history is indicated by abundance of thorny species
65	Fox River Woods	NA-3	T6N, R19E Sections 31, 32, 33 Town of Waukesha T5N, R19E Sections 4, 5 Town of Vernon	Department of Natural Resources and private	411	Disturbed dry-mesic and wet-mesic woodland along Fox River. Best area is near center of tract. Past disturbances include selective cutting and ditching attempts
66	Vernon Mesic Prairie	NA-3	T6N, R19E Section 32 Town of Waukesha	Department of Natural Resources	16	Wet-mesic prairie remnant and sedge meadow recovering from past agricultural practices
67	New Berlin Woods	NA-3 (RSH)	T6N, R20E Sections 11, 14 City of New Berlin	Private	35	Small dry-mesic hardwoods with shallow depressions that retain water in spring. Dominant trees include white and red oaks and sugar maple. The American gromwell (Lithospermum latifolium), a State-designated special concern species, is present
68	Oconomowoc Swamp	NA-3	T7N, R17E Sections 5, 8 City of Oconomowoc Town of Summit	Private	148	Wooded lowland consisting of shrub-carr, tamarack relict, and lowland hardwoods, with small areas of sedge meadow. Has suffered from groundwater-level changes in the area

Table 65 (continued)

Map 32 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
69	Crossroads Bog	NA-3 (RSH)	T7N, R17E Sections 19, 20 Town of Summit	Private	4	Disturbed tamarack swamp surrounding small pond and bog mat. Best area, dominated by wiregrass sedge, is on east side. A number of calciphilic species are present at low densities
70	Laura Lake Swamp	NA-3	T7N, R17E Sections 20, 21 Town of Summit	Private	274	Large, disturbed wooded wetland interspersed with dry-mesic forested islands. Area includes Battle Creek and small developed lake
71	Bark River Marsh	NA-3	T7N, R17E Section 23 Town of Summit	Private	158	Deep and shallow cattail marsh along Bark River
72	Breens Bay Sedge Meadow	NA-3 (RSH)	T7N, R17E Section 25 Town of Summit	Private	16	Calcareous sedge meadow at south end of Lower Nemahbin Lake. Contains Ohio goldenrod (Solidago ohioensis), a State-designated special concern species
73	Sawyer Road Sedge Meadow	NA-3	T7N, R17E Section 36 Town of Summit	Private	38	Marsh and sedge meadow wetland with scattered, small tamaracks
74	Hartland Railroad Prairie	NA-3	T7N, R18E Section 2 Village of Hartland	Private	4	Remnant mesic prairie, mostly on hill on north side of railway right-of-way. Characteristic species include big bluestem, rough blazing star, and prairie dock. Threatened by residential development
75	Nashotah House Woods	NA-3	T7N, R18E Sections 6, 7 City of Delafield Village of Nashotah	Nashotah House and other private	100	Relatively large but disturbed xeric oak woods with a thick shrub layer. Disturbances include a network of wide trails and past grazing and selective cutting
76	Bark River School Sedge Meadow	NA-3	T7N, R18E Section 9 City of Delafield	Private	17	Small sedge meadow of moderate quality on north side of Bark River
77	Lapham Peak Woods	NA-3 (RSH)	T7N, R18E Sections 29, 32, 33 Town of Delafield	Department of Natural Resources, Wisconsin Department of Health and Social Services, and private	451	Extensive but isolated xeric oak woods on rough interlobate moraine, dominated by white, red, and bur oaks, shagbark hickory, and black cherry. There is a past history of grazing and selective cutting. Threatened by encroaching subdivisions. Contains the late coral-root orchid (Corallorhiza odontorhiza), a State-designated special concern species
78	Capitol Drive Sedge Meadow and Wet Prairie	NA-3	T7N, R19E Section 6 Town of Pewaukee T7N, R18E Section 1 Town of Delafield	Pewaukee Lake Sanitary District, Town of Pewaukee, and private	91	Moderate-quality sedge meadow, wet-mesic prairie, and shallow marsh. Disturbed by highway construction
79	Pewaukee Lake Wetland	NA-3	T7N, R19E Section 7 Town of Pewaukee T7N, R18E Sections 1, 12 Town of Delafield	Private	68	Moderate-quality wetland complex at northwest corner of Pewaukee Lake, consisting of shallow marsh, sedge meadow, and shrub-carr

Table 65 (continued)

Map 32 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
80	Pewaukee Sedge Meadow	NA-3	T7N, R19E Section 8 Town of Pewaukee	Private	11	Small but good-quality sedge meadow and shallow marsh, with large areas of lake sedge (Carex lacustris)
81	Pewaukee Park Sedge Meadow	NA-3	T7N, R19E Section 9 Village of Pewaukee	Private	42	Moderate- to good-quality shallow marsh and sedge meadow, disturbed by ditching, highway construction, and residential development
82	Busse Woods	NA-3	T7N, R19E Section 23 Town of Pewaukee	Private	40	Good-quality wet-mesic woods, containing large swamp white oaks, embedded within a dry-mesic woods of lesser quality. Threatened by future selective cutting and expansion of industrial park
83	Wirth Swamp	NA-3	T7N, R20E Section 15 City of Brookfield	City of Brookfield and private	85	Degraded floodplain forest of lowland hardwoods, disturbed by ditching, residential encroachment, and Dutch elm disease
84	Bishops Woods	NA-3 (RSH)	T7N, R20E Sections 25, 36 City of Brookfield	Private	52	Formerly one of the best dry-mesic hardwood stands in the Region, now much degraded and reduced in size because of industrial park development. Small areas are still of good quality, but there is severe loss of forest interior. Dominant trees include sugar maple, red oak, and basswood
85	Brookfield Swamp	NA-3	T7N, R20E Sections 21, 28 City of Brookfield	City of Brookfield and private	203	Lowland hardwood forest of silver maple, green ash, and American elm, degraded by ditching, residential encroachment, and Dutch elm disease
86	Meadow View School Bog	NA-3	T8N, R17E Sections 15, 22 Town of Oconomowoc	Oconomowoc Area School District and private	11	Moderate- to good-quality sphagnum bog with small tamaracks
87	Raasch Tamarack Swamp	NA-3	T8N, R17E Sections 16, 17 Town of Oconomowoc	Department of Natural Resources and private	95	Relatively large but rather depauperate tamarack-leatherleaf-sphagnum swamp, disturbed by ditching and dredging
88	Lac La Belle Lowlands	NA-3	T8N, R17E Section 19 Town of Oconomowoc Village of Lac La Belle T8N, R16E Section 24 Town of Ixonia	Private	33 (plus 16 in Jefferson County)	Lowland complex northwest of Lac La Belle, consisting of lowland hardwoods, shrub-carr, shallow marsh, and fresh (wet) meadow. Disturbances include ditching, water-level changes, selective cutting, agricultural runoff, and residential development. Extends into Jefferson County
89	Oconomowoc River Marsh	NA-3	T8N, R17E Sections 33, 34 Town of Oconomowoc	Wisconsin Department of Transportation and private	100	Cattail-dominated deep and shallow marsh bordering the Oconomowoc River, disturbed by channelizing and highway construction
90	Oconomowoc Sedge Meadow	NA-3	T8N, R17E Section 14 Town of Oconomowoc	Private	19	Moderate- to good-quality deep and shallow marsh and sedge meadow. Large areas dominated by lake sedge

Table 65 (continued)

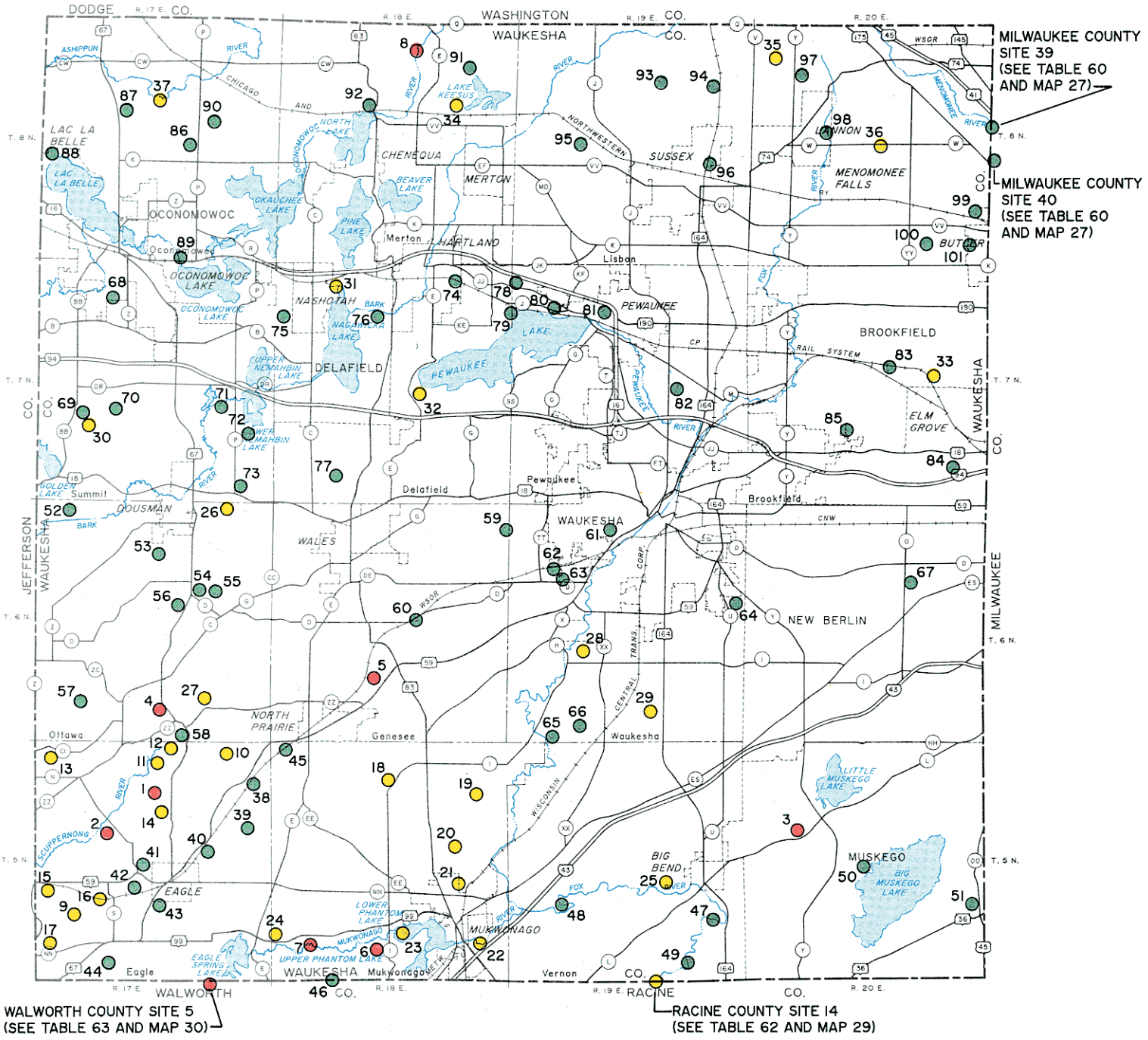
Map 32 Reference Number	Area Name	Classification Code[a]	Location	Ownership	Size (acres)	Description and Comments
91	Camp Whitcomb Lowland	NA-3	T8N, R18E Sections 2, 11 Town of Merton	Boys and Girls Clubs of Greater Milwaukee	48	A wetland complex of moderate quality, consisting of shrub-carr, sedge meadow, and shallow marsh. Disturbances include water-level changes and board-walk construction
92	Chenequa Wetland Complex	NA-3	T8N, R18E Sections 8, 9, 16, 17 Town of Merton	Private and Waukesha County	111	Lowland complex of shrub-carr, sedge meadow, shallow marsh, tamarack relict, and lowland hardwoods
93	Lisbon Low Woods	NA-3	T8N, R19E Sections 10, 11 Town of Lisbon	Private and Department of Natural Resources	267	Large but disturbed lowland hard-woods swemp, with mesic hard-woods on isolated uplands. Adversely affected by ditch-ing attempts
94	Sussex Swamp	NA-3	T8N, R19E Sections 11, 12 Town of Lisbon	Private	147	Lowland hardwood swamp domi-nated by black willow and green ash
95	Thousand Oaks Tamarack Relict	NA-3	T8N, R19E Section 17 Town of Lisbon	Waukesha County and private	30	Small kettle pond surrounded by shallow marsh, narrow bog mat, and disturbed combination of shrub-carr, lowland hardwoods, and tamaracks. Contains some northern relict species
96	Coolings Sedge Meadow	NA-3	T8N, R19E Section 23 Village of Sussex	Waukesha County and private	13	Moderate-quality sedge meadow disturbed by sewer-line construction
97	Peters Woods	NA-3 (RSH)	T8N, R20E Sections 5, 8 Village of Menomonee Falls	Private	69	Moderate-quality dry-mesic and wet-mesic hardwoods. The tree stratum, dominated by sugar maple, red oak, and basswood, includes Kentucky coffeetree (Gymnocladus dioicus), a State-designated special concern species
98	Zuba Woods	NA-3 (RSH)	T8N, R20E Sections 16, 17 Village of Lannon	Private and Waukesha County	51	Moderate- to good-quality mesic and wet-mesic hardwoods, with a rich ground flora
99	Menomonee River Swamp	NA-3	T8N, R20E Section 25 Village of Menomonee Falls City of Milwaukee	Private	29	Small, moderate-quality lowland hardwood forest along the Menomonee River
100	Theater Swamp	NA-3	T8N, R20E Section 35 Village of Menomonee Falls	Village of Menomonee Falls and private	91	Moderate-quality dry-mesic and wet-mesic hardwoods, with local areas of higher quality support-ing large swamp white oaks. Dredged stream channel contains runoff from surrounding resi-dences and abundant green algae
101	Clarks Woods	NA-3	T8N, R20E Section 36 Village of Butler	Waukesha County and private	23	Small, but good-quality, mesic hardwoods stand on summit and north- and east-facing slopes above the Menomonee River. Floodplain forest is present on flats bordering the river. Threat-ened by development of uplands

[a] *NA-1 identifies Natural Area sites of statewide or greater significance*
NA-2 identifies Natural Area sites of countywide or regional significance
NA-3 identifies Natural Area sites of local significance
SNA, or State Natural Area, identifies those sites officially designated as State Natural Areas by the State of Wisconsin Natural Areas Preservation Council
RSH, or Rare Species Habitat, identifies those sites which support rare, threatened, or endangered animal or plant species officially designated by the Wisconsin Department of Natural Resources

Source: Wisconsin Department of Natural Resources and SEWRPC.

Map 32

KNOWN NATURAL AREAS IN WAUKESHA COUNTY: 1994



This map identifies the known Natural Areas in Waukesha County. Natural Areas are tracts of land or water so little modified by human activity, or sufficiently recovered from the effects of such activity, that they contain intact native plant and animal communities believed to be representative of the pre-European-settlement landscape. Natural Area classification is based upon consideration of the structure and integrity of the native plant or animal communities; the extent of artificial disturbance; the commonness of the plant and animal communities present; the presence of critical plant or animal species; the diversity of plant and animal species; and the size of the area.

Source: Wisconsin Department of Natural Resources and SEWRPC.

Table 66

NATURAL AREAS OF SOUTHEASTERN WISCONSIN LISTED BY PREDOMINANT COMMUNITY TYPES: 1994

Community Type	County						
	Kenosha	Milwaukee	Ozaukee	Racine	Walworth	Washington	Waukesha
Bogs	Silver Lake Bog State Natural Area (1)[a]	--	Cedarburg Bog State Natural Area (4) Sapa Spruce Bog State Natural Area (5) Ducks Limited Bog (10) Max's Bog (14) Huiras Lake Woods and Bog (15) Knollwood Road Bog (34) Beekeeper Bog (39) Evergreen Road Bog (43)	Elm Island Bog-Island Oak Woods (6) Honey Lake Leatherleaf Bog (32)	Lulu Lake and Eagle Spring Lake Wetland Complex and Adjacent Uplands (5) Beulah Bog State Natural Area (7) Thiede Road Tamarack Swamp (18) Swan Lake Wetland Complex (19) Cranberry Road Bog (42)	Daniel Boone Bogs (11) Glacial Hills Park Bogs and Upland Woods (12) Big Cedar Lake Bog (16) Hacker Road Bog (25) Bellin Bog (29) Kettle Moraine Drive Bog (32) Hults Bog and Marsh (37) Heritage Trails Bog (61) Green Lake Bog (90)	Henrietta Lake Bog (26) Genesee Lake Road Bog (30) Nagawicka Lake Bog and Oak Woods (31) Crossroads Bog (69) Meadow View School Bog (86)
Dunes	Kenosha Sand Dunes and Low Prairie (6)	--	--	--	--	--	--
Fens	Stopa Fen (5)	Warnimont Park Fens (9)	--	Cherry Lake Sedge Meadow State Natural Area (1) Tichigan Fen (7) Karcher Springs State Natural Area (8) Brock Lake Fen (9) Leda Lake Fen-Meadow (10) Wind Lake Shrub-Fen (19)	Bluff Creek Fens (1) Clover Valley Fen State Natural Area (2) Lulu Lake and Eagle Spring Lake Wetland Complex and Adjacent Uplands (5) Pickerel Lake Fen State Natural Area (6) Comus Lake Wetland Complex (8) Delavan Prairie-Fen (9) Lake Ivanhoe Fen and Sedge Meadow (10) Spring Prairie Fen (11) Muir Oak Woods and Duffin Road Fen (15) Upper Mukwonago River Wetland omplex (16)	Aurora Road Fen (4) Paradise Lake Fen (5) Smith Lake and Wetlands (7) Colgate Fen-Meadow (14) University Fen (69) Camp Wowitan Wetlands (77)	Kettle Moraine Fen and Low Prairie State Natural Area (1) Scuppernong Prairie State Natural Area (2) Ottawa Lake Fen State Natural Area (4) Genesee Oak Opening and Yatzeck's Fen State Natural Area (5) Mukwonago Fen, Sedge Meadow, and Tamarack Relict (6) Eagle Shrub-Fen (11) Eagle Fen and Spring (12) Eagle Ory Prairie and Grotjans Fen (16) Spring Lake Sedge Meadow and Fens (18)

Table 66 (continued)

Community Type	County						
	Kenosha	Milwaukee	Ozaukee	Racine	Walworth	Washington	Waukesha
Fens (continued)					Adams Lake Fen and Marsh (17) Fontana Prairie and Fen (21) Turtle Creek Sedge Meadow and Fen (31) Creek Road Fen (32) Peterson Fen (39) Ivanhoe Creek Fen (41) Sugar Creek Fens, Springs, and Sedge Meadow (52) Connelly Fen (62) Lein's Road Fen (68) Troy Fen (69) Honey Creek Fen (70)		Vernon Tamarack-Fen (19) Vernon Prairie-Fen (20) Vernon Fen (21) Falk Fen and Woods (29) Pewaukee Lake Access Fen (32) Jericho Creek Fen (39) Brown's Fen (59) Fruits Pond Fen (61)
Lowland Hardwoods	Des Plaines River Wetlands (26) Des Plaines River Lowlands (29)	Root River Canal Woods (1) Root River Wet-Mesic Woods—West (2) Cudahy Woods (4) Falk Park Woods (5) Greenfield Park Woods (7) Wedge Woods (26) Oak Creek Low Woods (27) Root River Riverine Forest (28) Menomonee River Swamp—South (30) Currie Park Low Woods (32) Menomonee River Swamp—North (40)	Fairy Chasm State Natural Area (1) Riveredge Creek and Ephemeral Pond State Natural Area (3) Kinnamon Conifer Swamp (12) Huiras Lake Woods and Bog (15) Janik's Woods (16) Harrington Beach Lacustrine Forest (17) Solar Heights Low Woods (20) Ville du Parc Riverine Forest (22) Mole Creek Swamp (24) Cedar-Sauk Low Woods (25)	Tichigan Wetlands and Low Woods (16) Wind Lake Tamarack Swamp (18) County Line Riverine Woods (20) Fox River Riverine Forest (34) Six Mile Road Swamp (45) Caledonia Low Woods (49)	Warbler Trail Wetlands (36)	Germantown Swamp (3) Milwaukee River Floodplain Forest State Natural Area (6) Toland Swamp (9) Loew's Lake Wetland Complex (10) Mud Lake Swamp (15) Jackson Swamp (19) Schoenbeck Woods (28) Reinartz Cedar Swamp (30) Wayne Swamp (31) Thompson Swamp (40) Mason Creek Swamp (43)	Big Bend Wet-Mesic Woods (25) Menomonee Falls "Tamarack" Swamp (36) Mukwonago Low Woods (46) Porter Low Woods (48) Perkins Property (52) CTH ZC Lowlands (57) Oconomowoc Swamp (68) Laura Lake Swamp (70) Wirth Swamp (83) Brookfield Swamp (85) Lisbon Low Woods (93)

Table 66 (continued)

Community Type	County						
	Kenosha	Milwaukee	Ozaukee	Racine	Walworth	Washington	Waukesha
Lowland Hardwoods (continued)			Sherman Road Woods (27) Five Corners Swamp (28) Ulao Lowland Forest (32) Hawthorn Drive Forest (35) County Line Low Woods (38) Department of Natural Resources Lowlands (40) Pioneer Road Lowlands (41) Cedar Valley Swamp (42) Kohler Road Woods (44) Waubeka Low Woods (45) Cedar Grove Swamp (46) Belgium Swamp—North (47) Belgium Swamp—South (48)			CTH J Swamp (44) Hoelz Swamp (50) Lake Park Swamp (51) USH 41 Swamp (53) Kleinman Swamp (54) STH 60 Swamp (56) Kowalske Swamp (62) Sherman Road Swamp (63) Allenton Swamp (64) Sandy Knoll Swamp (72) Poplar Road Lacustrine Forest (74) Fellenz Hardwood Swamp (75) Theresa Swamp (79) Wayne Creek Swamp (80) Stockcar Swamp (81) Wildwood Hardwood Swamp (87) Milwaukee River Swamp (88)	Sussex Swamp (94) Menomonee River Swamp (99) Theater Swamp (100)
Oak Openings	--	Franklin Oak Woods and Oak Savanna (20)	--	--	--	--	Genesee Oak Opening and Yatzeck's Fen State Natural Area (5) Ottawa Oak Woods and Ory Prairies (27) Eagle Centre (Haffner) Oak Opening (43)

Table 66 (continued)

Community Type	County						
	Kenosha	Milwaukee	Ozaukee	Racine	Walworth	Washington	Waukesha
Prairies	Carol Beach Low Prairie and Panné State Natural Area (3) Chiwaukee Prairie State Natural Area(4) Kenosha Sand Dunes and Low Prairie (6) Benedict Prairie (11) Benedict Prairie (11) 104th Street Mesic Prairie (14) Carol Beach Prairie (15) Barnes Creek Dunes and Panné (16) Tobin Road Prairie (17) Lake Russo Prairie Remnant (28) Des Plaines River Lowlands (29) Bain Station Railroad Prairie (30) Pleasant Railroad Prairie (31) Carol Beach Estates Prairie (32) Bong Low Prairie (36) Paris (Ehlen) Prairie Remnant (37)	Mission Hills Wetlands (14) Root River Parkway Prairie (18)	--	Kansasville Railroad Prairie (4) Franksville Railroad Prairie (5) Rosewood Railroad Prairie (11) Union Grove Railroad Prairie (13) Burlington Railroad Prairie (24) Wadewitz Woods (27) English Settlement Prairie (29) Fox River Prairie (31) Sylvania Railroad Prairie (40) Tichigan Wet Prairie (43)	Young Prairie State Natural Area (4) Lulu Lake and Eagle Spring Lake Wetland Complex and Adjacent Uplands (5) Kestol Dry Prairie (13) Muir Oak Woods and Duffin Road Fen (15) Salt Box Road Railroad Prairie (20) Fontana Prairie and Fen (21) Pell Lake Railroad Prairie (28) Bloomfield Prairie (29) Marsh Road Railroad Prairie (34) Silver Lake (49) Whitewater Oak Woods (57) Rice Lake Dry Prairie (58) Duffin Road Prairie (60) Big Spring Road Prairie (61) Nordic Trail Oak Woods (63)	--	Kettle Moraine Fen and Low Prairie State Natural Area (1) Scuppernong Prairie State Natural Area (2) Genesee Oak Opening and Yatzeck's Fen State Natural Area (5) Eagle Oak Opening and Dry Prairies (9) Ulrickson Road Cedar Glade (10) Eagle Railroad Prairie (15) Eagle Dry Prairie and Grotjans Fen (16) Ottawa Oak Woods and Dry Prairies (27) Road X Railroad Prairie (38) Mailman Road Railroad Prairie (40) STH 59 Oak Woods and Prairies (42) North Prairie Railroad Prairie (45) Luther Parker Cemetery Prairie (51) Scuppernong Springs Dry Prairie (58) CTH O Railroad Prairie (60) Pebble Creek Railroad Prairie (62) Vernon Mesic Prairie (66) Hartland Railroad Prairie (74)

Table 66 (continued)

Community Type	County						
	Kenosha	Milwaukee	Ozaukee	Racine	Walworth	Washington	Waukesha
Tamarack Relicts	Powers Lake Tamarack Relict (22)	--	South Conifer Swamp (13)	Cherry Lake Sedge Meadow State Natural Area (1)	Swan Lake Wetland Complex (19) Bloomfield Sedge Meadow and Tamarack Relict (27) Tri-County Tamarack Swamp (38) Lake Geneve Tamarack Relict (40) Abells Corners Sedge Meadow and Tamarack Relict (54) East Troy Tamaracks (72) Potter Lake Tamaracks (73)	Murphy Lake-McConville Lake Wetland Complex (2) Loew's Lake Wetland Complex (10) Friess Lake Tamarack Swamp (13) Mud Lake Swamp (15) Gilbert Lake Tamarack Swamp (24) Amy Bell Lake and Lowlands (46) Sandy Knoll Wetlands (73) Paradise Drive Tamarack Swamp (76) Camp Wowitan Wetlands (77) Schalla Tamarack Swamp (78) Smith Lake Swamp (85)	Mukwonago Fen, Sedge Meadow, and Tamarack Relict (6) Menomonee Falls "Tamarack" Swamp (36) Raasch Tamarack Swamp (87) Chenequa Wetland Complex (92) Thousand Oaks Tamarack Relict (95)
Upland Woods	New Munster Shrub-Carr and Tamarack Relict (7) Merkt Woods (10) Bristol Woods (12) Harris Marsh and Oak Woods (20) Petrifying Springs Woods (21) Des Plaines River Lowlands (29) Section 11 Wetlands and Oak Woods (35) Pike River Low Woods (38)	Root River Canal Woods (1) Root River Wet-Mesic Woods—West (2) Rawson Park Woods (3) Cudahy Woods (4) Falk Park Woods (5) Root River Wet-Mesic Woods—East (6) Greenfield Park Woods (7) St. Francis Seminary Woods (8)	Fairy Chasm State Natural Area (1) Kurtz Woods State Natural Area (2) Cedarburg Beech Woods State Natural Area (6) Pigeon Creek Low and Mesic Woods (7) Donges Bay Gorge (8) Milwaukee River Mesic Woods (9) Riveredge Mesic Woods (11)	Cherry Lake Sedge Meadow State Natural Area (1) Sanders Park Hardwoods State Natural Area (2) Renak-Polak Maple-Beech Woods State Natural Area (3) Elm Island Bog-Island Oak Woods (6) Tichigan Fen (7) Waubeesee Oak Woods and Tamarack Relict (17)	Bluff Creek Woods (3) Lulu Lake and Eagle Spring Lake Wetland Complex and Adjacent Uplands (5) LaGrange Oak Woods (14) Muir Oak Woods and Duffin Road Fen (15) Swan Lake Wetland Complex (19) Wychwood (22) Peninsula Woods (23)	Kewaskum Maple-Oak Woods State Natural Area (1) Holy Hill Woods (8) Daniel Boone Bogs (11) Glacial Hills Park Bogs and Upland Woods (12) Mud Lake Upland Woods (17) St. Anthony Beech Woods (20) Lac Lawrann Conservancy Upland Woods and Wetlands (21)	Muskego Park Hardwoods State Natural Area (3) Monches Woods (8) Eagle Oak Opening and Dry Prairies (9) Kettle Moraine Limestone Outcrop (14) Big Bend Wet-Mesic Woods (25) Ottawa Oak Woods and Dry Prairies (27) Fosters Woods (28)

Table 66 (continued)

Community Type	County						
	Kenosha	Milwaukee	Ozaukee	Racine	Walworth	Washington	Waukesha
Upland Woods (continued)		Grobschmidt Park Wetlands and Upland Woods (10) Root River Parkway Woods (11) Whitnall Park Woods—South (12) Franklin (Puetz Road) Woods (15) Fitzsimmons Road Woods (16) Oakwood Park Oak Woods (17) Ryan Creek Woods (19) Franklin Oak Woods and Oak Savanna (20) Elm Road Woods (21) Grant Park Woods—South (22) Grant Park Woods—Old Growth (23) Esch-Honadel Woods (24) Wood Creek Woods (25) Wedge Woods (26) Whitnall Park Woods—North (29) Harley-Davidson Woods (31) Blue Mound Country Club Woods (33) Wil-O-Way Woods (34) Jacobus Park Woods (35) Downer Woods (36)	Huiras Lake Woods and Bog (15) Janik's Woods (16) Highland Road Woods (18) Pigeon Creek Maple Woods (19) Triple Woods (21) Grafton Woods (26) Cedar Creek Forest (29) Cedar Heights Gorge (30) Lions Den Gorge (31) Hawthorn Drive Forest (35) Spring Lake Beech Forest (37)	County Line Riverine Woods (20) Hunts Woods (21) Cliffside Park Woods and Clay Banks (23) Burlington Hills Woods (25) Wadewitz Woods (27) Rowntree Road Woods (28) Eagle Creek Woods (30) Wehmhoff Park Upland Woods and Wetlands (33) Ives Grove Woods (39) Campbell Woods (41) Van Valin Woods (42) Kimmel Woods (46) Seven Mile Road Woods (47) Zirbes Woods (48) Foley Road Woods—West (50) Foley Road Woods—East (51) Tabor Woods (52) Power Plant Ravine Woods (53)	Darien Oak Woods (30) Lake Loraine Woods—West (43) Lake Loraine Woods—East (44) Granzeau Woods (50) Pallottine Maple Woods (51) Lone Tree Trail Oak Woods (56) Island Woods (64)	Blue Hills Woods (22) Silverbrook Lake Woods (23) Muth Woods (26) Schoenbeck Woods (28) Glacial Trail Forest (33) St. Michael's Woods (34) North Branch Woods (35) Donegal Road Woods (41) Lake Five Woods (48) Faber-Pribyl Woods (49) Schoessow Woods (52) Pike Lake Woods (58) Mueller Woods (59) Slinger Upland Woods (60) CTH Z Upland Woods and Wetlands (70) Ziegler Woods (71) Kettle Moraine Drive Woods (83) STH 28 Woods (84) Lange Hardwoods (86) Lizard Mound Woods (89)	Falk Fen and Woods (29) Nagawicka Lake Bog and Oak Woods (31) Zion Woods (33) Held Maple Woods (35) Paradise Springs Woods (41) STH 59 Oak Woods and Prairies (42) River Oaks Woods and Wetlands (47) Norris Oak Woods and Wetlands (49) Nelson Oak Woods and Lowlands (53) Ottawa Limestone Outcrop (55) Minooka Park Woods (64) Fox River Woods (65) New Berlin Woods (67) Nashotah House Woods (75) Lapham Peak Woods (77) Busse Woods (82) Bishops Woods (84) Peters Woods (97) Zuba Woods (98) Clarks Woods (101)

Table 66 (continued)

Community Type	County						
	Kenosha	Milwaukee	Ozaukee	Racine	Walworth	Washington	Waukesha
Upland Woods (continued)		Bradley Woods (37) Brown Deer Park Woods (38) Harbinger Woods (39) Haskell Noyes Park Woods (41) Schlitz Audubon Center Woods and Beach (42) Kletzsch Park Woods (43)					
Wetlands (miscellaneous)	Peat Lake State Natural Area (2) New Munster Shrub-Carr and Tamarack Relict (7) Elizabeth Lake Lowlands (8) Camp Lake Marsh (9) Mud Lake Sedge Meadow (13) Friendship Lake Marsh (18) CTH NN Sedge Meadow (19) Harris Marsh and Oak Woods (20) Hooker Lake Marsh (23) Montgomery Lake Marsh (24) CTH B-CTH AH Sedge Meadow (25) Des Plaines River Wetlands (26) Salem Road Marsh (27) Des Plaines River Lowlands (29) Dyer Lake Sedge Meadow (33) Peterson Creek Sedge Meadow (34)	Grobschmidt Park Wetlands and Upland Woods (10) Monastery Lake Wetlands (13) Mission Hills Wetlands (14)	Mequon Wetland (23) Hansen's Lake Wetland (33) Spring Lake Marsh (36)	Cherry Lake Sedge Meadow State Natural Area (1) Brock Lake Fen (9) Leda Lake Fen-Meadow (10) Schroeder Road Marsh (12) Norris Marsh and Slough (14) Tichigan Marsh (15) Tichigan Wetlands and Low Woods (16) Caledonia Wildlife Area (22) Bohner Lake Lowlands (26) Wehmhoff Park Upland Woods and Wetlands (33) Dover Wildlife Area Wetlands (35) Church Road Lowlands (36) Eagle Lake Wetlands (37) Vandenboom Road Marsh (38) Wind Lake Wet Meadow (44)	Lulu Lake and Eagle Spring Lake Wetland Complex and Adjacent Uplands (5) Comus Lake Wetland Complex (8) Delavan Prairie-Fen (9) Lake Ivanhoe Fen and Sedge Meadow (10) Honey Lake Marsh and Sedge Meadow (12) Upper Mukwonago River Wetland Complex (16) Adams Lake Fen and Marsh (17) Swan Lake Wetland Complex (19) Williams Bay Lowlands (24) Hafs Road Marsh (25) Lake Ivanhoe Sedge Meadow (26) Bloomfield Sedge Meadow and Tamarack Relict (27) Turtle Creek Sedge Meadow and Fen (31)	Murphy Lake-McConville Lake Wetland Complex (2) Aurora Road Fen (4) Smith Lake and Wetlands (7) Toland Swamp (9) Loew's Lake Wetland Complex (10) Friess Lake Tamarack Swamp (13) Colgate Fen-Meadow (14) Mud Lake Swamp (15) Mud Lake Meadow (18) Lac Lawrann Conservancy Upland Woods and Wetlands (21) Little Cedar Lake Wetlands (27) Myra Wetlands (36) CTH E Wetlands (38) Erin Sedge Meadow (39) Thompson Swamp (40)	Mukwonago Fen, Sedge Meadow, and Tamarack Relict (6) Upper Mukwonago River (7) Eagle Fen and Spring (12) Beaver Dam Lake (13) Fur Farm Pond (17) Spring Lake Sedge Meadow and Fens (18) Lower Mukwonago River (22) Phantom Lake Wetlands (23) Brown Lake and Sedge Meadow (24) Lake Keesus Fen-Meadow (34) Menomonee Falls "Tamarack" Swamp (36) Ashippun River Lowlands (37) Malek Wetland (44) Muskego Lake Marsh (50) Nelson Oak Woods and Lowlands (53)

Table 66 (continued)

Community Type	County						
	Kenosha	Milwaukee	Ozaukee	Racine	Walworth	Washington	Waukesha
Wetlands (miscellaneous) (continued)	Section 11 Wetlands and Oak Woods (35)				Creek Road Fen (32) CTH P Sedge Meadow (33) Lake Lawn Wetland Complex (35) Warbler Trail Wetlands (36) Lake Como Wetlands (37) Lake Loraine Marsh (45) Lake No. 10 (46) Lake Wandawega Marsh (47) North Lake Marsh (48) Silver Lake (49) Sugar Creek Fens, Springs, and Sedge Meadow (52) Sugar Creek Wetlands (53) Abells Corners Sedge Meadow and Tamarack Relict (54) Spring Prairie Lowlands (55) Rock Shrub-Fen (59) Baywood Road Sedge Meadow (65) George Williams Sedge Meadow (66) Doyles Lake Wetlands (67) Army Lake Lowlands (71) Hilburn Sedge Meadow (74)	St. Augustine Road Sedge Meadow (42) CTH J Swamp (44) Hubertus Road Sedge Meadow (45) Amy Bell Lake and Lowlands (46) Colgate Shrub-Carr (47) Rubicon Lowlands (55) Pike Lake Sedge Meadow (57) Allenton Swamp (64) Newark Road Wetland (65) Sunset Park Wetlands (66) Albecker Park Wetlands (67) Silver Creek Marsh (68) CTH Z Upland Woods and Wetlands (70) Sandy Knoll Wetlands (73) Rock River Marsh (82)	Casper Creek Sedge Meadow (54) Larkin Lake (56) Fruits Pond Fen (61) Pebble Creek Wetlands (63) Vernon Mesic Prairie (66) Oconomowoc Swamp (68) Bark River Marsh (71) Breens Bay Sedge Meadow (72) Sawyer Road Sedge Meadow (73) Bark River School Sedge Meadow (76) Capitol Drive Sedge Meadow and Wet Prairie (78) Pewaukee Lake Wetland (79) Pewaukee Sedge Meadow (80) Pewaukee Park Sedge Meadow (81) Lac La Belle Lowlands (88) Oconomowoc River Marsh (89) Oconomowoc Sedge Meadow (90) Camp Whitcomb Lowland (91) Chenequa Wetland Complex (92) Coolings Sedge Meadow (96)

[a]*Numbers in parentheses correspond to reference numbers in appropriate county tables (Tables 59 through 65) and accompanying maps (Maps 26 through 32).*

Source: Wisconsin Department of Natural Resources and SEWRPC.

Table 67

SUMMARY OF KNOWN NATURAL AREAS IN SOUTHEASTERN WISCONSIN: 1994

Natural Area Category or Characteristic	County							Region
	Kenosha	Milwaukee	Ozaukee	Racine	Walworth	Washington	Waukesha	
NA-1 Areas								
Number of Sites	6	1[a]	5	7	7	7	9[b]	40
Combined Area (acres)	614	33	2,282	588	1,745	1,659	1,779	8,700
Percent of Area of County or Region	0.3	<0.1	1.5	0.3	0.5	0.6	0.5	0.5
Mean Size (acres)	102	33	456	84	249	237	198	218
NA-2 Areas								
Number of Sites	16[c]	9	12	19[d]	12	29	30[e]	122
Combined Area (acres)	1,819	669	2,088	2,729	2,647	6,350	4,889	21,191
Percent of Area of County or Region	1.0	0.4	1.4	1.2	0.7	2.3	1.3	1.2
Mean Size (acres)	114	74	174	144	220	219	163	174
NA-3 Areas								
Number of Sites	17	34	31	33[f]	58[g]	55[h]	66[i]	285
Combined Area (acres)	1,095	1,582	2,988	2,306	4,773	7,961	7,053	27,758
Percent of Area of County or Region	0.6	1.0	2.0	1.0	1.3	2.9	1.9	1.6
Mean Size (acres)	64	47	96	70	82	145	107	97
Total								
Number of Sites	39	44	48	59	77	91	105	447
Combined Area (acres)	3,528	2,284	7,358	5,623	9,165	15,970	13,721	57,649
Percent of Area of County or Region	1.9	1.5	4.9	2.6	2.5	5.8	3.7	3.3
Mean Size (acres)	90	52	153	95	119	175	131	129

NOTE: Because some Natural Areas are located within more than one county, regional totals may differ from the sums of county totals.

[a] *One NA-1 area shared with Ozaukee County.*

[b] *One NA-1 area shared with Walworth County.*

[c] *One NA-2 area shared with Racine County.*

[d] *Two NA-2 areas shared with Milwaukee County and one NA-2 area shared with Walworth County.*

[e] *One NA-2 area shared with Racine County.*

[f] *One NA-3 area shared with Milwaukee County, one NA-3 area shared with Walworth County, and one NA-3 area shared with Waukesha County.*

[g] *One NA-3 area shared with Waukesha County and two NA-3 areas shared with Racine County.*

[h] *One NA-3 area shared with Ozaukee County.*

[i] *Two NA-3 areas shared with Milwaukee County.*

Source: SEWRPC.

Table 68

SITE OCCURRENCES FOR CRITICAL PLANT SPECIES IN SOUTHEASTERN WISCONSIN: 1994

County	Species Status			Total
	Endangered	Threatened	Rare	
Kenosha	22	23	88	133
Milwaukee	17	14	63	94
Ozaukee	5	12	46	63
Racine	13	29	78	120
Walworth	8	50	133	191
Washington	0	4	47	51
Waukesha	8	55	103	166
Region	73	187	558	818

Source: SEWRPC.

located in Milwaukee County (see Table 71). Of the 20 threatened species in the Region, kittentails (Besseya bullii) was by far the most frequently encountered, being found at 56 sites (see Table 72). One hundred sites were found to support Ohio goldenrod (Solidago ohioensis), the most frequently occurring rare species (see Table 73).

In addition, 223 uncommon plant species were documented for the Region (see Table 74). Waukesha County contained the highest number of such occurrences at 466, while Milwaukee County contained the lowest number, with 114. The most frequently occurring uncommon species were wild sarsaparilla (Aralia nudicaulis) and sage willow (Salix candida), with 90 and 89 occurrences, respectively, in the Region.

The above photograph shows the sage willow (Salix candida). Sage willow is a low shrub of the better-quality calcareous meadows, low prairies, and fens located in glaciated regions. It may also occur occasionally in open bogs.

Source: Donald M. Reed.

The entire range in Wisconsin of the blue-stemmed goldenrod (Solidago caesia), a State of Wisconsin-designated endangered species, extends from the Root River in the City of Racine northward to about E. Oklahoma Avenue in the City of Milwaukee, and westward from Lake Michigan to about STH 38 in Milwaukee and Racine Counties.

Source: Donald M. Reed.

Intensive and uncontrolled recreational use of Milwaukee County's Rawson Park not only threatens critical habitat for the blue-stemmed goldenrod (Solidago caesia), a State of Wisconsin-designated endangered species, but has compromised the ground-layer flora of what would otherwise be an outstanding Natural Area.

Source: Donald M. Reed.

Table 69

CRITICAL PLANT SPECIES HABITAT SITES IN SOUTHEASTERN WISCONSIN: 1995

Map 33 Reference Number	Site Name	County	Location	Species of Concern[a]	Ownership
1	Hamilton Woods	Kenosha	T1N, R19E Section 33	Trillium recurvatum (R)	Private
2	Wilmot Ski Hill Prairie	Kenosha	T1N, R20E Section 31	Liatris spicata (R) Solidago ohioensis (R)	Private
3	Trevor Creek Wet Prairie	Kenosha	T1N, R20E Section 34	Solidago ohioensis (R)	Private
4	Piela Property	Kenosha	T1N, R22E Section 33	Agrimonia parviflora (R)	Private
5	Martin Band Parcel	Kenosha	T1N, R23E Section 18	Phlox glaberrima (E)	Private
6	Nedweski Parcel	Kenosha	T1N, R23E Section 18	Calamovilfa longifolia (T)	Private
7	Barnes Creek	Kenosha	T1N, R23E Section 19	Trillium recurvatum (R) Solidago ohioensis (R)	Private
8	Brighton-Dale Woods	Kenosha	T2N, R20E Section 10	Eupatorium sessilifolium (R) Trillium recurvatum (R)	Kenosha County
9	Peterson Creek Wetland	Kenosha	T2N, R20E Section 30	Solidago ohioensis (R)	Private
10	Poisl Woods	Kenosha	T2N, R21E Section 1	Trillium recurvatum (R)	Private
11	Thompson Woods	Kenosha	T2N, R22E Section 13	Trillium recurvatum (R)	Private
12	Bradford School Woods	Kenosha	T2N, R22E Section 25	Trillium recurvatum (R)	City of Kenosha
13	Parkside Woods	Kenosha	T2N, R22E Section 12	Trillium recurvatum (R)	University of Wisconsin-Parkside
14	Burlington Crevasse Filling	Racine	T2N, R19E Section 4	Besseya bullii (T)	Private
15	Margis Wildlife Area[b]	Racine	T2N, R19E Section 17	Gentiana procera (R)	Department of Natural Resources
16	Ranger Mac Fen	Racine	T2N, R19E Section 17	Solidago ohioensis (R) Gentiana procera (R)	The Nature Conservancy
17	Karcher Sedge-Carr	Racine	T2N, R19E Sections 21, 22	Cacalia tuberosa (T)	Department of Natural Resources
18	Ela Park Dry Prairie	Racine	T3N, R19E Section 10	Besseya bullii (T)	Racine County
19	Ives Grove Prairie Remnant	Racine	T3N, R21E Section 13	Parthenium integrifolium (T)	Private
20	Waxdale Railroad Prairie	Racine	T3N, R22E Sections 15, 22	Parthenium integrifolium (T) Thalictrum revolutum (R)	Private
21	Pritchard Park Woods	Racine	T3N, R22E Section 24	Trillium recurvatum (R)	Racine County
22	Washington Park Woods	Racine	T3N, R23E Section 17	Solidago caesia (E)	City of Racine
23	Maple Road Gravel Pit	Racine	T4N, R19E Section 28	Besseya bullii (T) Penstemon hirsutus (R)	Private

Table 69 (continued)

Map 33 Reference Number	Site Name	County	Location	Species of Concern[a]	Ownership
24	Erwin Wetlands	Racine	T4N, R20E Section 3	Solidago ohioensis (R)	Private
25	Patzke Fen	Racine	T4N, R20E Section 3	Solidago ohioensis (R)	Private
26	Krieser Fen	Racine	T4N, R20E Section 10	Solidago ohioensis (R)	Private
27	Landon Wetland	Racine	T4N, R20E Section 10	Solidago ohioensis (R)	Private
28	Sherwood Property	Racine	T4N, R22E Section 2	Carex lupuliformis (E)	Private
29	River Meadow Woods	Racine	T4N, R22E Section 23	Trillium recurvatum (R)	Private
30	Forked Aster Site	Racine	T4N, R22E Section 23	Aster furcatus (T)	Private
31	Caledonia Sanitary Sewer Right-of-Way	Racine	T4N, R22E Section 25	Solidago caesia (E) Ptelea trifoliata (R) Scutellaria ovata (R)	Private
32	Caledonia Site South[c]	Racine	T4N, R22E Section 25	Ptelea trifoliata (R)	Private
33	Root River Bluff	Racine	T4N, R22E Section 26	Ptelea trifoliata (R)	Private
34	Hoods Creek Swamp	Racine	T4N, R22E Section 26	Trillium recurvatum (R)	Private
35	Breakers Woods	Racine	T4N, R23E Section 16	Solidago caesia (E)	Private
36	Dominican Ravine	Racine	T4N, R23E Section 21	Solidago caesia (E)	Private
37	Wind Point	Racine	T4N, R23E Section 27	Cakile edentula (R)	Racine County
38	North Bay Ravine and Beach	Racine	T4N, R23E Section 33	Cakile edentula (R)	Private
39	Four Mile Road Woods	Racine	T4N, R23E Sections 19, 30	Trillium recurvatum (R)	Private
40	Caledonia Low Woods	Racine	T4N, R23E Section 30	Ptelea trifoliata (R) Trillium recurvatum (R)	Private
41	River Bend Upland Woods	Racine	T4N, R23E Section 31	Solidago caesia (E)	Racine County
42	Root River Strip Woods	Racine	T4N, R23E Section 31	Ptelea trifoliata (R)	Private
43	Railroad Lowland	Walworth	T1N, R15E Sections 2, 11	Gentiana procera (R)	Department of Natural Resources
44	Elkhorn Railroad Prairie Remnant	Walworth	T2N, R17E Section 6	Asclepias sullivantii (T)	Private
45	White River Railroad Prairie	Walworth	T2N, R18E Section 1	Cypripedium candidum (T)	Private
46	Radio Station Wetland	Walworth	T2N, R18E Section 32	Gentiana procera (R)	Private

Table 69 (continued)

Map 33 Reference Number	Site Name	County	Location	Species of Concern[a]	Ownership
47	Peterson Property	Walworth	T2N, R18E Section 35	Agrimonia parviflora (R)	Private
48	Lake Number 10 Open Woods	Walworth	T3N, R15E Section 10	Besseya bullii (T)	Private
49	Island Road Shrub-Carr	Walworth	T3N, R15E Section 35	Gentiana procera (R) Solidago ohioensis (R)	Private
50	Sugar Creek Woods—North	Walworth	T3N, R17E Sections 15, 16	Corallorhiza odontorhiza (R)	Private
51	Sugar Creek Wet Woods	Walworth	T3N, R17E Section 16	Agastache nepetoides (T)	Private
52	Sugar Creek Woods—South	Walworth	T3N, R17E Sections 15, 16, 17	Corallorhiza odontorhiza (R)	Private
53	Abells Corners Fen	Walworth	T3N, R17E Section 17	Gentiana procera (R)	Private
54	Hargraves Road Sedge Meadow	Walworth	T3N, R18E Section 17	Gentiana procera (R)	Private
55	Mills Road Prairie	Walworth	T4N, R15E Section 15	Asclepias sullivantii (T)	Private
56	Anderson Road	Walworth	T4N, R15E Section 16	Asclepias sullivantii (T)	Private
57	Island Road Prairie	Walworth	T4N, R15E Section 21	Asclepias sullivantii (T)	Private
58	LaGrange Campground	Walworth	T4N, R16E Section 10	Besseya bullii (T)	Department of Natural Resources
59	Lauderdale Lakes Woods	Walworth	T4N, R16E Section 35	Aster furcatus (T) Eupatorium sessilifolium (R)	Private
60	Harmony Hills Savanna	Walworth	T4N, R17E Section 8	Carex torreyi (R)	Private
61	Doyles Lake Prairies	Walworth	T4N, R17E Sections 8, 9	Besseya bullii (T)	Private
62	Camp Timberlee	Walworth	T4N, R17E Section 17	Agrimonia parviflora (R)	Private
63	Shelter Two Ridge	Waukesha	T5N, R17E Section 19	Besseya bullii (T)	Department of Natural Resources
64	Eagle Dump Oak Opening	Waukesha	T5N, R17E Section 26	Besseya bullii (T)	Private
65	Domon Prairie Remnant	Waukesha	T5N, R17E Section 27	Besseya bullii (T)	Private
66	Holtz Oak Opening	Waukesha	T5N, R17E Sections 12, 13	Besseya bullii (T)	Private
67	Mounded Fen	Waukesha	T5N, R17E Section 30	Solidago ohioensis (R)	Department of Natural Resources
68	Spring Lake Woods	Waukesha	T5N, R18E Section 8	Besseya bullii (T)	Private
69	Romanowski Fen	Waukesha	T5N, R18E Section 15	Gentiana procera (R) Solidago ohioensis (R)	Private

Table 69 (continued)

Map 33 Reference Number	Site Name	County	Location	Species of Concern[a]	Ownership
70	Pheasant Hill Woods	Waukesha	T5N, R19E Section 15	Trillium recurvatum (R)	Private
71	Utica Lake Tamaracks	Waukesha	T6N, R17E Section 4	Cypripedium parviflorum (R)	Private
72	Lurvey Tamaracks	Waukesha	T6N, R17E Section 15	Cypripedium reginae (R)	Private
73	Delopst Meadow	Waukesha	T6N, R20E Section 6	Solidago ohioensis (R)	Private
74	Kostello Property	Waukesha	T6N, R20E Section 10	Carex lupuliformis (E)	Private
75	Genesee Lake Road Tamaracks	Waukesha	T7N, R17E Section 29	Cypripedium reginae (R)	Private
76	Dousman Road Low Woods	Waukesha	T7N, R17E Section 33	Solidago ohioensis (R) Triglochin maritimum (R)	Private
77	Massaro Woods	Waukesha	T7N, R17E Section 13	Trillium recurvatum (R)	Private
78	Meadowbrook Prairie	Waukesha	T7N, R19E Section 18	Cypripedium candidum (T)	Pewaukee Lake Sanitary District
79	Elm Grove Road Pond	Waukesha	T7N, R20E Section 25	Carex crus-corvi (E) Carex lupuliformis (E)	Private
80	Ranch Woods	Waukesha	T8N, R20E Section 8	Lithospermum latifolium (R)	Private
81	Glass-Glick Woods	Waukesha	T8N, R20E Section 34	Carex formosa (T)	Private
82	Heritage Woods	Waukesha	T8N, R20E Section 13	Trillium nivale (T)	Private
83	Rozik Woods	Waukesha	T8N, R20E Section 16	Carex lupuliformis (E)	Private
84	Elm Road Woods—North	Milwaukee	T5N, R21E Section 36	Trillium recurvatum (R) Viburnum prunifolium (R)	Private
85	Meyers Woods	Milwaukee	T5N, R22E Section 19	Viburnum prunifolium (R)	Private
86	PPG Woods	Milwaukee	T5N, R22E Section 32	Trillium recurvatum (R)	Private
87	Fittshur Wetland	Milwaukee	T5N, R22E Section 23	Solidago caesia (E)	Private
88	Bender Park Woods and Clay Banks	Milwaukee	T5N, R22E Section 25	Solidago caesia (E) Equisetum variegatum (R)	Milwaukee County
89	Bender Park Woods—South	Milwaukee	T5N, R22E Section 25	Solidago caesia (E)	Milwaukee County
90	Oak Creek Power Plant Woods	Milwaukee	T5N, R22E Section 36	Solidago caesia (E)	Wisconsin Electric Power Company
91	Warnimont Park Woods	Milwaukee	T6N, R22E Section 36	Solidago caesia (E)	Milwaukee County
92	Underwood Parkway Woods	Milwaukee	T7N, R21E Section 20	Ptelea trifoliata (R)	Milwaukee County
93	Stadium Bluff Woods	Milwaukee	T7N, R21E Section 35	Aster furcatus (T)	Zablocki Veterans Affairs Medical Center

Table 69 (continued)

Map 33 Reference Number	Site Name	County	Location	Species of Concern[a]	Ownership
94	Cambridge Avenue Woods	Milwaukee	T7N, R22E Section 9	Aster furcatus (T)	Milwaukee County
95	Brynwood Country Club Woods	Milwaukee	T8N, R21E Section 15	Lithospermum latifolium (R)	Private
96	Fox Point Clay Bluffs	Milwaukee	T8N, R22E Sections 9, 16, 21, 28	Tofieldia glutinosa (T) Trillium nivale (T)	Private
97	Stauss Woods	Ozaukee	T9N, R21E Section 33	Lithospermum latifolium (R)	Private
98	Pecard Sedge Meadow	Ozaukee	T9N, R22E Section 19	Gentiana alba (T)	Private
99	Eastbrook Road Woods	Ozaukee	T9N, R22E Section 19	Aster furcatus (T)	Private
100	Cedarburg Woods—West	Ozaukee	T10N, R21E Section 22	Hydrastis canadensis (R)	Private
101	Cedar-Sauk Upland Woods	Ozaukee	T11N, R21E Section 33	Lithospermum latifolium (R)	Private
102	Sauk Creek Nature Preserve	Ozaukee	T11N, R22E Section 29	Aster furcatus (T)	Ozaukee County
103	Jackson Woods	Washington	T10N, R20E Section 20	Lithospermum latifolium (R)	Private
104	St. Anthony Maple Woods	Washington	T11N, R18E Section 10	Lithospermum latifolium (R)	Private
105	Doll Woods	Washington	T11N, R18E Section 16	Lithospermum latifolium (R)	Private
106	Riesch Woods	Washington	T11N, R19E Section 6	Lithospermum latifolium (R)	Private
107	Silver Lake Swamp	Washington	T11N, R19E Section 34	Cypripedium reginae (R)	Private
108	Cameron Property	Washington	T11N, R20E Section 8	Cypripedium parviflorum (R)	Private
109	Fechters Woods	Washington	T11N, R20E Section 36	Hydrastis canadensis (R)	Private
110	High School Woods	Washington	T11N, R19E Section 24	Panax quinquefolius (R)	City of West Bend
111	Paradise Springs Brook	Waukesha	T5N, R17E Section 16	Carex crawei (R) Solidago ohioensis (R)	Department of Natural Resources

[a] *"E" refers to species designated as endangered in Wisconsin*
"T" refers to species designated as threatened in Wisconsin
"R" refers to species designated as special concern or watch species in Wisconsin

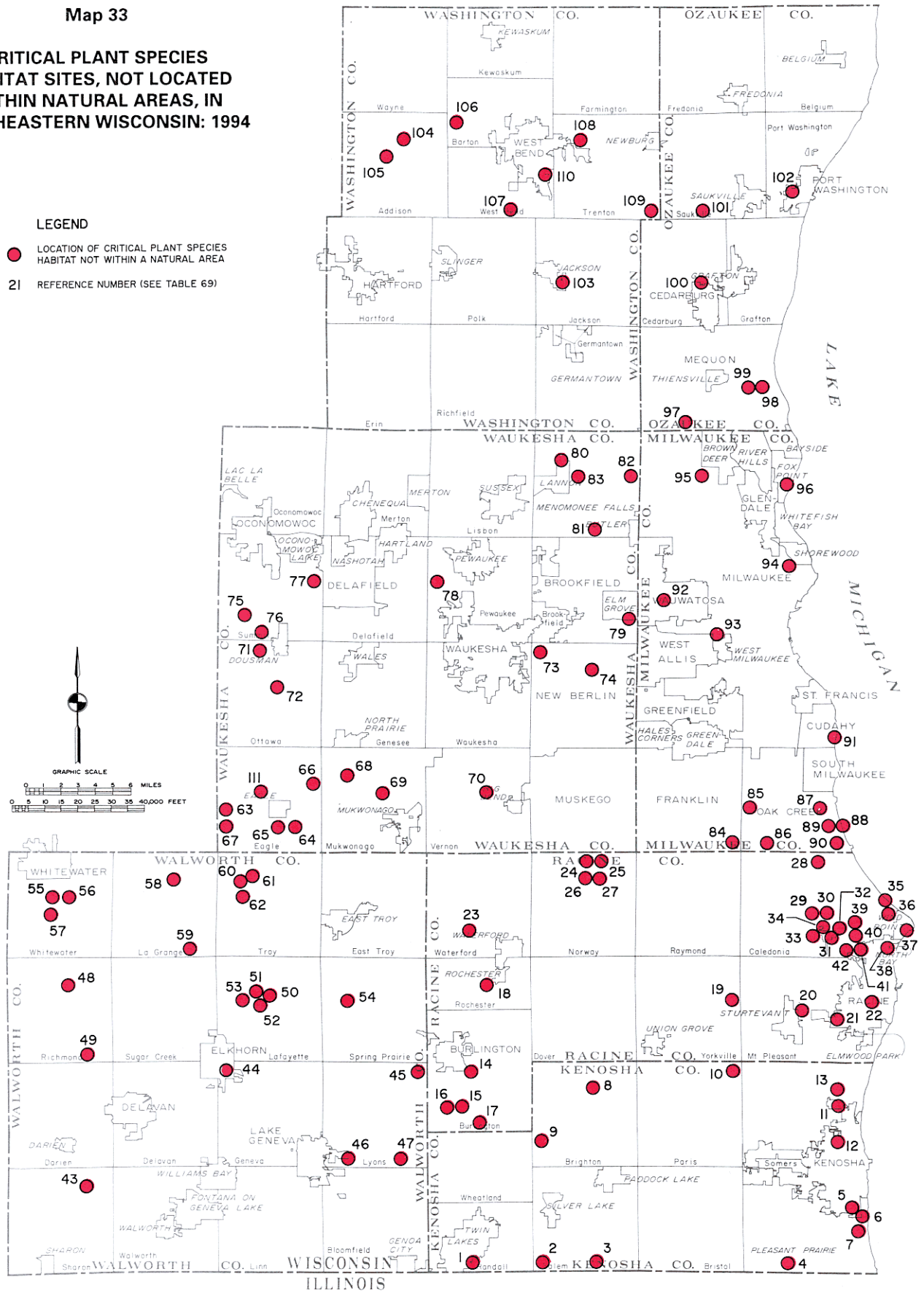
[b] *The Margis Wildlife Area has been identified as both a Critical Plant Species Habitat site and a Critical Bird Species Habitat site.*

[c] *The Caledonia Site South Critical Plant Species Habitat site is located entirely within the Caledonia Sanitary Sewer Right-of-Way site.*

Source: SEWRPC.

Map 33

CRITICAL PLANT SPECIES HABITAT SITES, NOT LOCATED WITHIN NATURAL AREAS, IN SOUTHEASTERN WISCONSIN: 1994



This map identifies designated Critical Plant Species Habitat sites located within Southeastern Wisconsin. Critical Plant Species Habitat sites are those areas, exclusive of identified Natural Areas, which have been found to support State-designated endangered, threatened, or rare plant species, or a combination of such categories. These areas do not meet the criteria for Natural Area status, as outlined in Chapter II. A total of 111 Critical Plant Species Habitat sites have been identified in the Region.

Source: SEWRPC.

Table 70

DISTRIBUTION OF ENDANGERED AND THREATENED PLANT SPECIES IN DESIGNATED NATURAL AREAS IN SOUTHEASTERN WISCONSIN

Distribution Category	Natural Areas by Category			Total
	NA-1	NA-2	NA-3	
One Endangered or Threatened Species	6	33	30	69
Two or More Endangered or Threatened Species	16	7	7	30
Total	22	40	37	99

Source: SEWRPC.

WILDLIFE HABITAT MAPPING

In 1985, the Wisconsin Department of Natural Resources and the Regional Planning Commission cooperatively developed criteria for evaluating and ranking wildlife habitats within the Region. Based upon these criteria, the wildlife habitats of the Region were delineated and classified on Commission 1985 ratioed and rectified, one-inch-equals-400-feet-scale aerial photographs. Forests, upland brushlands, grasslands, wetland habitats, riparian zones, and habitat corridors were identified and delineated on the aerial photographs. Drained wetlands, drainage ditches, and drain tiles, where detectable, were also identified and delineated on the photographs.

The wetland boundaries used were those delineated on the one-inch-equals-2,000-feet-scale final Wisconsin Wetland Inventory maps. The Wisconsin Wetland Inventory classification system, which includes aquatic, emergent, shrub, and forested communities, was used to classify wetlands.

Upland forests were delineated on the large-scale photographs. These forests included all those wooded stands with 50 percent or more canopy coverage, and were classified primarily into five types: maple-dominant, oak-dominant, mixed-hardwoods, conifer plantation, and aspen-dominant. The Wisconsin Department of Natural Resources Land Inventory maps prepared in 1961 were used to locate lowland hardwoods not identified on the Wisconsin Wetland Inventory maps and to distinguish upland hardwoods from oak-hickory stands. The U. S. Soil Conservation Service soil survey maps, as prepared under contract to the Commission at a scale of one inch equals 2,000 feet, were also used

The photograph above shows the beaked spike-rush (Eleocharis rostellata), a plant species defined by the State of Wisconsin as threatened. This species is restricted to calcareous fens in Southeastern Wisconsin. This spike-rush is a halophyte, or salt-tolerant plant species, which normally occurs in salt marshes of the Atlantic coastal plain. Within the calcareous fen community, beaked spike-rush occurs as a pioneer species colonizing the barren, exposed soils with active spring seepages.

Source: Donald M. Reed.

Mare's-tail (Hippuris vulgaris), shown above, is an uncommon, emergent aquatic plant species of spring ponds and streams. This plant species was identified from only three locations in the Region during the natural areas and critical species habitat inventory.

Source: Donald M. Reed.

to help identify forest types. To further improve the accuracy of forest typing, Wisconsin Department of Natural Resources foresters provided cover-type maps for those lands enrolled in the State forest tax law program.

The map delineations were annotated to describe critical habitat components, such as wetland and

Table 71

ENDANGERED PLANT SPECIES OCCURRENCES IN SOUTHEASTERN WISCONSIN: 1994

Species	County							Total
	Kenosha	Milwaukee	Ozaukee	Racine	Walworth	Washington	Waukesha	
Agalinis skinneriana	1	0	0	0	0	0	0	1
Asclepias purpurascens	2	0	0	1	1	0	1	5
Astragalus neglectus	1	0	0	0	0	0	0	1
Camassia scilloides	0	0	0	0	1	0	0	1
Carex crus-corvi	0	1	0	0	0	0	2	3
Carex lupuliformis	0	2	0	2	0	0	4	8
Fimbristylis puberula	1	0	0	0	0	0	0	1
Phlox glaberrima	9	0	0	0	0	0	0	9
Plantago cordata	0	1	2	0	0	0	0	3
Platanthera leucophaea	6	0	1	0	1	0	1	9
Polygala incarnata	1	0	0	0	0	0	0	1
Potamogeton pulcher	0	0	1	0	0	0	0	1
Pterospora andromeda	0	0	1	0	0	0	0	1
Scirpus cespitosus var. callosus	1	0	0	0	4	0	0	5
Scutellaria parvula	0	0	0	0	1	0	0	1
Solidago caesia	0	13	0	10	0	0	0	23
Totals	22	17	5	13	8	0	8	73

NOTE: For common names of plant species, refer to Table 47 in Chapter V of this report (see pages 160-162) or Appendix A.

Source: SEWRPC.

Table 72

THREATENED PLANT SPECIES OCCURRENCES IN SOUTHEASTERN WISCONSIN: 1994

Species	County							Total
	Kenosha	Milwaukee	Ozaukee	Racine	Walworth	Washington	Waukesha	
Agalinis gattingeri	1	0	0	0	0	0	0	1
Agastache nepetoides	0	0	0	1	1	0	0	2
Asclepias sullivantii	4	0	0	1	5	0	1	11
Aster furcatus	0	6	4	1	1	2	4	18
Besseya bullii	0	0	0	8	23	2	23	56
Cacalia tuberosa	5	0	0	4	1	0	4	14
Calamovilfa longifolia var. magna	4	0	0	0	0	0	0	4
Carex formosa	0	2	1	1	0	0	1	5
Cypripedium arietinum	0	0	2	0	0	0	0	2
Cypripedium candidum	2	0	0	0	5	0	9	16
Drosera linearis	0	0	1	0	0	0	0	1
Echinacea pallida	0	0	0	1	0	0	0	1
Eleocharis rostellata	2	0	0	1	10	0	5	18
Elymus lanceolatus	0	0	1	0	0	0	0	1
Fraxinus quadrangulata	0	0	0	0	0	0	2	2
Gentiana alba (G. flavida)	0	2	1	5	0	0	2	10
Parthenium integrifolium	2	0	0	6	0	0	0	8
Tofieldia glutinosa	3	3	1	0	4	0	2	13
Trillium nivale	0	1	1	0	0	0	1	3
Valeriana uliginosa	0	0	0	0	0	0	1	1
Totals	23	14	12	29	50	4	55	187

NOTE: For common names of plant species, refer to Table 47 in Chapter V of this report (see pages 160-162) or Appendix A.

Source: SEWRPC.

Table 73

SPECIAL CONCERN OR RARE PLANT SPECIES OCCURRENCES IN SOUTHEASTERN WISCONSIN: 1994

Species	County							Total
	Kenosha	Milwaukee	Ozaukee	Racine	Walworth	Washington	Waukesha	
Agrimonia parviflora	1	0	0	0	6	0	0	7
Arethusa bulbosa	0	0	1	0	1	0	0	2
Cakile edentula	2	1	2	2	0	0	0	7
Calamagrostis inexpansa	0	0	0	0	0	2	0	2
Calamintha arkansana	7	0	0	0	0	0	0	7
Cardamine pratensis var. palustris	0	0	3	0	0	3	1	7
Carex crawei	1	0	0	1	1	0	1	4
Carex sychnocephala	0	0	0	0	1	0	1	2
Carex tenuiflora	0	0	2	0	0	0	0	2
Carex torreyi	0	0	0	0	1	0	0	1
Corallorhiza odontorhiza	0	0	1	0	2	0	1	4
Coreopsis lanceolata var. lanceolata	4	0	0	0	0	0	0	4
Cypripedium parviflorum	1	0	8	0	3	8	4	24
Cypripedium reginae	1	0	2	0	1	3	5	12
Deschampsia cespitosa	0	0	0	0	0	0	1	1
Dryopteris clintoniana	0	0	1	0	0	0	0	1
Epilobium palustre	0	0	1	0	0	0	0	1
Epilobium strictum	2	0	0	0	3	0	2	7
Equisetum palustre	0	0	0	0	1	0	0	1
Equisetum variegatum	0	2	1	0	0	0	0	3
Eupatorium sessilifolium	1	0	0	0	0	0	0	1
Euphorbia polygonifolia	1	0	0	0	0	0	0	1
Gentiana procera	8	2	0	5	35	2	19	71
Gymnocladus dioicus	0	0	0	0	0	0	3	3
Hibiscus moscheutos	0	0	0	0	1	0	0	1
Hydrastis canadensis	0	1	6	2	0	6	0	15
Jeffersonia diphylla	2	3	1	0	0	0	0	6
Liatris spicata	15	0	0	14	6	0	7	42
Lithospermum latifolium	0	14	7	3	1	11	7	43
Malaxis brachypoda	0	0	1	0	0	0	0	1
Medeola virginiana	0	0	1	0	0	0	0	1
Orobanche uniflora	1	0	0	0	0	0	0	1
Panax quinquefolius	0	1	1	1	1	4	0	8
Peltandra virginica	0	0	1	0	0	0	0	1
Penstemon hirsutus	1	0	0	1	0	0	0	2
Penstemon pallidus	1	0	0	0	0	0	0	1
Platanthera dilatata	0	0	1	0	1	0	0	2
Platanus occidentalis	0	0	0	0	1	0	0	1
Ptelea trifoliata	0	1	0	5	1	0	2	9
Scleria triglomerata	1	0	0	0	0	0	0	1
Scleria verticillata	2	0	0	0	5	0	0	7
Scutellaria ovata	0	1	0	2	0	0	0	3
Solidago ohioensis	15	2	0	13	37	2	31	100
Thalictrum revolutum	2	2	0	1	1	0	0	6
Triglochin maritimum	3	0	3	1	14	2	6	29
Triglochin palustre	2	1	1	3	8	4	5	24
Trillium recurvatum	13	15	0	19	1	0	7	55
Trisetum melicoides	0	1	0	0	0	0	0	1
Utricularia purpurea	0	0	1	0	0	0	0	1
Viburnum prunifolium	1	16	0	5	0	0	0	22
Totals	88	63	46	78	133	47	103	558

NOTE: For common names of plant species, refer to Table 47 in Chapter V of this report (see pages 160-162) or Appendix A.

Source: SEWRPC.

Table 74

UNCOMMON PLANT SPECIES OCCURRENCES IN SOUTHEASTERN WISCONSIN: 1994

Species	County							Total
	Kenosha	Milwaukee	Ozaukee	Racine	Walworth	Washington	Waukesha	
Acer spicatum	0	0	6	0	0	2	0	8
Acorus calamus	8	0	2	5	5	2	5	27
Agastache scrophulariaefola	0	0	0	0	0	0	1	1
Aletris farinosa	1	0	0	0	0	0	0	1
Allium cernuum	9	0	0	8	0	0	0	17
Ammophila breviligulata	0	1	1	0	0	0	0	2
Amorpha canescens	2	1	0	9	17	0	26	55
Andromeda glaucophylla	0	0	5	0	1	4	2	12
Anemone patens	0	0	0	2	13	0	16	31
Anemonella thalictroides	6	1	1	5	4	5	7	29
Aplectrum hyemale	0	1	2	0	1	0	1	5
Arabis divaricarpa	0	0	0	0	0	0	1	1
Arabis hirsuta (A. pycnocarpa)	0	0	0	0	2	1	0	3
Aralia nudicaulis	8	5	20	4	9	35	9	90
Aralia racemosa	0	3	6	0	2	8	0	19
Arenaria stricta	1	0	0	3	16	0	12	32
Arisaema dracontium	2	13	0	6	0	0	2	23
Aristida basiramea	0	0	0	0	0	0	1	1
Aristida intermedia	1	0	0	0	0	0	0	1
Artemisia serrata	0	0	0	0	1	0	0	1
Asclepias amplexicaulis	1	0	0	0	0	0	7	8
Asclepias hirtella	4	0	0	1	0	0	0	5
Asclepias tuberosa	4	0	0	2	3	0	4	13
Asclepias viridiflora	3	0	0	0	1	0	1	5
Asplenium platyneuron	0	0	0	1	2	1	2	6
Aster cordifolius	0	2	2	0	0	0	0	4
Aster linariifolius	0	0	0	0	0	0	2	2
Aster prenanthoides	1	0	5	1	2	8	4	21
Astragalus canadensis	1	0	0	1	0	0	0	2
Aureolaria grandiflora	0	0	0	1	2	0	1	4
Baptisia leucantha	3	0	0	4	3	0	3	13
Baptisia leucophaea	2	0	0	2	2	0	1	7
Berula erecta	0	0	0	2	11	0	3	16
Boltonia latisquama	1	0	0	0	0	0	0	1
Botrychium multifidum	0	0	1	0	0	0	0	1
Brasenia schreberi	0	0	1	0	1	0	1	3
Bromus kalmii	1	0	0	0	0	2	2	5
Bulbostylis capillaris	0	0	0	0	0	0	1	1
Cacalia atriplicifolia	0	0	0	0	0	0	5	5
Cacalia suaveolens	0	1	1	0	0	0	0	2
Calla palustris	0	0	3	0	3	9	0	15
Callitriche palustris	0	1	0	0	0	0	0	1
Calopogon pulchellus	1	0	4	0	0	1	1	7
Camptosorus rhizophyllus	0	0	0	0	0	0	2	2
Carex atherodes	0	0	0	0	1	0	0	1
Carex aurea	0	1	2	0	0	0	0	3
Carex cephalantha	0	0	1	0	1	2	0	4
Carex conoidea	11	0	0	0	1	1	2	15
Carex cryptolepis (C. fertilis)	0	0	0	2	0	1	2	5
Carex deweyana	0	0	2	0	1	0	0	3
Carex disperma	0	0	2	0	0	3	0	5

Table 74 (continued)

Species	County							Total
	Kenosha	Milwaukee	Ozaukee	Racine	Walworth	Washington	Waukesha	
Carex eburnea	0	0	2	1	0	0	0	3
Carex gravi	0	7	1	2	0	0	0	10
Carex haydenii	0	0	0	0	2	0	0	2
Carex limosa	0	0	4	0	0	3	1	8
Carex livida	0	0	1	0	0	0	0	1
Carex meadii	2	0	0	0	0	0	0	2
Carex tuckermanii	0	2	1	0	0	0	1	4
Castilleja coccinea	3	0	0	0	0	1	1	5
Cinna arundinacea	0	2	1	1	0	4	3	11
Circaea alpina	0	0	7	0	0	3	0	10
Cladium mariscoides	4	0	0	4	4	1	7	20
Clintonia borealis	0	0	7	0	0	8	0	15
Conopholis americana	1	1	2	2	0	6	0	12
Coptis groenlandica (C. trifolia)	0	0	7	1	0	5	0	13
Corallorhiza maculata	0	1	0	0	2	0	1	4
Corallorhiza trifida	0	0	1	0	0	0	0	1
Corispermum hyssopifolium	1	0	0	0	0	0	0	1
Cornus canadensis	0	0	6	1	0	11	1	19
Cornus rugosa	2	3	7	2	2	7	5	28
Cypripedium acaule	0	0	1	0	1	2	2	6
Cypripedium pubescens	0	0	1	0	1	5	1	8
Dentaria diphylla	0	1	0	0	0	0	0	1
Desmanthus illinoensis	0	0	0	0	1	0	0	1
Desmodium cuspidatum	0	0	0	0	0	0	1	1
Dicentra canadensis	0	0	1	0	0	0	0	1
Dicentra cucullaria	2	5	4	4	2	3	4	24
Diervilla lonicera	0	4	7	2	3	6	0	22
Dirca palustris	0	7	19	1	0	17	3	47
Drosera intermedia	0	0	1	0	1	0	0	2
Drosera rotundifolia	1	0	6	1	9	7	6	30
Dryopteris goldiana	0	0	0	1	0	0	0	1
Equisetum scirpoides	0	0	2	0	0	0	0	2
Erigeron pulchellus	0	0	2	0	1	0	2	5
Eriophorum spissum	0	0	0	0	1	1	1	3
Eriophorum viridi-carinatum	0	0	1	0	0	0	0	1
Eryngium yuccifolium	4	0	0	10	6	0	2	22
Floerkea proserpinacoides	1	8	4	11	1	3	6	34
Galium lanceolatum	0	0	2	0	0	1	0	3
Gaultheria hispidula	0	0	1	0	0	0	0	1
Gaultheria procumbens	0	0	4	0	0	0	0	4
Gaura biennis	0	0	0	1	1	0	0	2
Gentiana crinita	11	1	1	1	4	0	2	20
Gentiana puberula	3	0	0	3	1	0	2	9
Gentianella quinquefolia	0	2	1	3	1	0	3	10
Gerardia aspera	1	0	0	0	0	0	0	1
Geum rivale	1	0	4	0	1	2	0	8
Gleditsia triacanthos	0	0	0	0	0	0	1	1
Goodyera pubescens	0	1	0	0	2	0	2	5
Habenaria viridis var. bracteata	1	0	0	0	0	0	0	1
Helianthemum bicknellii	0	1	0	0	0	0	6	7
Heuchera richardsonii	11	1	2	7	16	9	18	64
Hippuris vulgaris	0	0	0	0	1	0	2	3

Table 74 (continued)

Species	County							Total
	Kenosha	Milwaukee	Ozaukee	Racine	Walworth	Washington	Waukesha	
Houstonia longifolia	0	0	0	0	4	0	6	10
Hypericum kalmianum	7	0	0	0	0	0	6	13
Hypericum majus	0	0	0	0	1	0	0	1
Hypericum pyramidatum	0	0	1	0	2	0	0	3
Juncus bufonius	1	0	0	0	0	0	0	1
Juncus effusus	0	0	1	1	0	0	0	2
Juncus greenei	3	0	0	0	0	0	0	3
Juniperus horizontalis	0	0	2	0	0	0	0	2
Kalmia polifolia	0	0	1	0	0	1	0	2
Koeleria cristata	1	0	0	0	3	0	5	9
Lathyrus japonicus (L. maritimus)	1	0	1	0	0	0	0	2
Lathyrus ochroleucus	2	0	2	1	2	9	5	21
Lechea intermedia	0	0	0	0	1	0	1	2
Lechea stricta	1	0	0	0	0	0	5	6
Ledum groenlandicum	0	0	1	0	0	0	0	1
Liatris cylindracea	0	0	0	2	0	0	5	7
Liatris ligulistylis	0	0	0	0	1	0	5	6
Lilium philadelphicum	0	0	0	1	0	0	1	2
Linaria canadensis	0	0	0	0	0	0	2	2
Linnaea borealis	0	0	2	0	0	1	1	4
Liparis liliifolia	1	0	1	1	5	0	4	12
Liparis loeselii	1	0	2	0	2	1	2	8
Lonicera canadensis	0	1	2	0	0	2	0	5
Lonicera oblongifolia	0	0	1	0	0	0	0	1
Lonicera villosa	0	0	2	0	0	0	0	2
Lupinus perennis	1	0	1	0	0	0	3	5
Lycopus virginicus	0	0	2	0	0	0	0	2
Megalodonta beckii	1	0	0	0	0	0	0	1
Menyanthes trifoliata	2	0	6	1	9	14	12	44
Milium effusum	0	0	2	0	0	1	0	3
Mimulus glabratus	0	0	0	0	2	0	0	2
Mitchella repens	0	0	9	1	0	15	0	25
Mitella nuda	0	0	7	0	0	7	1	15
Moneses uniflora	0	0	1	0	0	0	0	1
Monotropa hypopithys	0	0	0	2	0	2	0	4
Monotropa uniflora	1	4	6	5	5	5	6	32
Muhlenbergia cuspidata	0	0	0	0	1	0	0	1
Myriophyllum verticillatum	0	0	1	1	0	1	0	3
Nemopanthus mucronatus	0	0	3	0	1	5	0	9
Nyssa sylvatica	1	0	0	0	0	0	0	1
Opuntia compressa	0	0	0	0	0	0	2	2
Orchis spectabilis	1	2	1	0	0	1	2	7
Oryzopsis asperifolia	0	0	3	0	0	4	0	7
Oryzopsis racemosa	0	0	1	0	0	7	3	11
Oxalis violacea	1	0	0	0	0	0	1	2
Panax trifolius	0	1	4	2	0	6	0	13
Panicum depauperatum	1	0	0	0	0	0	0	1
Panicum flexile	3	1	0	0	4	2	5	15
Panicum lindheimeri	1	0	0	0	0	0	0	1
Panicum villosissimum (P. praecocius)	1	0	0	0	0	0	1	2

Table 74 (continued)

Species	County							Total
	Kenosha	Milwaukee	Ozaukee	Racine	Walworth	Washington	Waukesha	
Pellaea glabella	0	0	0	0	0	0	1	1
Penstemon calycosus	1	0	0	0	0	0	0	1
Penstemon digitalis	2	0	0	0	1	0	0	3
Petalostemum candidum	1	0	0	0	0	0	3	4
Picea mariana	0	0	4	0	0	1	0	5
Pinus strobus	0	0	5	0	0	1	0	6
Plantago purshii (P. patagonica)	0	0	0	0	1	0	0	1
Platanthera hyperborea	0	1	3	0	6	2	4	16
Platanthera lacera	0	0	1	0	0	0	0	1
Platanthera obtusata	0	0	1	0	0	0	0	1
Platanthera psycodes	0	0	2	0	0	1	0	3
Pogonia ophioglossoides	0	0	3	0	2	4	0	9
Polemonium reptans	0	1	1	1	11	11	7	32
Polygala paucifolia	0	0	2	0	0	2	0	4
Polymnia canadensis	0	3	0	1	0	6	1	11
Pontederia cordata	1	0	3	0	1	1	0	6
Populus balsamifera	0	0	4	1	0	0	0	5
Potamogeton robbinsii	0	0	1	0	0	0	0	1
Prenanthes racemosa	4	0	0	2	2	0	5	13
Pyrola asarifolia	0	0	2	0	0	1	0	3
Pyrola elliptica	1	0	7	2	15	13	7	45
Pyrola rotundifolia	0	0	3	0	0	0	1	4
Pyrola secunda	0	0	1	0	0	0	0	1
Quercus muehlenbergii	0	1	1	0	0	2	0	4
Ranunculus hispidus	0	1	1	0	0	0	0	2
Ranunculus rhomboideus	0	0	0	0	0	0	1	1
Rhamnus alnifolia	0	0	4	0	3	15	7	29
Rhynchospora alba	3	1	1	2	6	2	4	19
Rhynchospora capillacea	3	1	1	1	11	2	7	26
Rhynchospora capitellata	2	0	0	0	0	0	0	2
Ribes hirtellum	0	0	6	0	5	6	6	23
Ruppia maritima	1	0	0	0	0	0	0	1
Salix candida	8	0	4	4	36	16	21	89
Salix humilis	4	0	0	0	1	0	3	8
Salix serissima	0	0	3	0	3	2	3	11
Sambucus pubens	0	0	5	0	0	0	0	5
Saxifraga pensylvanica	6	6	13	1	11	17	19	73
Schizachne purpurascens	0	0	5	0	0	8	0	13
Scirpus clintonii	0	0	0	0	1	0	0	1
Scirpus rubrotinctus	0	0	1	0	0	0	0	1
Scirpus smithii	0	0	0	0	1	0	0	1
Scirpus subterminalis	0	0	1	0	0	0	0	1
Shepherdia canadensis	1	3	3	2	1	0	0	10
Silene stellata	3	0	0	0	4	0	2	9
Silphium laciniatum	11	1	0	10	10	0	7	39
Sisyrinchium albidum	11	1	0	6	3	0	9	30
Sisyrinchium angustifolium	0	0	1	0	0	0	0	1
Sisyrinchium campestre	4	1	0	1	5	2	8	21
Smilacina trifolia	0	0	8	0	3	11	3	25
Sorbus americana	0	0	3	0	0	0	0	3
Sorbus decora	1	0	1	1	0	0	0	3

Table 74 (continued)

Species	County							Total
	Kenosha	Milwaukee	Ozaukee	Racine	Walworth	Washington	Waukesha	
Spiranthes lucida	0	0	0	0	1	0	0	1
Spiranthes magnicamporum	0	0	0	1	1	0	3	5
Staphylea trifolia	0	1	1	1	0	0	1	4
Streptopus roseus	0	1	3	0	0	0	0	1
Symphoricarpos albus	0	4	8	0	1	5	0	18
Taxus canadensis	0	1	3	0	0	1	0	5
Tephrosia virginiana	0	0	0	0	1	0	0	1
Trillium cernuum	0	0	6	0	0	1	0	7
Utricularia cornuta	0	0	1	0	0	0	0	1
Utricularia gibba	0	0	0	0	1	0	0	1
Utricularia minor	0	0	1	0	2	1	1	5
Vaccinium myrtilloides	0	0	6	2	2	3	1	14
Valeriana edulis	3	0	0	6	12	0	13	34
Verbena simplex	0	0	0	0	1	0	0	1
Viola septentrionalis	0	0	1	0	0	0	0	1
Vulpia octoflora (Festuca o.)	0	0	0	0	0	0	1	1
Waldsteinia fragarioides	0	0	2	0	0	0	0	2
Zizania aquatica	0	0	2	1	2	2	1	8
Zygadenus elegans	7	0	0	3	8	0	21	39
Totals	230	114	383	185	371	420	466	2,169

NOTE: For common names of plant species, refer to Table 48 in Chapter V of this report (see pages 163-165) or Appendix A.

Source: SEWRPC.

woodland quality, extent of wetland drainage, intensity of agricultural use, degree of urbanization, distribution and quality of wildlife habitat for food, shelter, breeding, denning, and nesting, modification of weather impact, and special features, such as fens and bogs.

Wildlife habitat evaluation criteria were formulated by the Wisconsin Department of Natural Resources and Commission staff which considered both game and nongame species as well as rare, threatened, and endangered species. Careful consideration was given in the formulation to each of the major groups of species inhabiting the Region, including forest-interior songbirds, small game mammals, marsh and grassland birds, and waterfowl. Special consideration was given to those species most affected by human activities, such as forest-interior songbirds, threatened and endangered species, and ground-nesting birds. The criteria are set forth in Appendix B.

A three-category classification system was used to rank all habitat types in the Region. Class I wildlife habitat areas, the highest-value habitats by definition, contained a good diversity of wildlife species; were adequate in size to meet all habitat requirements for the species concerned; and were generally located in proximity to other wildlife habitat areas. Class II wildlife habitat areas were, by definition, lacking in terms of one of the three aforementioned criteria for a Class I habitat area. However, Class II areas retained good plant and animal diversity. Class III wildlife habitat areas were remnant in nature and, by definition, lacking in terms of at least two of the three aforementioned criteria for Class I wildlife habitat areas but, nevertheless, were important if they were located in close proximity to other wildlife habitat areas, if they provided travel corridors linking other habitat areas, or if they provided the only available range in an area. Habitat elements used to evaluate the habitat requirements included size, juxtaposition, structure, quality, and disturbance. The areal extent of wildlife habitat remaining in Southeastern Wisconsin in 1985 is shown on Map 34 and is summarized in Table 75. Walworth, Washington, and Waukesha Counties together accounted for the majority, approximately 68 percent, of the remaining wildlife habitat areas in the Region. In addition,

the larger tracts of high-quality wildlife habitat within the Region are concentrated in the Allenton Marsh, Jackson Marsh, Scuppernong, and Vernon Marsh State Wildlife Areas; Bong State Recreation Area; Cedarburg Bog State Natural Area; the Northern and Southern Units of the Kettle Moraine State Forest; and at Big Muskego Lake. A total of about 658 square miles, or about 24 percent of the Region, has been identified as supporting significant wildlife habitat (see Table 75 and Map 34). Of this total, about 284 square miles, or 43 percent, have been identified as Class I wildlife habitat; about 221 square miles, or 34 percent, have been identified as Class II wildlife habitat; and about 153 square miles, or 23 percent, have been identified as Class III wildlife habitat.

Analysis of the Region's wildlife habitat types (see Table 76) indicates that about 182 square miles, or about 28 percent, of the total habitat occurs as upland hardwood forest, while only about five square miles, or about 1 percent of the total habitat, occurs as lowland coniferous swamp. Upland coniferous forest, upland brush, and grassland habitats respectively account for about 16 square miles, or about 2 percent; about 22 square miles, or about 3 percent; and about 156 square miles, or about 24 percent, of the remaining wildlife habitat within the Region. Excluding the conifer swamps, wetland habitats, including emergent marsh, lowland hardwood forests, lowland shrub swamps, and open-water habitats respectively account for about 133 square miles, or about 20 percent; about 75 square miles, or about 11 percent; about 63 square miles, or about 10 percent; and six square miles, or about 1 percent, of the Region's wildlife habitat.

CRITICAL BIRD SPECIES HABITATS

Table 77 and Map 35 present recently documented records of habitats of endangered, threatened, rare (or "special concern") and regionally uncommon bird species in Southeastern Wisconsin. These records have been compiled by competent observers, including biologists of the Wisconsin Department of Natural Resources and local naturalists. Many of these records involve breeding-season occurrences. Whatever the season of record, however, these species have been confirmed as utilizing the sites involved during at least part of their life history, whether for breeding, nesting, foraging, or migration. Most of the listed regionally significant bird species habitat sites occupy, in part or whole, the geographic areas identified above as regional Natural Areas. However, a number of bird species habitat sites do not meet the criteria for inclusion as Natural Areas per se because of past disturbance history, low acreage, preponderance of nonnative vegetation, or a combination of such factors.

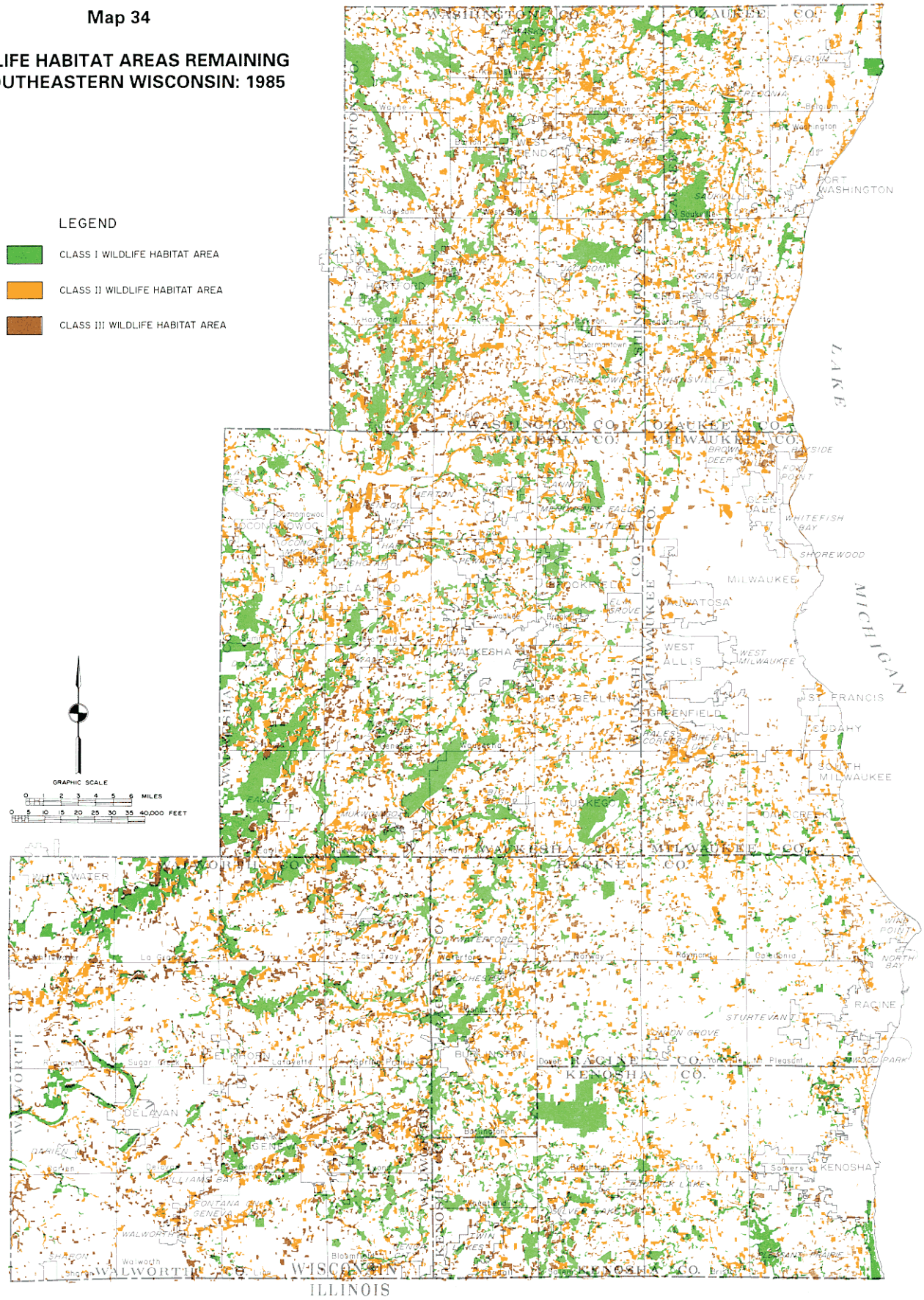
Table 77 is a compilation of the known bird species habitat survey data that are reliable, currently available, and relatively recent—1970 to present. The habitat areas have been verified as being intact on the Commission's large-scale 1990 aerial photography and it has been presumed that the species involved still utilized these sites in 1990. As such, the list may not fully reflect the distribution of all of the critical bird species habitat in Southeastern Wisconsin. However, it provides the best approximation of such habitat available at this time.

In all, 120 sites have been identified as providing habitat for endangered, threatened, rare, and regionally uncommon bird species. Of these, 87 sites are located wholly within identified Natural Areas. Of the remaining 33 sites, 30 sites—including four sites that are associated with a Natural Area but which encompass areas both within and outside the Natural Area—meet the structural needs of the listed endangered, threatened, or rare bird species and, as such, are considered Critical Bird Species Habitat sites. The remaining three sites have been identified as nesting areas for the great blue heron, a regionally uncommon bird species. Those three sites have not been identified as providing habitat for endangered, threatened, or rare bird species, and are therefore not considered Critical Bird Species Habitat sites.

The identified Critical Bird Species Habitat sites support six species designated as endangered, including the loggerhead shrike (Lanius ludovicianus), Forster's tern (Sterna forsteri), piping plover (Charadrius melodus), common tern (Sterna hirundo), yellow-throated warbler (Dendroica dominica), and worm-eating warbler (Helmitheros vermivorus); six species designated as threatened, including the great egret (Casmerodius albus), Acadian flycatcher (Empidonax virescens), red-shouldered hawk (Buteo lineatus), cerulean warbler (Dendroica cerulea), hooded warbler (Wilsonia citrina), and Kentucky warbler (Oporornis formosus); and 32 species designated as rare or "special concern" species, including such birds as the American bittern (Botaurus lentiginosus), black tern (Chlidonias niger), and bobolink (Dolichonyx oryzivorus). Seven sites were found to support endangered species; 35 sites were found to support threatened species; and 60 sites were found to

Map 34

WILDLIFE HABITAT AREAS REMAINING IN SOUTHEASTERN WISCONSIN: 1985



Wildlife habitat areas remaining in the Southeastern Wisconsin Region were classified according to native species diversity; territorial requirements of major species; adequacy of vegetation providing for nesting sites, travel routes, concealment, and weather impact modifications; location with respect to other wildlife habitat areas; and artificial disturbance levels.

Source: SEWRPC.

Table 75

WILDLIFE HABITAT AREAS IN SOUTHEASTERN WISCONSIN: 1985

County	Wildlife Habitat Class						Total	
	Class I		Class II		Class III			
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Kenosha	22,814	55	11,083	27	7,614	18	41,511	100
Milwaukee	3,464	19	7,993	43	7,172	38	18,629	100
Ozaukee	12,554	37	13,106	38	8,415	25	34,075	100
Racine	16,019	41	14,886	38	8,161	21	39,066	100
Walworth	32,564	38	27,560	32	25,238	30	85,362	100
Washington	38,689	45	27,734	32	20,228	23	86,651	100
Waukesha	55,803	48	38,764	34	21,176	18	115,743	100
Regional Totals	181,907	43	141,126	34	98,004	23	421,037	100

Source: SEWRPC.

Table 76

WILDLIFE HABITAT TYPES IN SOUTHEASTERN WISCONSIN: 1985

Wildlife Habitat Type	Wildlife Habitat Class						Total	
	Class I		Class II		Class III			
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Grassland	25,095	6	26,449	6	48,136	11	99,680	24
Upland Brush	4,759	1	5,952	1	3,336	1	14,047	3
Upland Hardwood Forest	28,071	7	60,005	14	28,561	7	116,637	28
Upland Coniferous Forest	575	--[a]	5,580	1	4,315	1	10,470	2
Emergent Marsh	65,565	16	13,598	3	5,829	1	84,992	20
Lowland Shrub Swamp	29,470	7	9,328	2	1,452	--[a]	40,250	10
Lowland Hardwood Forest	24,534	6	18,959	5	4,332	1	47,825	11
Lowland Coniferous Swamp	2,625	1	634	--[a]	19	--[a]	3,278	1
Open Water	1,213	--[a]	621	--[a]	2,024	--[a]	3,858	1
Total	181,907	43	141,126	34	98,004	23	421,037	100

[a]*Less than 0.5 percent.*

Source: SEWRPC.

support rare or "special concern" species. The most frequently occurring endangered species in the Region was Forster's tern (Sterna forsteri), at five sites; the most frequently occurring threatened species in the Region was the Acadian flycatcher (Empidonax virescens), at 19 sites; and the most frequently occurring rare or "special concern" species in the Region was the black tern (Chlidonias niger), at 35 sites.

CRITICAL HERPTILE SPECIES HABITATS

Amphibians and reptiles are collectively referred to as herptiles. Eight herptile species remaining in Southeastern Wisconsin have been identified by the Wisconsin Department of Natural Resources as being endangered, threatened, or of special concern. Three herptile species have been identified by local naturalists as being uncommon in Southeastern Wisconsin. The endangered species include Blanchard's cricket frog (Acris crepitans blanchardi), the queen snake (Regina septemvittata), the eastern massasauga (Sistrurus catenatus catenatus), the western ribbon snake (Thamnophis proximus), and the northern ribbon snake (Thamnophis sauritus). The threatened species is Blanding's turtle (Emydoidea blandingii). The "special concern" species include the bullfrog (Rana catesbeiana) and the pickerel frog (Rana palustris). The Commission-designated uncommon species include the spotted

Table 77

ENDANGERED, THREATENED, RARE OR SPECIAL CONCERN, AND UNCOMMON BIRD SPECIES HABITAT SITES IN SOUTHEASTERN WISCONSIN: 1994

Map 35 Reference Number	Site Name	County(ies)	Location	Species of Concern[a]	Associated Natural Area(s)[b]
1	New Munster Bog Area	Kenosha	T1N, R19E Sections 2, 3, 10, 11	Loggerhead shrike (E) American bittern (R) Black tern (R) Blackburnian warbler (R) Bobolink (R) Ruby-crowned kinglet (R) Least bittern (R) American woodcock (U) Common snipe (U) Wood thrush (U) Veery (U) Black-and-white warbler (U) Chestnut-sided warbler (U) Ovenbird (U) Northern waterthrush (U) Blue-winged warbler (U) Alder flycatcher (U) Brewer's blackbird (U) American coot (U) Great blue heron (U)	Kenosha 7
2	Unnamed wetland	Kenosha	T1N, R19E Sections 10, 15	Forster's tern (E) Great egret (T)	--
3	Lake Elizabeth	Kenosha	T1N, R19E Sections 31, 32	Black tern (R) (colony)	Kenosha 8
4	Camp Lake	Kenosha	T1N, R20E Sections 20, 29	Black tern (R) (colony)	Kenosha 9
5	Peat Lake	Kenosha	T1N, R20E Section 32	Black tern (R) (colony)	Kenosha 2
6	Chiwaukee Prairie	Kenosha	T1N, R23E Sections 19, 20, 29-32	Upland sandpiper (R) Black tern (R) Dickcissel (R) Western meadowlark (R) Bobolink (R) Alder flycatcher (U) Brewer's blackbird (U) Green-winged teal (U)	Kenosha 4
7	Bong State Recreation Area	Kenosha	T2N, R19E Sections 12, 13 T2N, R20E Sections 3, 4, 7, 9, 10, 15-23	Forster's tern (E) Piping plover (E) Yellow-throated warbler (E) Loggerhead shrike (E) Great egret (T) Black tern (R) (colony) Henslow's sparrow (R) Northern harrier (R) Grasshopper sparrow (R) Bobolink (R) Upland sandpiper (R) Northern goshawk (R) American black duck (R) Short-eared owl (R) American bittern (R) Swainson's thrush (R) Lark sparrow (R) Sedge wren (R) Blackburnian warbler (R) Yellow-bellied flycatcher (R)	--

Table 77 (continued)

Map 35 Reference Number	Site Name	County(ies)	Location	Species of Concern[a]	Associated Natural Area(s)[b]
7 (continued)				Merlin (R) Common moorhen (R) Least bittern (R) Common merganser (R) Black-crowned night heron (R) Wilson's phalarope (R) Prothonotary warbler (R) Louisiana waterthrush (R) Dickcissel (R)	
8	Burlington Woods	Racine Walworth	T2N, R18E Sections 1, 12 T2N, R19E Sections 5-7, 18	Blue-gray gnatcatcher (U) Great blue heron (U) Ovenbird (U) Wood thrush (U)	Racine 25
9	Margis Wildlife Area[c]	Racine	T2N, R19E Section 17	Great egret (T) Hooded merganser (U) Great blue heron (U)	- -
10	Wadewitz Woods	Racine	T3N, R19E Sections 2, 3	Black tern (R) Grasshopper sparrow (R) Bobolink (R) Great blue heron (U) Cooper's hawk (U) American woodcock (U) Common snipe (U) Whip-poor-will (U) Ovenbird (U) Wood thrush (U) Golden-winged warbler (U) Black-and-white warbler (U) Chestnut-sided warbler (U) Black-throated green warbler (U)	Racine 27
11	Ela Park Woods	Racine	T3N, R19E Section 11	Acadian flycatcher (T) Cooper's hawk (U) Ovenbird (U) American woodcock (U) Blue-gray gnatcatcher (U) Wood thrush (U) Chestnut-sided warbler (U)	- -
12	Rowntree Road Woods	Racine	T3N, R19E Section 12	Great blue heron (U) (rookery)	Racine 28
13	Cherry Lake	Racine	T3N, R19E Sections 10, 15	Northern waterthrush (U) Common snipe (U) Sandhill crane (U) Veery (U) Whip-poor-will (U)	Racine 1
14	Sanders Park	Racine	T3N, R22E Section 36	Blackburnian warbler (R) Black-throated green warbler (U) Ovenbird (U) Mourning warbler (U) Canada warbler (U)	Racine 2
15	Elm Island Bog	Racine	T4N, R19E Sections 23, 26	Blue-gray gnatcatcher (U)	Racine 6
16	Tichigan Marsh	Racine	T4N, R19E Sections 9, 10	Forster's tern (E) Black tern (R) (colony) American bittern (R)	Racine 15

Table 77 (continued)

Map 35 Reference Number	Site Name	County(ies)	Location	Species of Concern[a]	Associated Natural Area(s)[b]
17	Waubeesee Woods	Racine	T4N, R20E Section 7	Acadian flycatcher (T) Cerulean warbler (T) Cooper's hawk (U) Blue-winged warbler (U) Wood thrush (U) Veery (U) Ovenbird (U) Blue-gray gnatcatcher (U)	Racine 17
18	Wind Lake Tamarack Swamp	Racine	T4N, R20E Sections 10, 11	American woodcock (U) Mourning warbler (U) Ovenbird (U) Wood thrush (U) Veery (U)	Racine 18
19	Caledonia Wildlife Area	Racine	T4N, R22E Section 21	Northern pintail (R) Great blue heron (U)	Racine 22
20	Wind Lake	Racine	T4N, R20E	Black tern (R) (colony)	- -
21	County Line Riverine Woods	Racine	T4N, R21E Section 1	Acadian flycatcher (T) Cooper's hawk (U) Wood thrush (U)	Racine 20
22	Waubeesee Lake	Racine	T4N, R20E	Black tern (R) (colony)	- -
23	Root River Parkway	Racine	T4N, R22E Sections 3, 10, 11	Red-shouldered hawk (T) Louisiana waterthrush (R) American woodcock (U) Blue-gray gnatcatcher (U)	Racine 21, 49, 50, 51
24	Hunts Woods	Racine	T4N, R22E Section 3	Mourning warbler (U)	Racine 21
25	Renak-Polak Woods	Racine	T4N, R22E Section 14	Broad-winged hawk (U)	Racine 3
26	Cliffside Park Old Field	Racine	T4N, R23E Sections 7, 8	Bobolink (R) Upland sandpiper (R) Grasshopper sparrow (R) Cooper's hawk (U) Wood thrush (U)	Racine 23[d]
27	Root River Riverine Forest	Racine Milwaukee	T4N, R21E Section 3 T4N, R22E Sections 4-6 T5N, R21E Sections 34-36 T5N, R22E Sections 31-33	Red-shouldered hawk (T) Cooper's hawk (U) Great blue heron (U) (colony) Blue-gray gnatcatcher (U)	Milwaukee 1, 2, 6, 28
28	Swift Lake Wetland	Walworth	T1N, R18E Section 3	Black tern (R) (colony)	- -
29	Section Five Marsh and Pond	Walworth	T1N, R18E Sections 4, 5	Black tern (R) (colony)	- -
30	Bloomfield Tamaracks	Walworth	T1N, R18E Section 8	Alder flycatcher (U) Veery (U)	Walworth 27
31	Como Lake	Walworth	T2N, R17E Section 32	Black tern (R) (colony)	Walworth 37
32	Unnamed wetland	Walworth	T3N, R15E Section 4	Black tern (R) (colony)	- -
33	LaGrange Oak Woods	Walworth	T4N, R16E	Acadian flycatcher (T) Cerulean warbler (T) Hooded warbler (T) Cooper's hawk (U) Sandhill crane (U) Least flycatcher (U)	Walworth 14

Table 77 (continued)

Map 35 Reference Number	Site Name	County(ies)	Location	Species of Concern[a]	Associated Natural Area(s)[b]
33 (continued)				Blue-gray gnatcatcher (U) Veery (U) Wood thrush (U) Blue-winged warbler (U) Chestnut-sided warbler (U) Ovenbird (U) Mourning warbler (U)	
34	Muir Oak Woods	Walworth	T4N, R16E Sections 3, 4, 9, 16	Hooded warbler (T) Acadian flycatcher (T) Cerulean warbler (T)	Walworth 15
35	Van der Bosch Site	Walworth	T4N, R16E Sections 10, 11, 14, 15	Great blue heron (U) Sandhill crane (U) Wood thrush (U)	Walworth 63
36	Lulu Lake Area	Walworth	T4N, R17E Sections 1-3, 10, 11	Cerulean warbler (T) Blue-winged warbler (U) Veery (U) Whip-poor-will (U) American woodcock (U)	Walworth 5
37	Beulah Bog	Walworth	T4N, R18E Sections 7, 8	Nashville warbler (U)	Walworth 11
38	Swan Lake	Walworth	T4N, R18E Section 18	Blue-winged warbler (U)	Walworth 11
39	Ulrickson Cedar Glade	Waukesha	T5N, R17E Section 2	Eastern bluebird (U) Clay-colored sparrow (U)	Waukesha 10
40	Kettle Moraine Fen and Low Prairie	Waukesha	T5N, R17E Sections 3, 4, 9, 10	Northern harrier (R) Bobolink (R) Eastern bluebird (U) Common snipe (U) Alder flycatcher (U) Veery (U) Golden-winged warbler (U) Blue-winged warbler (U) Sandhill crane (U) American woodcock (U)	Waukesha 1
41	Scuppernong Marsh	Waukesha	T5N, R17E Sections 1, 2, 4, 9-12, 16, 17	Bobolink (R) Henslow's sparrow (R) Sedge wren (R) Northern harrier (R) Yellow-breasted chat (R) Blue-winged warbler (U) Veery (U) Common snipe (U) Mourning warbler (U) Sandhill crane (U) American woodcock (U)	Waukesha 2
42	Scuppernong Prairie	Waukesha	T5N, R17E Sections 16, 17	Western meadowlark (R) Bobolink (R) Upland sandpiper (R) Alder flycatcher (U) Common snipe (U)	Waukesha 2
43	Beaver Dam Lake	Waukesha	T5N, R17E Section 6	American bittern (R) Least bittern (R) Black tern (R) (colony) Common moorhen (R) Ring-necked duck (U) American coot (U) Sandhill crane (U) Ruddy duck (U)	Waukesha 13

Table 77 (continued)

Map 35 Reference Number	Site Name	County(ies)	Location	Species of Concern[a]	Associated Natural Area(s)[b]
44	Fur Farm Pond	Waukesha	T5N, R17E Section 31	Sandhill crane (U)	Waukesha 17
45	Headquarters Grasslands	Waukesha	T5N, R17E Section 20	Upland sandpiper (R)	--
46	Eagle Oak Opening	Waukesha	T5N, R17E Sections 29, 30	Cerulean warbler (T) Hooded warbler (T) Acadian flycatcher (T) Wood thrush (U) Blue-winged warbler (U) Blue-gray gnatcatcher (U)	Waukesha 9
47	STH 59 Woods	Waukesha	T5N, R17E Sections 20, 21	Wood thrush (U)	Waukesha 42
48	Paradise Springs Woods	Waukesha	T5N, R17E Sections 16, 21	Red-shouldered hawk (T) Acadian flycatcher (T) Cerulean warbler (T) Hooded warbler (T) Louisiana waterthrush (R) Yellow-breasted chat (R) Cooper's hawk (U) Blue-gray gnatcatcher (U) Wood thrush (U) Ovenbird (U)	Waukesha 41
49	Old World Wisconsin Marsh	Waukesha	T5N, R17E Sections 21, 28	Black tern (R) Common moorhen (R) American coot (U)	--
50	Eagle Spring Lake	Waukesha	T5N, R17E Section 35	Black tern (R)	Walworth 5
51	Malek Wetland	Waukesha	T5N, R17E Section 33	Black tern (R)	Waukesha 44
52	Ottawa Oak Woods and Conifer Plantations	Waukesha	T5N, R17E Sections 3, 10 T6N, R17E Sections 23, 24, 36	Acadian flycatcher (T) Hooded warbler (T) Cerulean warbler (T) Kentucky warbler (T) Long-eared owl (R) Pine siskin (R) Cooper's hawk (U)	Waukesha 27
53	Eagle Fen Area	Waukesha	T5N, R17E Sections 3, 10 T6N, R17E Section 34	American bittern (R) Common moorhen (R) Sedge wren (R) Bobolink (R) Henslow's sparrow (R) Northern harrier (R) Yellow-breasted chat (R) Short-eared owl (R) Sandhill crane (U) Common snipe (U) American woodcock (U) Alder flycatcher (U) Veery (U) Mourning warbler (U) Blue-winged warbler (U) White-eyed vireo (U) Blue-gray gnatcatcher (U) Sharp-shinned hawk (U) Pine warbler (U) Solitary vireo (U) Ovenbird (U) Red-breasted nuthatch (U) Broad-winged hawk (U) Black-throated green warbler (U) Red crossbill (U) Turkey vulture (U) Pileated woodpecker (U)	Waukesha 11, 12

Table 77 (continued)

Map 35 Reference Number	Site Name	County(ies)	Location	Species of Concern[a]	Associated Natural Area(s)[b]
53 (continued)				Wood thrush (U) Northern saw-whet owl (U) Chestnut-sided warbler (U) Golden-crowned kinglet (U) Golden-winged warbler (U)	
54	Lakewood Farms Tamaracks	Waukesha	T5N, R18E Sections 28, 33	Northern harrier (R) Sedge wren (R) Sandhill crane (U)	Waukesha 6
55	Lower Phantom Lake	Waukesha	T5N, R18E Sections 26, 27, 34, 35	Black tern (R) (colony) Least bittern (R) Sandhill crane (U)	Waukesha 22
56	Mukwonago Fen	Waukesha	T5N, R18E Sections 28, 33	Sandhill crane (U) Common snipe (U)	Waukesha 6
57	Vernon Marsh	Waukesha	T5N, R18E T5N, R19E T6N, R19E	Black tern (R) (colony) Sandhill crane (U)	- -
58	Big Muskego Lake	Waukesha	T5N, R20E Sections 15, 21, 23, 28, 33	Forster's tern (E) Common tern (E) Great egret (T) Black tern (R) (colony)	Waukesha 50
59	Muskego Park	Waukesha	T5N, R20E Section 17	Cooper's hawk (U)	Waukesha 3
60	Denoon Lake	Waukesha	T5N, R20E Section 31	Black tern (R)	- -
61	Dog Trial Area	Waukesha	T6N, R17E Sections 27, 34	Grasshopper sparrow (R) Clay-colored sparrow (U) Blue-winged warbler (U)	- -
62	School Section Lake	Waukesha	T6N, R17E Sections 16, 17	Black tern (R) (colony)	- -
63	Larkin Lake	Waukesha	T6N, R17E Section 15	Black tern (R) (colony) Common moorhen (R) Least bittern (R) Great blue heron (U)	Waukesha 56
64	Nelson Woods	Waukesha	T6N, R17E Sections 3, 10	Red-shouldered hawk (T) Acadian flycatcher (T) Great blue heron (U) (rookery) Cooper's hawk (U) Ovenbird (U) Wood thrush (U) Blue-winged warbler (U) Blue-gray gnatcatcher (U)	Waukesha 53
65	CTH ZC Lowlands	Waukesha	T6N, R17E Sections 29, 31, 32	Veery (U) Nashville warbler (U) Blue-winged warbler (U) Sharp-shinned hawk (U) Alder flycatcher (U) Blue-gray gnatcatcher (U) Northern waterthrush (U)	Waukesha 57
66	Ottawa Lake Fen	Waukesha	T6N, R17E Section 34	Black tern (R)	Waukesha 4
67	Dousman Mill Pond	Waukesha	T6N, R17E Section 3	Black tern (R) Common moorhen (R) Least bittern (R) American bittern (R)	- -

Table 77 (continued)

Map 35 Reference Number	Site Name	County(ies)	Location	Species of Concern[a]	Associated Natural Area(s)[b]
68	Unnamed shrub-grassland	Waukesha	T6N, R17E Sections 27, 28	Grasshopper sparrow (R) Upland sandpiper (R) King rail (R) Blue-winged warbler (U) Golden-winged warbler (U) Clay-colored sparrow (U) American woodcock (U) Prairie warbler (U)	- -
69	Unnamed low woods-thicket	Waukesha	T6N, R17E Sections 15, 16, 21	Acadian flycatcher (T) Cerulean warbler (T) Hooded warbler (T) Yellow-breasted chat (R) Least flycatcher (U) Blue-winged warbler (U) Golden-winged warbler (U) Mourning warbler (U) Chestnut-sided warbler (U) Blue-gray gnatcatcher (U)	- -
70	Perkins Wildlife Area	Waukesha	T6N, R17E Sections 5, 6 T7N, R17E Sections 31, 32	Acadian flycatcher (T) Cerulean warbler (T) Grasshopper sparrow (R) Dickcissel (R) Henslow's sparrow (R) Sedge wren (R) Yellow-breasted chat (R) Louisiana waterthrush (R) Sandhill crane (U) Great blue heron (U) (rookery) Cooper's hawk (U) Turkey vulture (U) Common snipe (U) American woodcock (U) Blue-gray gnatcatcher (U) Wood thrush (U) Alder flycatcher (U) Veery (U) Wood thrush (U) Chestnut-sided warbler (U) Mourning warbler (U) Black-and-white warbler (U) Ovenbird (U) Blue-winged warbler (U) Canada warbler (U)	Waukesha 52
71	Brandy Brook	Waukesha	T6N, R18E Section 11	Great blue heron (U) (rookery)	- -
72	Genesee Oak Opening	Waukesha	T6N, R18E Section 28	Bobolink (R) Sedge wren (R) Orchard oriole (R) Common snipe (U) Blue-winged warbler (U)	Waukesha 5
73	Unnamed wetland	Waukesha	T6N, R18E Section 32	Black tern (R) (rookery)	- -
74	Mill Creek	Waukesha	T6N, R19E Section 27	Great blue heron (U) (rookery)	- -
75	Minooka Park Woods	Waukesha	T6N, R19E Section 13	Cooper's hawk (U)	Waukesha 64
76	Falk Fen	Waukesha	T6N, R19E Sections 33, 34	Mourning warbler (U) Blue-winged warbler (U) Golden-winged warbler (U)	Waukesha 29

Table 77 (continued)

Map 35 Reference Number	Site Name	County(ies)	Location	Species of Concern[a]	Associated Natural Area(s)[b]
77	Laura Lake Swamp	Waukesha	T7N, R17E Sections 20, 21	Acadian flycatcher (T) Northern waterthrush (U) Veery (U) Black-and-white warbler (U)	Waukesha 70
78	Genesee Lake Road Bog	Waukesha	T7N, R17E Sections 20, 29	Veery (U) Canada warbler (U) Northern waterthrush (U)	Waukesha 30
79	Duck Lake	Waukesha	T7N, R17E Section 22	Black tern (R)	- -
80	Lapham Peak Woods	Waukesha	T7N, R18E Sections 29, 32	Cooper's hawk (U) Ovenbird (U) Wood thrush (U)	Waukesha 77
81	Nagawicka Lake	Waukesha	T7N, R18E Sections 5, 8	Worm-eating warbler (E) Cerulean warbler (T) Acadian flycatcher (T) Kentucky warbler (T) Black tern (R) Blue-gray gnatcatcher (U) Chestnut-sided warbler (U)	Waukesha 31[e]
82	Steinacker Woods	Waukesha	T7N, R20E Section 5	Great blue heron (U) (rookery)	- -
83	Stonebank Tamarack Relict	Waukesha	T8N, R17E Sections 13, 14, 24	Black-crowned night heron (R) Alder flycatcher (U) Northern waterthrush (U) Veery (U)	- -
84	Ashippun Lowlands	Waukesha	T8N, R17E Sections 9, 10, 15	Forster's tern (E) Common moorhen (R) Black tern (R) (colony) Alder flycatcher (U) Veery (U) American woodcock (U) Great blue heron (U)	Waukesha 37
85	Raasch Tamaracks	Waukesha	T8N, R17E Section 16	Veery (U) Northern waterthrush (U) Canada warbler (U)	Waukesha 87
86	Monches Woods	Waukesha	T8N, R18E Sections 3, 4	Cerulean warbler (T) Red-shouldered hawk (T) Cooper's hawk (U) Great blue heron (U) (rookery)	Waukesha 8
87	Camp Whitcomb Lowlands	Waukesha	T8N, R18E Sections 2, 11	Acadian flycatcher (T) Veery (U) Wood thrush (U) Ovenbird (U) Blue-gray gnatcatcher (U)	Waukesha 91
88	Lake Keesus Fen-Meadow	Waukesha	T8N, R18E Section 11, 14	Bobolink (R) Sedge wren (R)	Waukesha 34
89	Chenequa Wetlands	Waukesha	T8N, R18E Sections 9, 16	Alder flycatcher (U) Veery (U)	Waukesha 92
90	Fox River Woods	Waukesha	T8N, R20E Section 31	Great egret (T)	- -
91	Menomonee Falls Tamaracks	Waukesha	T8N, R20E	Veery (U) Alder flycatcher (U) American woodcock (U) White-eyed vireo (U) Mourning warbler (U) Blue-winged X golden-winged warbler (U)	Waukesha 36

Table 77 (continued)

Map 35 Reference Number	Site Name	County(ies)	Location	Species of Concern[a]	Associated Natural Area(s)[b]
92	Held Woods	Waukesha	T8N, R20E Section 6	Wood thrush (U) Ovenbird (U)	Waukesha 35
93	Loew's Lake	Washington	T9N, R18E Sections 24-26, 35	Sedge wren (R) Great blue heron (U) Veery (U) Ovenbird (U) Canada warbler (U)	Washington 10
94	Murphy Lake Area	Washington	T9N, R18E Sections 21, 22, 27, 28, 33, 34	Canada warbler (U) Mourning warbler (U) Veery (U) Northern waterthrush (U)	Washington 2
95	Friess Lake Tamaracks	Washington	T9N, R18E Section 24 T9N, R19E Sections 18, 19	Alder flycatcher (U) Veery (U) Blue-gray gnatcatcher (U) Canada warbler (U) Blue-winged warbler (U) Golden-winged warbler (U)	Washington 13
96	Glacier Hills Park Woods	Washington	T9N, R19E Section 18	Red-shouldered hawk (T)	Washington 12
97	USH 41 Swamp	Washington	T9N, R20E Section 28	Great blue heron (U) (rookery)	Washington 53
98	Unnamed wetland	Washington	T10N, R18E Section 25	Black tern (R) (colony)	- -
99	Unnamed wetland	Washington	T10N, R18E Section 13	Black tern (R) (colony)	- -
100	Mueller Woods	Washington	T10N, R19E Section 6	Acadian flycatcher (T)	Washington 59
101	Mud Lake Meadow	Washington	T10N, R19E Section 19	Black tern (R)	Washington 1B
102	Heritage Trails Bog	Washington	T10N, R19E Sections 20, 29	Mourning warbler (U)	Washington 61
103	Jackson Swamp	Washington	T10N, R20E Sections 9, 10, 16	Veery (U) Ovenbird (U) Black-throated green warbler (U) Black-and-white warbler (U) Northern waterthrush (U) Nashville warbler (U) Mourning warbler (U) Blue-gray gnatcatcher (U) Canada warbler (U) Wood thrush (U) White-throated sparrow (U) Winter wren (U)	Washington 19
104	Blue Hills Woods	Washington	T11N, R19E Sections 3, 10	Hooded warbler (T) Blue-gray gnatcatcher (U) Ovenbird (U)	Washington 22
105	Silver Lake	Washington	T11N, R19E Section 27	Red-shouldered hawk (T)	- -
106	Gilbert Lake	Washington	T11N, R19E Sections 17, 20	Black tern (R) (colony)	Washington 24[f]
107	Allenton Swamp	Washington	T11N, R18E Sections 22, 26-28, 35	Veery (U) Blue-winged warbler (U) Alder flycatcher (U) Mourning warbler (U)	Washington 64

Table 77 (continued)

Map 35 Reference Number	Site Name	County(ies)	Location	Species of Concern[a]	Associated Natural Area(s)[b]
108	Unnamed wetland	Washington	T12N, R18E Section 7	Great egret (T)	- -
109	Soo Line Swamp	Washington	T12N, R18E Sections 17-20, 29, 30	Mourning warbler (U) Veery (U)	Washington 79
110	Stockcar Swamp	Washington	T12N, R18E Sections 23-26	Northern harrier (R)	Washington 81
111	Glacial Trail Forest	Washington	T12N, R19E Sections 11, 14	Red-shouldered hawk (T) Hooded warbler (T) Cerulean warbler (T) Acadian flycatcher (T) Cooper's hawk (U) Wood thrush (U) Blue-gray gnatcatcher (U) Blue-winged warbler (U) Ovenbird (U)	Washington 33
112	St. Michael's Woods	Washington	T12N, R19E Sections 13, 14	Hooded warbler (T) Acadian flycatcher (T) Blue-gray gnatcatcher (U) Cooper's hawk (U) Ovenbird (U) Blue-winged warbler (U)	Washington 34
113	Kewaskum Woods	Washington	T12N, R19E Section 15	Acadian flycatcher (T) Kentucky warbler (T)	Washington 1
114	Moraine Orive Woods-North	Washington	T12N, R19E Sections 2, 11, 12	Cooper's hawk (U) Ovenbird (U)	Washington 83
115	Donges Bay-Fairy Chasm	Ozaukee	T9N, R22E Section 33	Cerulean warbler (T) Pine siskin (R) Cooper's hawk (U) American woodcock (U) Veery (U) Wood thrush (U) Ovenbird (U) Red crossbill (U)	Ozaukee 1, 8
116	Riveredge Nature Center	Ozaukee	T11N, R21E	Red-shouldered hawk (T) Cooper's hawk (U) Broad-winged hawk (U) Blue-gray gnatcatcher (U)	Ozaukee 3, 11
117	Cedarburg Beech Woods	Ozaukee	T11N, R21E Section 30	Red-shouldered hawk (T) Acadian flycatcher (T) Cerulean warbler (T) Alder flycatcher (U) Brown creeper (U) Winter wren (U) Veery (U) Eastern bluebird (U) Black-and-white warbler (U) Golden-winged warbler (U) Blue-winged warbler (U) Chestnut-sided warbler (U) Ovenbird (U) Mourning warbler (U)	Ozaukee 6
118	Cedarburg Bog-Mud Lake	Ozaukee	T11N, R21E Sections 31, 32	Black tern (R) (colony)	Ozaukee 4

Table 77 (continued)

Map 35 Reference Number	Site Name	County(ies)	Location	Species of Concern[a]	Associated Natural Area(s)[b]
119	Cedarburg Bog	Ozaukee	T11N, R21E Sections 29, 31, 32	Red-shouldered hawk (T) Yellow-bellied flycatcher (R) Alder flycatcher (U) Brown creeper (U) Great blue heron (U) Winter wren (U) Ruffed grouse (U) Common snipe (U) Veery (U) Black-and-white warbler (U) Golden-winged warbler (U) Blue-winged warbler (U) Nashville warbler (U) Ovenbird (U) Canada warbler (U) Northern waterthrush (U) Mourning warbler (U) Black-throated green warbler (U) Pileated woodpecker (U)	Ozaukee 4
120	Harrington Beach State Park Old Fields	Ozaukee	T12N, R22E Section 24 T12N, R23E Section 19	Upland sandpiper (R) Bobolink (R) Veery (U) Wood thrush (U) Ovenbird (U) Mourning warbler (U) Canada warbler (U) Great blue heron (U) Eastern bluebird (U) Clay-colored sparrow (U)	Ozaukee 17[g]

[a] *"E" refers to species designated as endangered*
"T" refers to species designated as threatened
"R" refers to species designated as rare or of special concern
"U" refers to species designated as uncommon

[b] *The locations of the associated Natural Areas are set forth in Tables 59 through 65 and on Maps 26 through 32.*

[c] *The Margis Wildlife Area has been identified as both a Critical Bird Species Habitat site and a Critical Plant Species Habitat site.*

[d] *Five acres of this Critical Species Habitat site extend outside the Natural Area.*

[e] *Twenty-seven acres of this Critical Species Habitat site extend outside the Natural Area.*

[f] *Ten acres of this Critical Species Habitat site extend outside the Natural Area.*

[g] *Two hundred two acres of this Critical Species Habitat site extend outside the Natural Area.*

Source: Wisconsin Department of Natural Resources; John Bielefeldt, Naturalist, Racine County Parks Department; and SEWRPC.

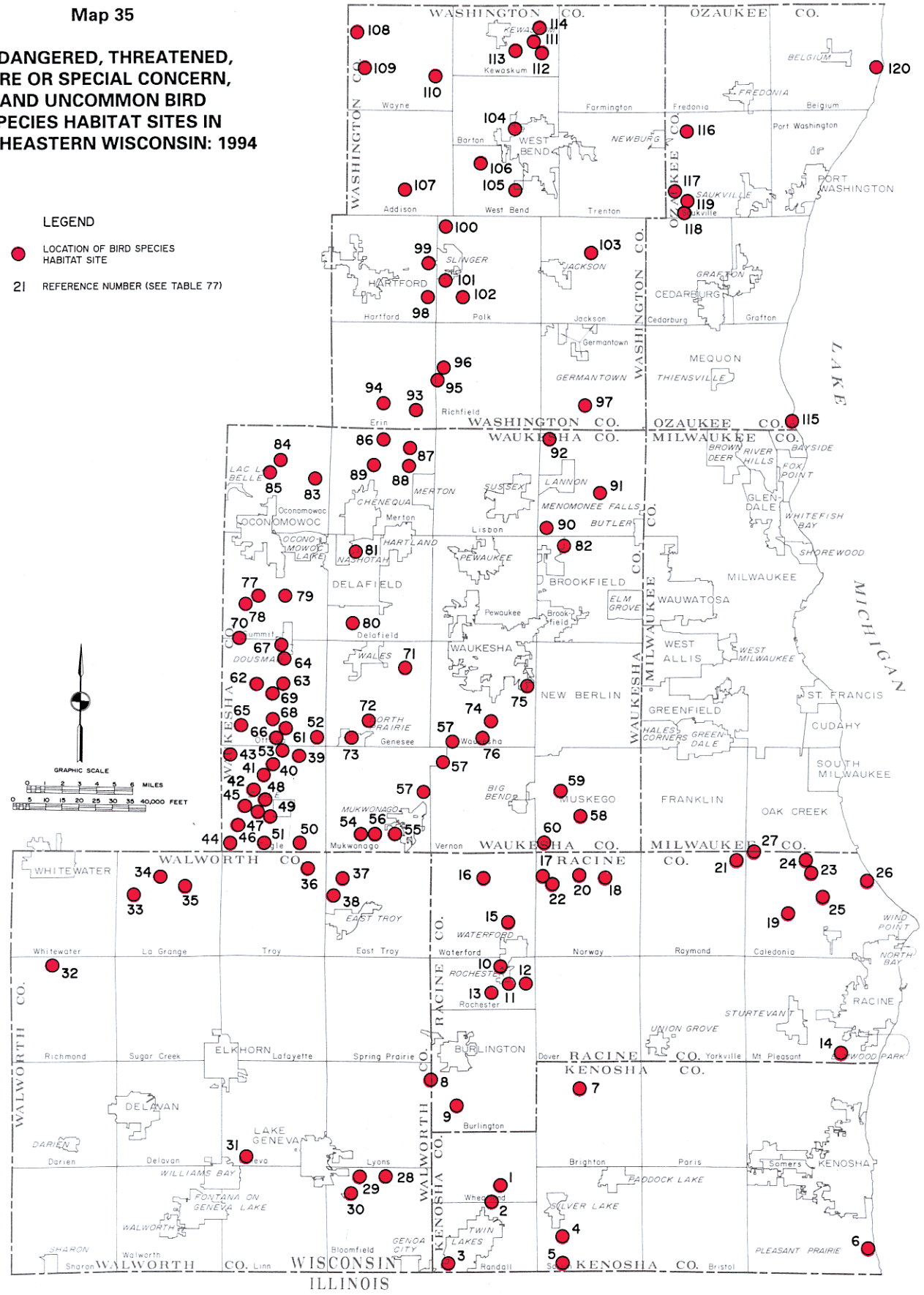
salamander (Ambystoma maculatum), four-toed salamander (Hemidactylium scutatum), and Butler's garter snake (Thamnophis butleri). Richard C. Vogt[8] offers historical records and field observations of amphibians and reptiles by county for the State of Wisconsin. However, detailed and comprehensive descriptions of their ranges and suitable habitats within Southeastern Wisconsin have not been published.

Preliminary range maps for the 11 herptile species noted above have been prepared by Mr. G. S. Casper, Collections Specialist of the Milwaukee Public Museum staff, as part of the Wisconsin Herpetological Atlas Project sponsored by the Wisconsin Department of Natural Resources and the Milwaukee Public Museum. In addition, the Commission staff added habitats to the original range infor-

[8] *Richard Carl Vogt, Natural History of Amphibians and Reptiles in Wisconsin, Milwaukee Public Museum, Milwaukee, Wisconsin, 1981.*

Map 35

ENDANGERED, THREATENED, RARE OR SPECIAL CONCERN, AND UNCOMMON BIRD SPECIES HABITAT SITES IN SOUTHEASTERN WISCONSIN: 1994



This map uses recent records to identify habitats of endangered, threatened, rare or special concern, and uncommon bird species in Southeastern Wisconsin. Birds use these sites for portions of their life history, including breeding, nesting, foraging, or migration. Many of these sites occupy, in part or whole, the same geographic areas as do designated Natural Areas in the Region.

Source: Wisconsin Department of Natural Resources; John Bielefeldt, Naturalist, Racine County Parks Department; and SEWRPC.

mation based on records provided by the Bureau of Endangered Resources of the Wisconsin Department of Natural Resources, the Commission field inventory files, and local naturalists.[9]

The Commission staff identified suitable habitat types for each species based on the staff's field experience and the habitat information identified by Vogt. Habitat types followed the vegetation cover codes used in the Commission's 1985 wildlife habitat type inventory. Vegetation polygons, representing suitable habitat, were then selected within each of the identified sighting ranges. The term "sighting ranges" refers to the extensive areas of the Region within which a given critical herptile species has been identified in the past. In the following text of this report, these sighting ranges are referred to as "range areas." Also, suitable nesting types were identified for Blanding's turtle and the western ribbon snake. Nesting types followed the appropriate soils codes in combination with vegetation cover codes. Maps were prepared using the Commission's automated geographic information system. These maps displayed suitable habitat areas for each species and also suitable nesting areas for Blanding's turtle and the western ribbon snake within each range area. Tables 78 through 84 summarize the species habitats that occur in each county in the Region, while Table 85 provides a regional summary.

A total of 12 range areas for Blanchard's cricket frog, a State-designated endangered species, was identified in Walworth, Ozaukee, Washington, Waukesha, Kenosha, and Racine Counties. Suitable habitats for this species include emergent-wet meadows, aquatic beds, and shallow ponds. A total of 2,817 acres of suitable habitat for this species occurs within the range areas. The locations of the range areas are shown on Map 36. It should be noted, however, that attempts since 1988 to record this frog species in Southeastern Wisconsin have failed. The reason for this sudden and drastic decline is unclear.

A total of eight range areas for the queen snake, a State-designated endangered species, was identified in Walworth, Milwaukee, Washington, Waukesha, and Racine Counties. Suitable habitats for this species include wet meadows, shrub-carrs, and alder thickets adjacent to rivers and streams. A total of 3,630 acres of suitable habitat for this species occurs within the range areas. The locations of the range areas are shown on Map 37. Shoreline areas with sunny banks, crayfish beds, and in-stream riffle zones are important to this species.

The above photograph shows a queen snake (Regina septemvittata), a State of Wisconsin-designated endangered species. Queen snakes occur in wet meadows, shrub-carrs, and alder thickets adjacent to clear, spring-fed rivers and streams having sunny banks, crayfish beds, and in-stream riffle zones.

Source: G. S. Casper, Milwaukee Public Museum, Inc.

A total of two range areas for the eastern massasauga, a State-designated endangered species, was identified in Kenosha and Walworth Counties. Suitable habitats for this species include shallow marshes, wet meadows, and shrub-carr wetland communities. Upland brush and grassland communities associated with streams, rivers, and lakes also provide suitable habitat. A total of 4,345 acres of suitable habitat for this species occurs within the range areas. The locations of the range areas are shown on Map 38.

A total of three range areas for the northern ribbon snake, a State-designated endangered species, was identified in Washington County. Suitable habitats for this species include tamarack and cedar swamps, shrub-carrs, alder thickets, and bog wetland communities and the ponds which may occur in these communities. A total of 124 acres of suitable habitat for this species occurs within the range areas. The locations of the range areas are shown on Map 39.

A total of two range areas for the western ribbon snake, a State-designated endangered species, was identified in Kenosha and Waukesha Counties.

[9]*Richard H. Radaj, Inventory of S. E. Wisconsin Fish, Reptile, & Amphibian Species. Unpublished.*

Table 78

KENOSHA COUNTY CRITICAL HERPTILE SPECIES HABITAT

Species	Status	Number of Range Areas	Suitable Habitat Area (acres)	Suitable Nesting Area (acres)[a]
Blanchard's Cricket Frog	Endangered	3	625	NA
Eastern Massasauga	Endangered	1	1,821	Unknown
Western Ribbon Snake	Endangered	1	42	0
Blanding's Turtle	Threatened	3	788	30
Bullfrog	Special concern	2	1,636	NA

[a] *"NA," or Not Applicable, refers to the fact that the amphibians of Southeastern Wisconsin lay their eggs as a gelatinous mass in lakes, ponds, streams, or wetlands, rather than select an upland nest.*

Source: Wisconsin Herpetological Atlas Project, Wisconsin Department of Natural Resources, local naturalists, and SEWRPC.

Table 79

MILWAUKEE COUNTY CRITICAL HERPTILE SPECIES HABITAT

Species	Status	Number of Range Areas	Suitable Habitat Area (acres)	Suitable Nesting Area (acres)[a]
Queen Snake	Endangered	1	4	Unknown
Blanding's Turtle	Threatened	3	26	2
Bullfrog	Special concern	1	10	NA
Butler's Garter Snake	Uncommon	11	2,328	Unknown

[a] *"NA," or Not Applicable, refers to the fact that the amphibians of Southeastern Wisconsin lay their eggs as a gelatinous mass in lakes, ponds, streams, or wetlands, rather than select an upland nest.*

Source: Wisconsin Herpetological Atlas Project, Wisconsin Department of Natural Resources, local naturalists, and SEWRPC.

Table 80

OZAUKEE COUNTY CRITICAL HERPTILE SPECIES HABITAT

Species	Status	Number of Range Areas	Suitable Habitat Area (acres)	Suitable Nesting Area (acres)[a]
Blanchard's Cricket Frog	Endangered	1	7	NA
Blanding's Turtle	Threatened	1	524	69
Bullfrog	Special concern	1	348	NA
Spotted Salamander	Uncommon	2	230	NA
Butler's Garter Snake	Uncommon	2	232	Unknown

[a] *"NA," or Not Applicable, refers to the fact that the amphibians of Southeastern Wisconsin lay their eggs as a gelatinous mass in lakes, ponds, streams, or wetlands, rather than select an upland nest.*

Source: Wisconsin Herpetological Atlas Project, Wisconsin Department of Natural Resources, local naturalists, and SEWRPC.

Table 81

RACINE COUNTY CRITICAL HERPTILE SPECIES HABITAT

Species	Status	Number of Range Areas	Suitable Habitat Area (acres)	Suitable Nesting Area (acres)[a]
Blanchard's Cricket Frog	Endangered	1	1,005	NA
Queen Snake	Endangered	1	115	Unknown
Blanding's Turtle	Threatened	7	4,582	76
Bullfrog	Special concern	1	992	NA

[a] *"NA," or Not Applicable, refers to the fact that the amphibians of Southeastern Wisconsin lay their eggs as a gelatinous mass in lakes, ponds, streams, or wetlands, rather than select an upland nest.*

Source: Wisconsin Herpetological Atlas Project, Wisconsin Department of Natural Resources, local naturalists, and SEWRPC.

Table 82

WALWORTH COUNTY CRITICAL HERPTILE SPECIES HABITAT

Species	Status	Number of Range Areas	Suitable Habitat Area (acres)	Suitable Nesting Area (acres)[a]
Blanchard's Cricket Frog	Endangered	1	210	NA
Queen Snake	Endangered	3	2,187	Unknown
Eastern Massasauga	Endangered	1	2,524	Unknown
Blanding's Turtle	Threatened	5	6,359	1,312
Bullfrog	Special concern	2	894	NA
Four-Toed Salamander	Uncommon	1	20	NA
Butler's Garter Snake	Uncommon	1	401	Unknown

[a] *"NA," or Not Applicable, refers to the fact that the amphibians of Southeastern Wisconsin lay their eggs as a gelatinous mass in lakes, ponds, streams, or wetlands, rather than select an upland site.*

Source: Wisconsin Herpetological Atlas Project, Wisconsin Department of Natural Resources, local naturalists, and SEWRPC.

Suitable habitats for this species include wet meadows, swamp hardwoods, and nearby oak savannas that are associated with rivers and streams. A total of 54 acres of suitable habitat for this species occurs within the range areas. The locations of the range areas are shown on Map 40. Suitable nesting sites were also identified and include the well-drained soils of open brush and grassland communities. A total of 82 acres of suitable habitat for this species occurs within the range areas. Because there is no evidence to suggest reproduction occurs for this species in Southeastern Wisconsin, the records may represent escapes.

A total of 29 range areas for Blanding's turtle, a State-designated threatened species, was identified

Table 83

WASHINGTON COUNTY CRITICAL HERPTILE SPECIES HABITAT

Species	Status	Number of Range Areas	Suitable Habitat Area (acres)	Suitable Nesting Area (acres)[a]
Blanchard's Cricket Frog	Endangered	3	86	NA
Queen Snake	Endangered	1	513	Unknown
Northern Ribbon Snake	Endangered	3	124	Unknown
Blanding's Turtle	Threatened	6	944	218
Pickerel Frog	Special concern	1	32	NA
Bullfrog	Special concern	3	831	NA
Butler's Garter Snake	Uncommon	2	338	Unknown

[a] *"NA," or Not Applicable, refers to the fact that the amphibians of Southeastern Wisconsin lay their eggs as a gelatinous mass in lakes, ponds, streams, or wetlands, rather than select an upland site.*

Source: Wisconsin Herpetological Atlas Project, Wisconsin Department of Natural Resources, local naturalists, and SEWRPC.

Table 84

WAUKESHA COUNTY CRITICAL HERPTILE SPECIES HABITAT

Species	Status	Number of Range Areas	Suitable Habitat Area (acres)	Suitable Nesting Area (acres)[a]
Blanchard's Cricket Frog	Endangered	3	884	NA
Queen Snake	Endangered	2	811	Unknown
Western Ribbon Snake	Endangered	1	12	82
Blanding's Turtle	Threatened	4	19,891	2,539
Pickerel Frog	Special concern	3	273	NA
Bullfrog	Special concern	9	5,573	NA
Spotted Salamander	Uncommon	1	278	NA
Butler's Garter Snake	Uncommon	7	2,466	Unknown

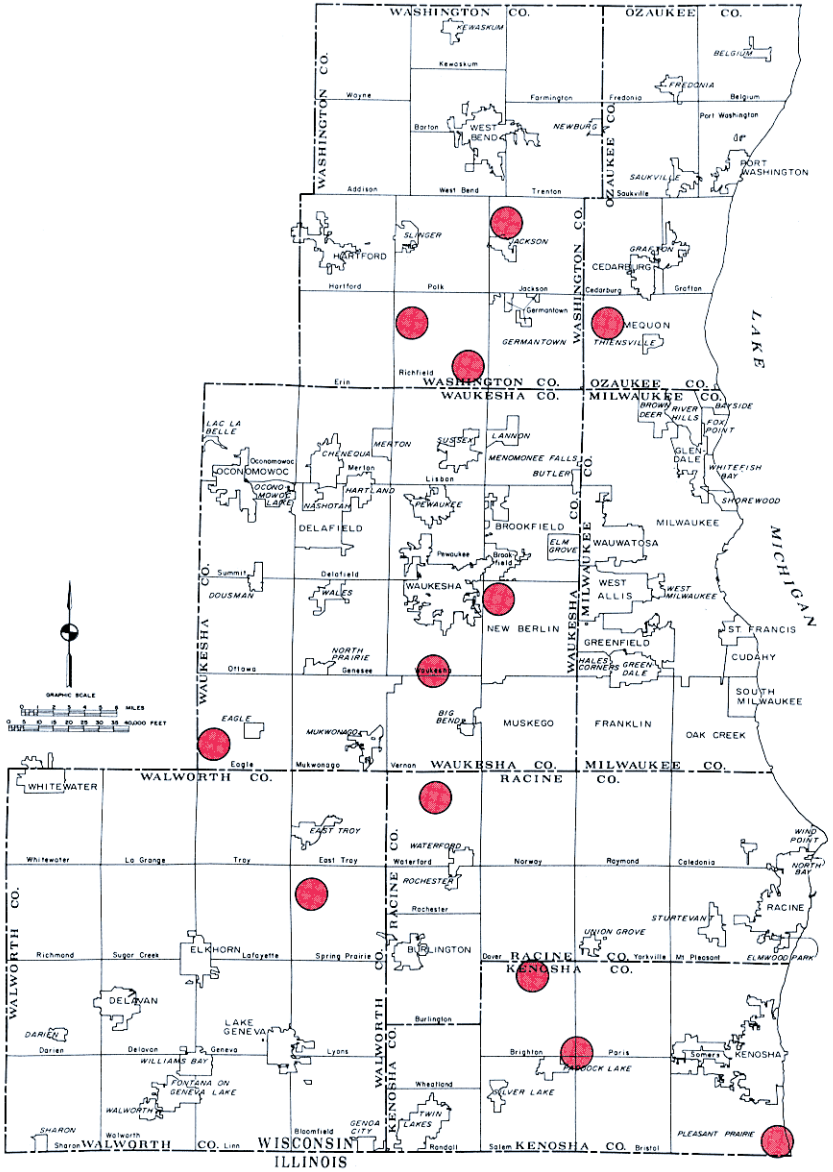
[a] *"NA," or Not Applicable, refers to the fact that the amphibians of Southeastern Wisconsin lay their eggs as a gelatinous mass in lakes, ponds, streams, or wetlands, rather than select an upland site.*

Source: Wisconsin Herpetological Atlas Project, Wisconsin Department of Natural Resources, local naturalists, and SEWRPC.

in all seven Southeastern Wisconsin counties. A large range area which covers much of western Waukesha County and northeastern Walworth County contains one of the three largest populations in the State. In arriving at the county and regional totals, the respective portions of this large area within the two counties were counted separately. The Blanding's turtle's status as a threatened species is explained by its poor reproduction, caused by nest predation by small mammals whose numbers have increased with urbanization. Suitable habitats for this species include small ponds and their adjacent wetlands, and marshes and wet meadows associated with lakes, ponds, rivers, and streams. A total of 33,114 acres of suitable habitat for this species occurs within the range areas. The

Map 36

BLANCHARD'S CRICKET FROG RANGE AREAS OF SOUTHEASTERN WISCONSIN

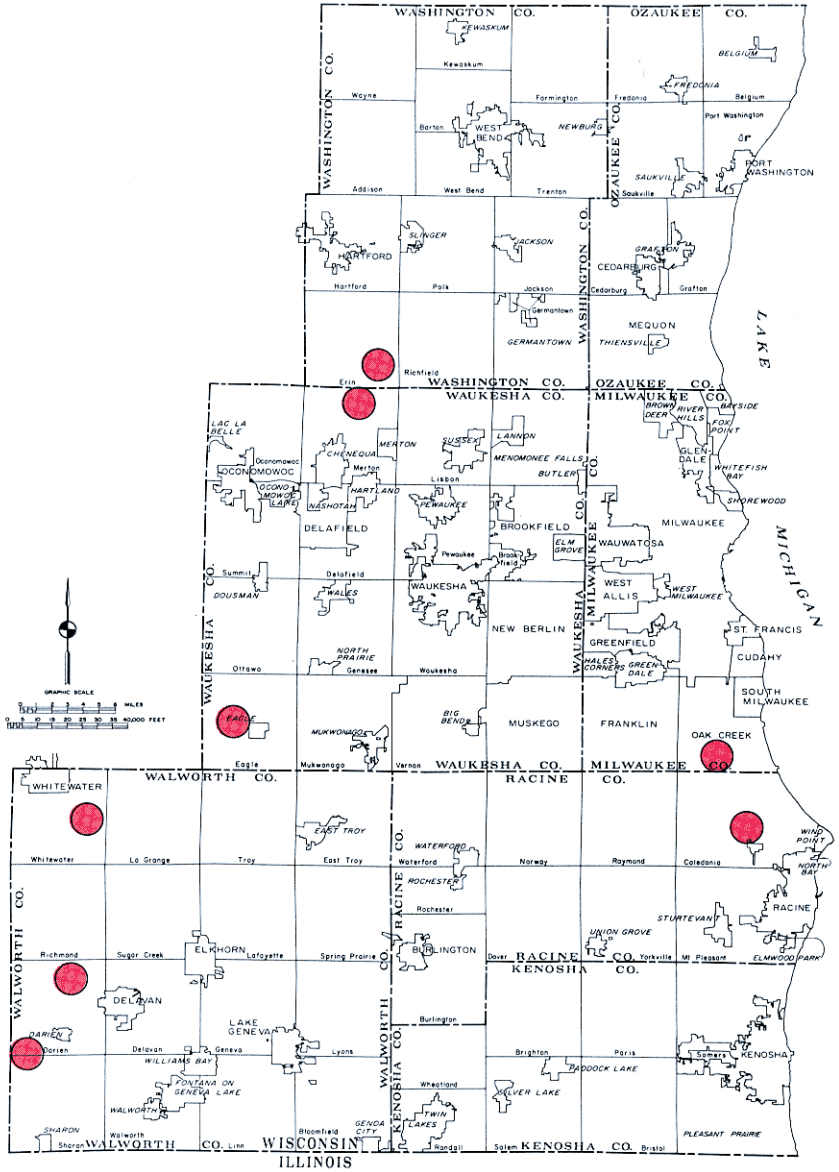


This map identifies locations of range areas within the Region for Blanchard's cricket frog, a State-designated endangered species, which contain collections of suitable habitat areas in the vicinity of occurrence records.

Source: Wisconsin Herpetological Atlas Project, Wisconsin Department of Natural Resources, local naturalists, and SEWRPC.

Map 37

QUEEN SNAKE RANGE AREAS OF SOUTHEASTERN WISCONSIN



This map identifies locations of range areas within the Region for the queen snake, a State-designated endangered species, which contain collections of suitable habitat areas in the vicinity of occurrence records.

Source: Wisconsin Herpetological Atlas Project, Wisconsin Department of Natural Resources, local naturalists, and SEWRPC.

Table 85

REGIONAL CRITICAL HERPTILE SPECIES HABITAT

Species	Status	Number of Range Areas	Suitable Habitat Area (acres)	Suitable Nesting Area (acres)[a]
Blanchard's Cricket Frog	Endangered	12	2,817	NA
Queen Snake	Endangered	8	3,630	Unknown
Eastern Massasauga	Endangered	2	4,345	Unknown
Northern Ribbon Snake	Endangered	3	124	Unknown
Western Ribbon Snake	Endangered	2	54	82
Blanding's Turtle	Threatened	29	33,114	4,246
Pickerel Frog	Special concern	4	305	NA
Bullfrog	Special concern	19	10,284	NA
Spotted Salamander	Uncommon	3	508	NA
Four-Toed Salamander	Uncommon	1	20	NA
Butler's Garter Snake	Uncommon	23	5,765	Unknown

[a] *"NA," or Not Applicable, refers to the fact that the amphibians of Southeastern Wisconsin lay their eggs as a gelatinous mass in lakes, ponds, streams, or wetlands, rather than select an upland site.*

Source: Wisconsin Herpetological Atlas Project, Wisconsin Department of Natural Resources, local naturalists, and SEWRPC.

Blanding's turtle (Emydoidea blandingii), a State of Wisconsin-designated threatened species shown above, was identified in all seven Southeastern Wisconsin counties. The threatened status of this turtle is explained by its poor reproduction caused by nest predation from mammals such as skunks, opossums, and raccoons. The prevalence of such predators—which readily adapt to the urban environment—has been increased greatly by scattered urban and suburban sprawl.

Source: G. S. Casper, Milwaukee Public Museum, Inc.

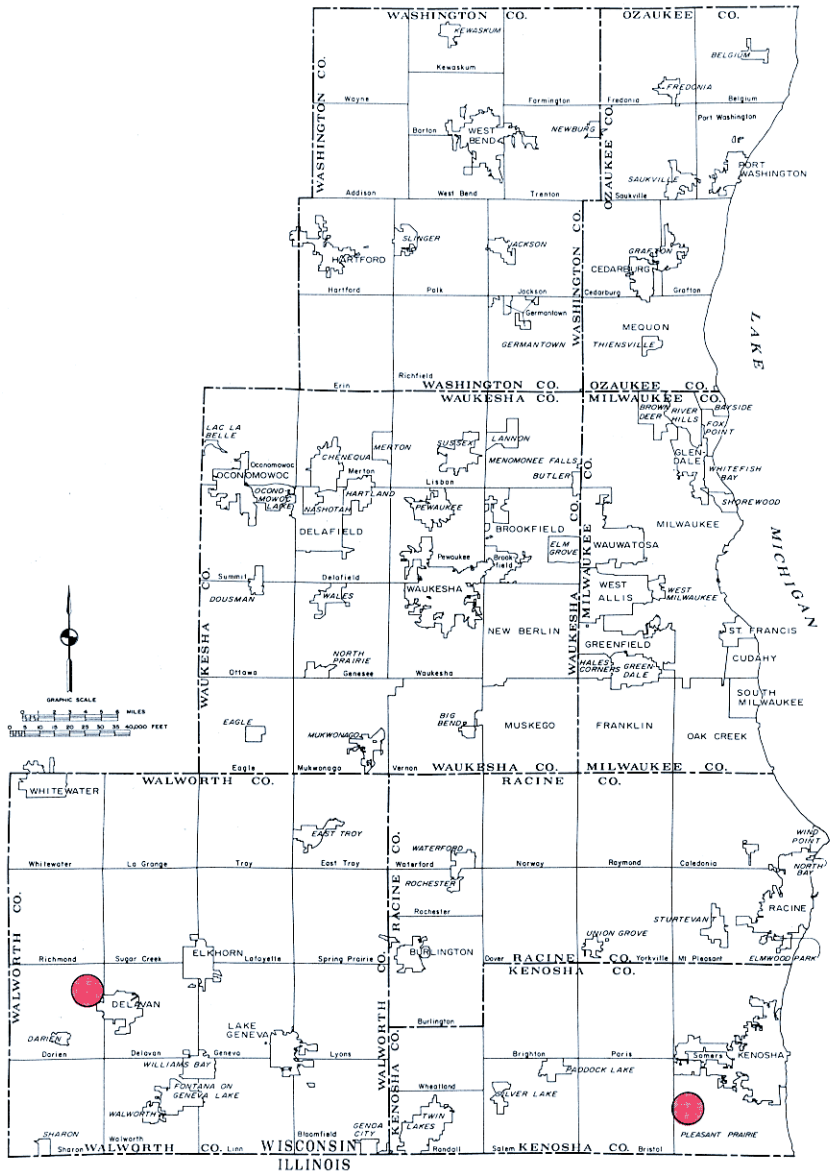
locations of the range areas are shown on Map 41. Suitable nesting sites were also identified and include the well-drained soils of open upland brush and grassland habitats. A total of 4,246 acres of suitable nesting sites for this species occurs within the range areas.

A total of four range areas for the pickerel frog, a State-designated "special concern" species, was identified in Washington and Waukesha Counties. Suitable habitats for this species include deep and shallow marshes, sedge meadows, bog ponds, shrub-carrs, and alder thickets as well as other open-habitat-type communities adjacent to streams and ponds. A total of 305 acres of suitable habitat for this species occurs within the range areas. The locations of the range areas are shown on Map 42.

A total of 19 range areas for the bullfrog, a State-designated "special concern" species, was identified in all seven Southeastern Wisconsin counties. Suitable habitats for this species include deep and shallow marshes, sedge meadows and exposed shorelands associated with open water, and shallow

Map 38

EASTERN MASSASAUGA RANGE AREAS OF SOUTHEASTERN WISCONSIN

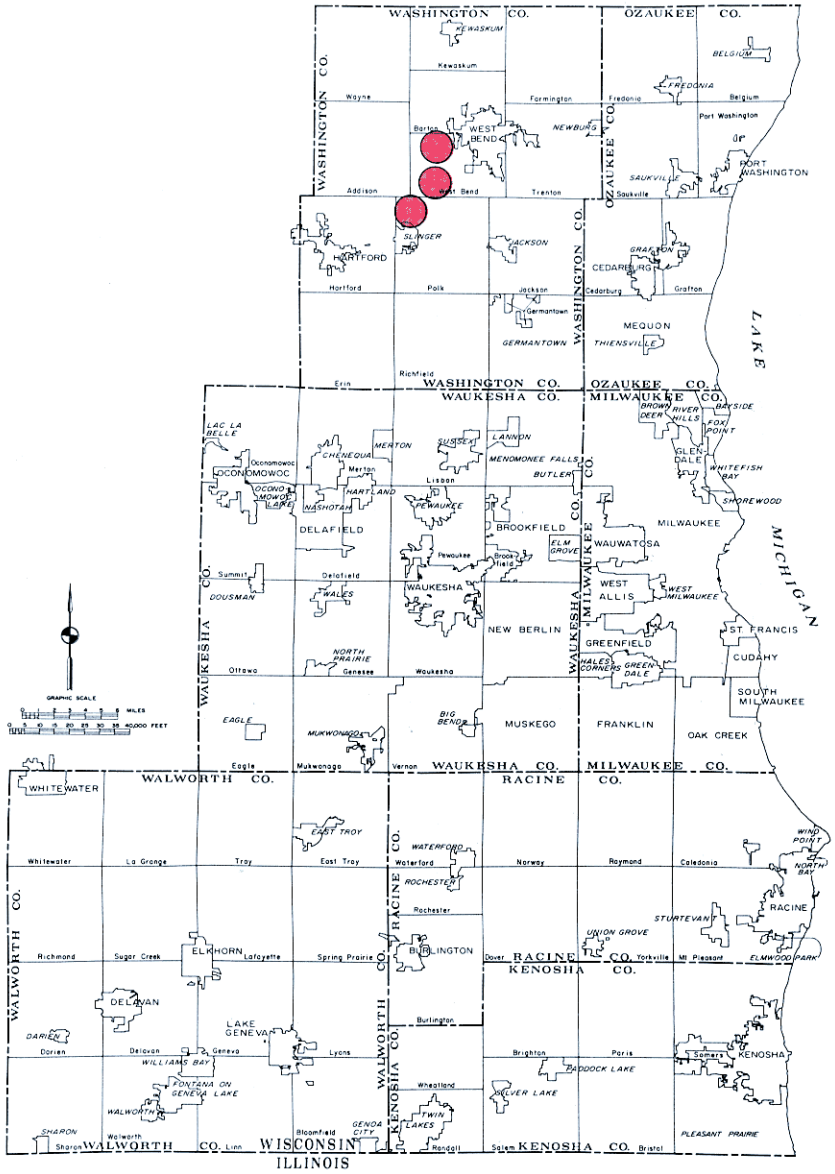


This map identifies locations of range areas within the Region for the eastern massasauga, a State-designated endangered species, which contain collections of suitable habitat areas in the vicinity of occurrence records.

Source: Wisconsin Herpetological Atlas Project, Wisconsin Department of Natural Resources, local naturalists, and SEWRPC.

Map 39

NORTHERN RIBBON SNAKE RANGE AREAS OF SOUTHEASTERN WISCONSIN

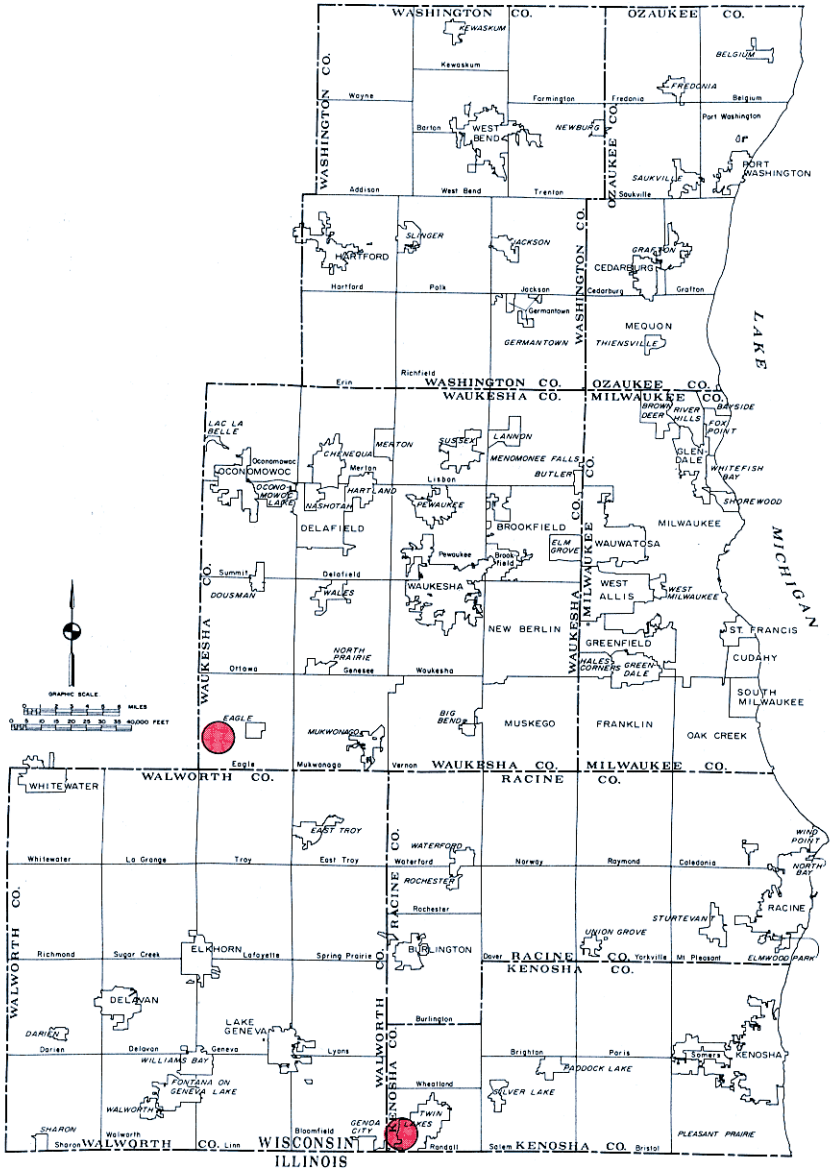


This map identifies locations of range areas within the Region for the northern ribbon snake, a State-designated endangered species, which contain collections of suitable habitat areas in the vicinity of occurrence records.

Source: Wisconsin Herpetological Atlas Project, Wisconsin Department of Natural Resources, local naturalists, and SEWRPC.

Map 40

WESTERN RIBBON SNAKE RANGE AREAS OF SOUTHEASTERN WISCONSIN

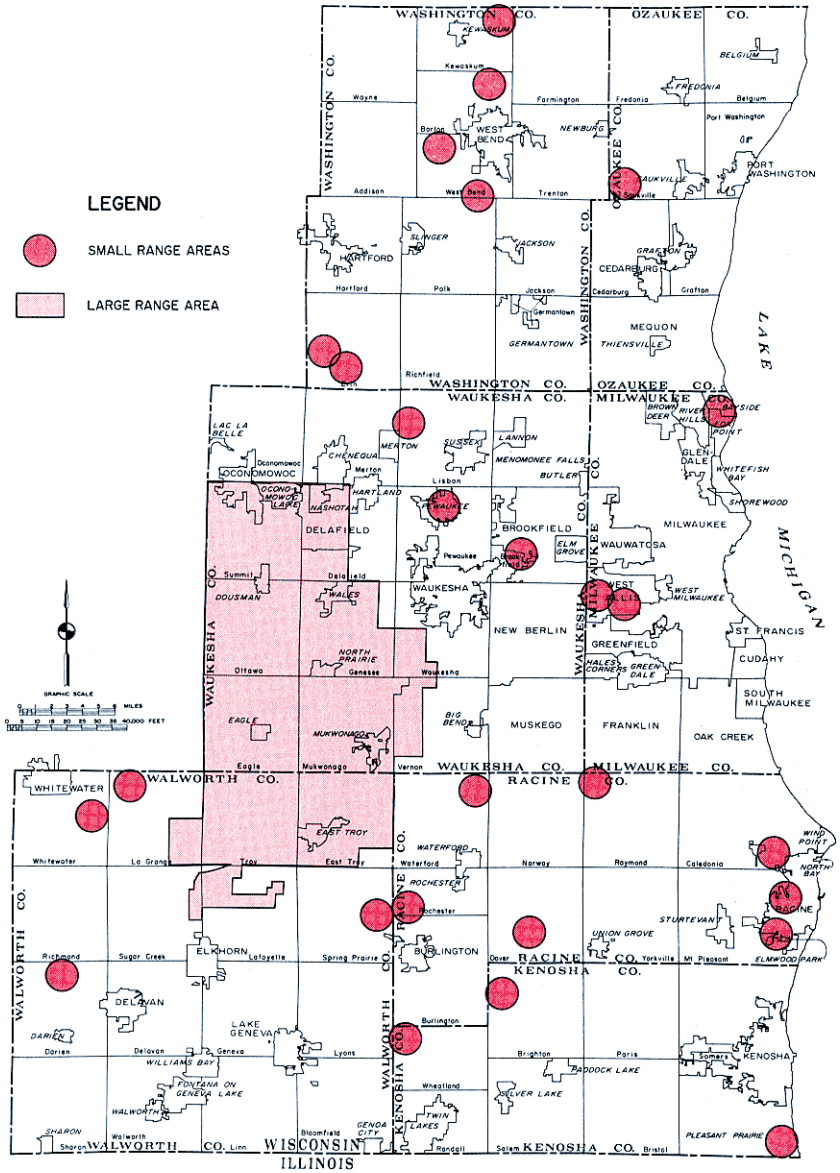


This map identifies locations of range areas within the Region for the western ribbon snake, a State-designated endangered species, which contain collections of suitable habitat and suitable nesting areas in the vicinity of occurrence records.

Source: Wisconsin Herpetological Atlas Project, Wisconsin Department of Natural Resources, local naturalists, and SEWRPC.

Map 41

BLANDING'S TURTLE RANGE AREAS OF SOUTHEASTERN WISCONSIN



This map identifies locations of range areas within the Region for Blanding's turtle, a State-designated threatened species, which contain collections of suitable habitat and suitable nesting areas in the vicinity of occurrence records.

Source: Wisconsin Herpetological Atlas Project, Wisconsin Department of Natural Resources, local naturalists, and SEWRPC.

open-water communities and the beds of ponds, lakes, and streams. A total of 10,284 acres of suitable habitat for this species occurs within the range areas. The locations of the range areas are shown on Map 43.

A total of three range areas for the spotted salamander, a Commission-identified uncommon species, was identified in Ozaukee and Waukesha Counties. Suitable habitats for this species include upland hardwoods and aspen groves associated with open water such as ephemeral wet basins, shallow ponds, or smaller streams. A total of 508 acres of suitable habitat for this species occurs within the range areas. The locations of the range areas are shown on Map 44.

A single range area for the four-toed salamander, a Commission-identified uncommon species, was identified in Walworth County. Suitable habitat within the Region is somewhat speculative, but this very secretive species seems to prefer sphagnum moss communities. A total of 20 acres of known suitable habitat for this species occurs within the range area. The location of the range area is shown on Map 45.

A total of 23 range areas for Butler's garter snake, a Commission-identified uncommon species, was identified in Walworth, Milwaukee, Ozaukee, Washington, and Waukesha Counties. Suitable habitats include upland brush and grassland communities associated with wet meadows, open wetlands of less than two acres in area, and shrub-carr wetland communities. A total of 5,765 acres of suitable habitat for this species occurs within the range areas. The locations of the range areas are shown on Map 46.

CRITICAL MAMMAL SPECIES

Two critical mammal species, the bobcat (Lynx rufus) and Franklin's ground squirrel (Spermophilus franklinii), have been reported in Southeastern Wisconsin since the early 1970s. Both are listed by the Wisconsin Department of Natural Resources as "special concern" species.

The occurrence records of critical mammal species in Southeastern Wisconsin are based upon records provided by the Wisconsin Department of Natural Resources and from Commission staff and are displayed on Map 47. It should be noted that, except for the capture of a Franklin's ground squirrel at Bong State Recreation Area in Kenosha County, records are based upon informal verbal testimony of sightings of the bobcat and Franklin's ground squirrel.

The immature bullfrog (Rana catesbeiana), shown above, is a State of Wisconsin-designated special concern species because of its declining populations associated with loss of suitable habitat.

Source: G. S. Casper, Milwaukee Public Museum, Inc.

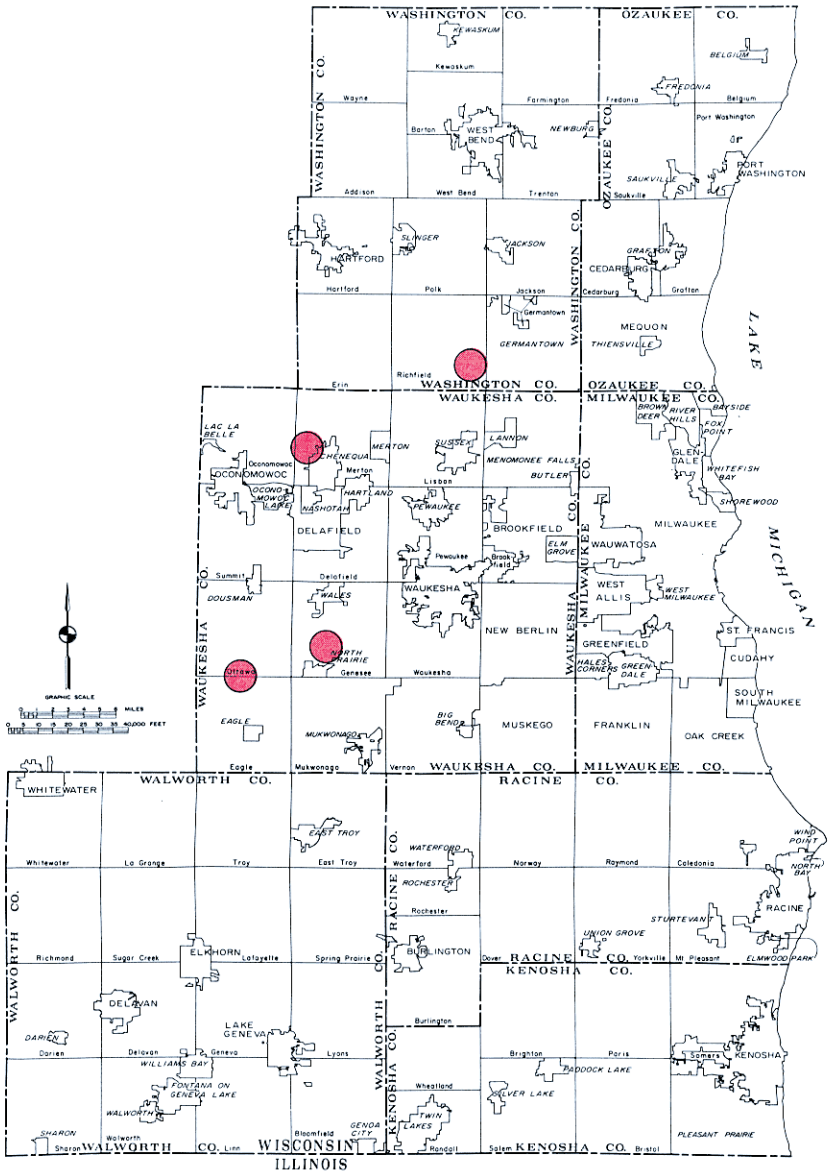
Suitable habitats for the spotted salamander (Ambystoma maculatum), shown above, include upland hardwoods and aspen groves associated with open water. Within the Southeastern Wisconsin Region, this uncommon salamander is known to occur only in Ozaukee and Waukesha Counties.

Source: G. S. Casper, Milwaukee Public Museum, Inc.

Bobcat records available for the Region occur within or near the Southern Unit of the Kettle Moraine State Forest. The stability of the bobcat population in this area is questionable because of current trends of recreational and habitat management

Map 42

PICKEREL FROG RANGE AREAS OF SOUTHEASTERN WISCONSIN

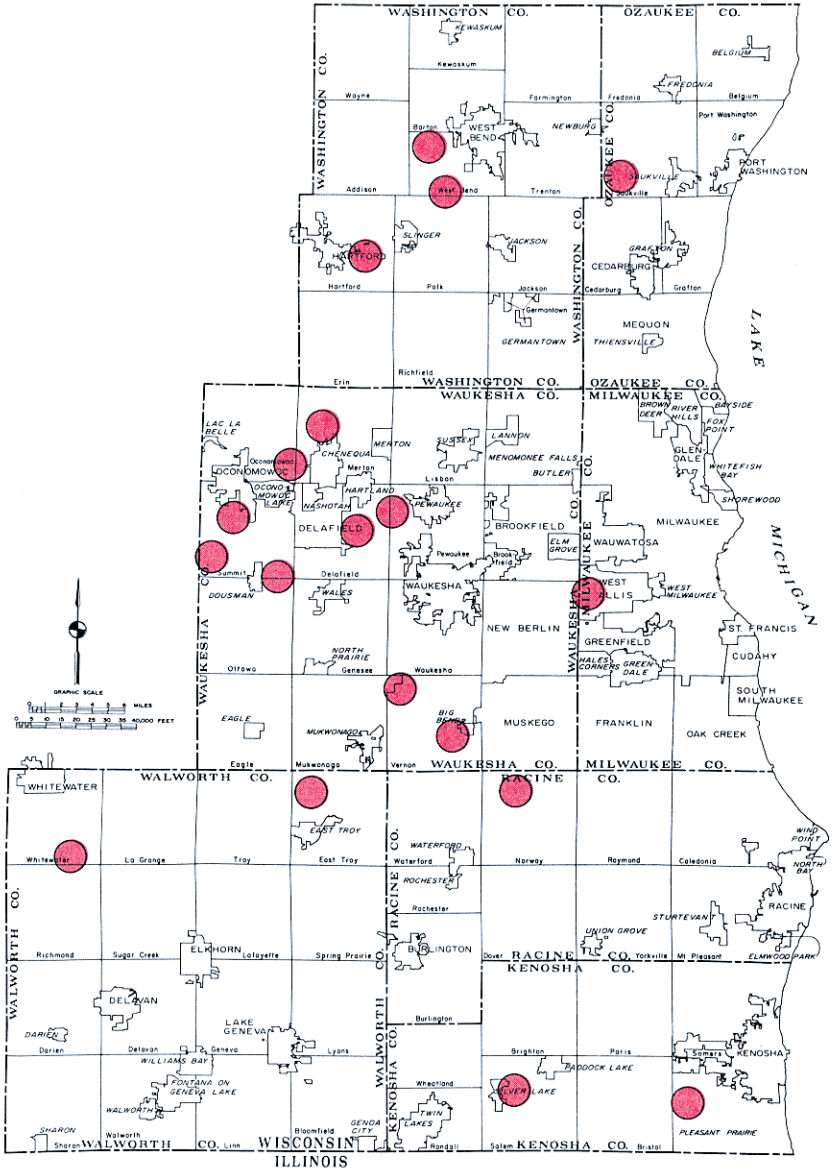


This map identifies locations of range areas within the Region for the pickerel frog, a State-designated "special concern" species, which contain collections of suitable habitat areas in the vicinity of occurrence records.

Source: Wisconsin Herpetological Atlas Project, Wisconsin Department of Natural Resources, local naturalists, and SEWRPC.

Map 43

BULLFROG RANGE AREAS OF SOUTHEASTERN WISCONSIN

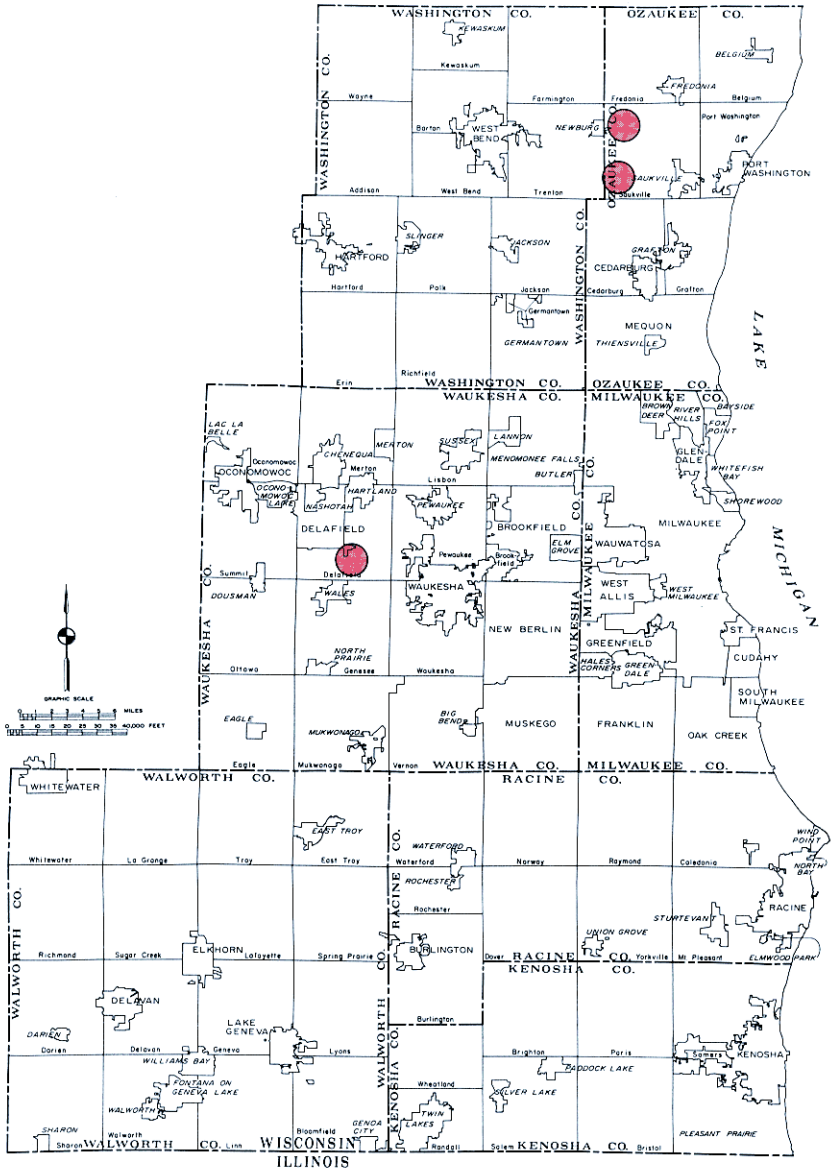


This map identifies locations of range areas within the Region for the bullfrog, a State-designated "special concern" species, which contain collections of suitable habitat areas in the vicinity of occurrence records.

Source: Wisconsin Herpetological Atlas Project, Wisconsin Department of Natural Resources, local naturalists, and SEWRPC.

Map 44

SPOTTED SALAMANDER RANGE AREAS OF SOUTHEASTERN WISCONSIN

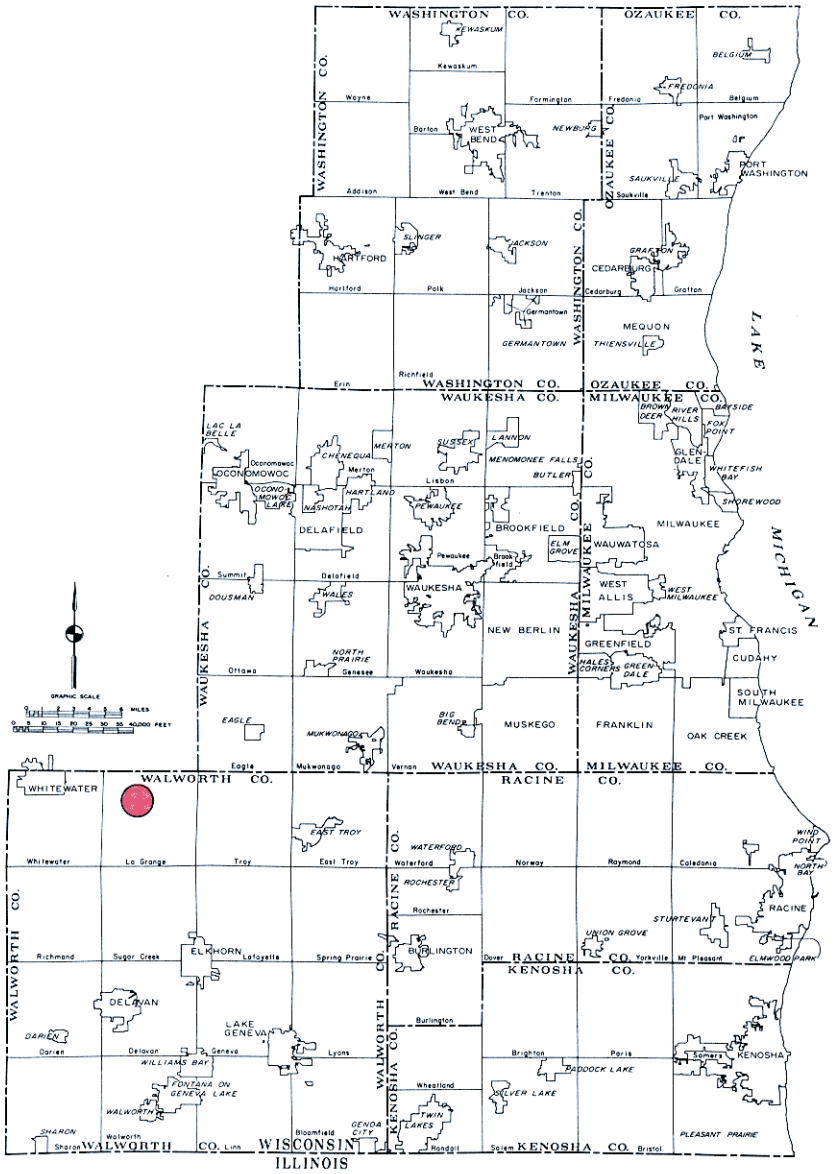


This map identifies locations of range areas within the Region for the spotted salamander, a Commission-identified uncommon species, which contain collections of suitable habitat areas in the vicinity of occurrence records.

Source: Wisconsin Herpetological Atlas Project, Wisconsin Department of Natural Resources, local naturalists, and SEWRPC.

Map 45

FOUR-TOED SALAMANDER RANGE AREA WITHIN SOUTHEASTERN WISCONSIN

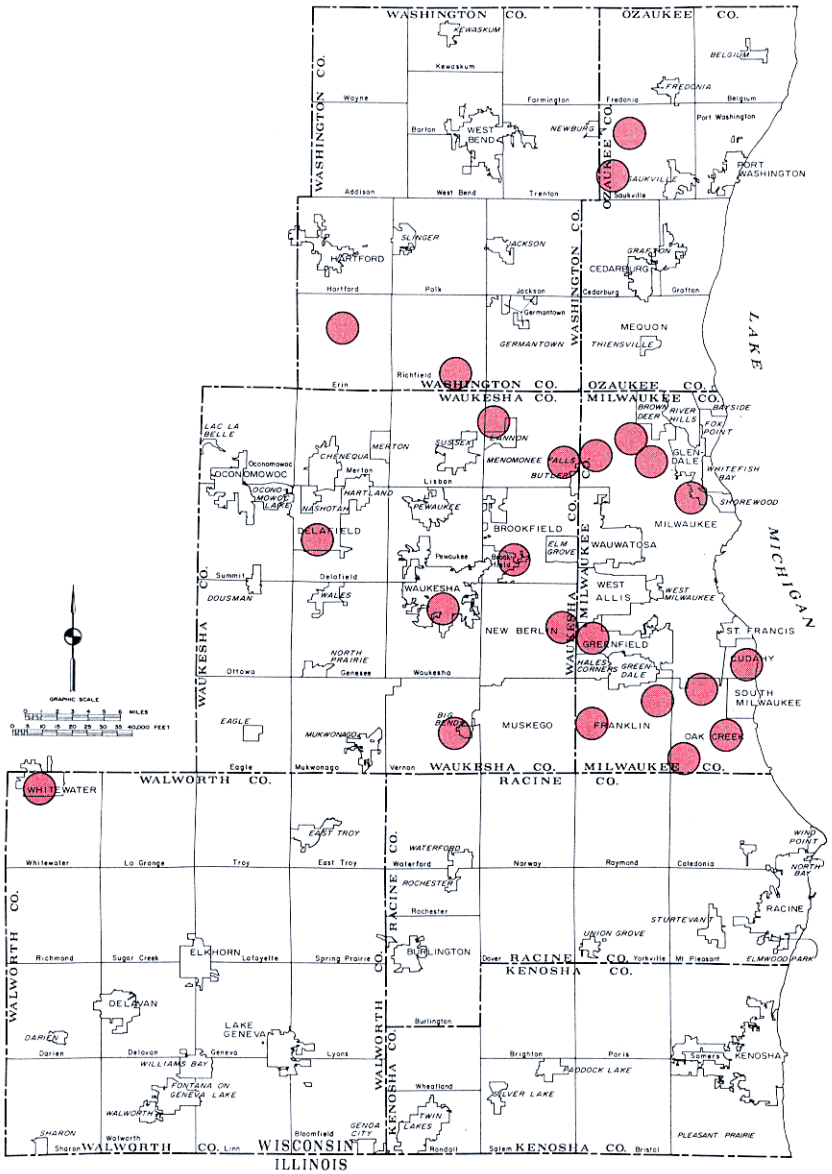


This map identifies the location of the only known range area within the Region for the four-toed salamander, a Commission-identified uncommon species, which contains collections of suitable habitat areas in the vicinity of occurrence records.

Source: Wisconsin Herpetological Atlas Project, Wisconsin Department of Natural Resources, local naturalists, and SEWRPC.

Map 46

BUTLER'S GARTER SNAKE RANGE AREAS OF SOUTHEASTERN WISCONSIN

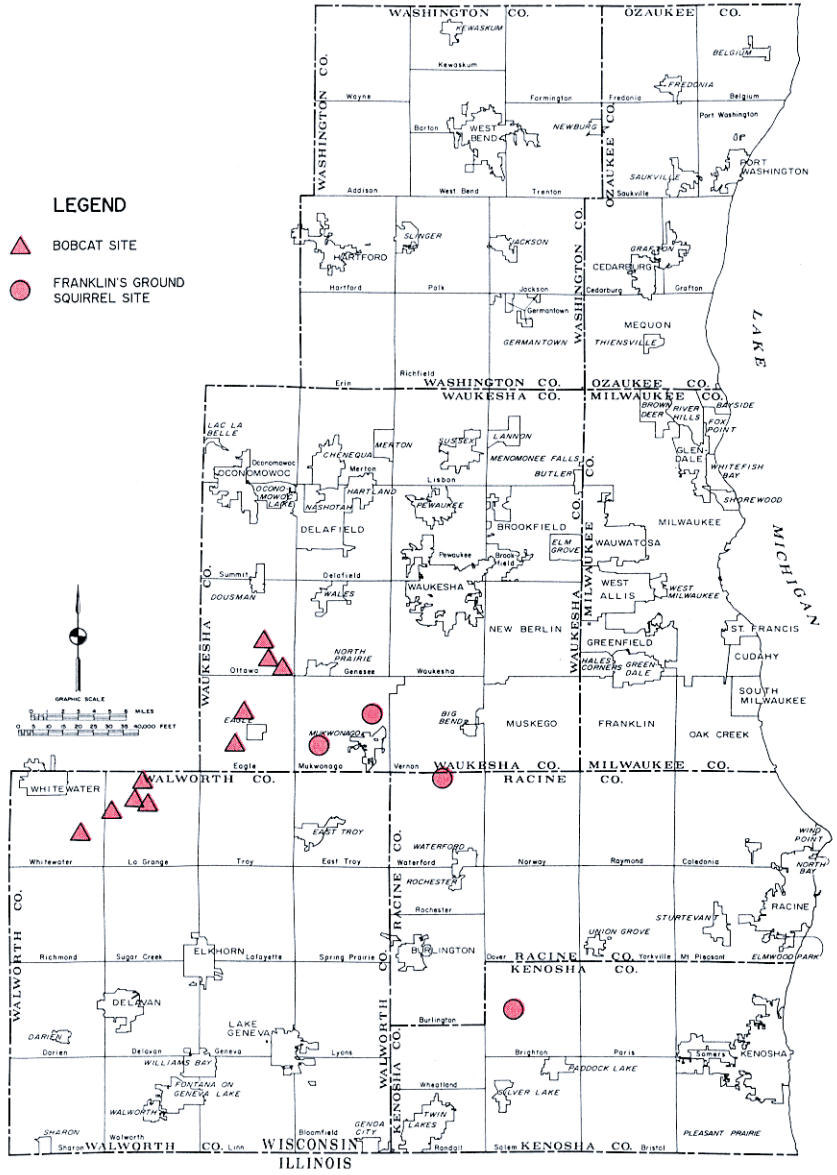


This map identifies locations of range areas within the Region for Butler's garter snake, a Commission-identified uncommon species, which contain collections of suitable habitat areas in the vicinity of occurrence records.

Source: Wisconsin Herpetological Atlas Project, Wisconsin Department of Natural Resources, local naturalists, and SEWRPC.

Map 47

SPECIAL CONCERN MAMMAL SPECIES SITES IN SOUTHEASTERN WISCONSIN



This map identifies the locations of occurrence records for two critical mammal species, the bobcat and Franklin's ground squirrel, both State-designated "special concern" species, which have been reported in Southeastern Wisconsin since the early 1970s.

Source: Wisconsin Department of Natural Resources and SEWRPC.

activities in the area. Wisconsin Department of Natural Resources staff members based in the area have reported an increase in certain recreational activities along trails and believe that this has had an adverse effect on the local bobcat population.

Franklin's ground squirrel has also been reported in publicly owned areas such as Bong State Recreation Area, the Vernon Marsh Wildlife Area, and Waukesha County's Mukwonago Park. Portions of Mukwonago Park and adjacent privately owned lands have been identified as a Critical Mammal Species Habitat site for Franklin's ground squirrel. As is true of the Kettle Moraine State Forest, Bong State Recreation Area, the Vernon Marsh Wildlife Area, and Mukwonago Park are multi-use areas managed for many recreational activities. These activities may have had adverse effects on Franklin's ground squirrel populations.

Research is needed to answer the question of compatibility between certain types of recreational activities and maintenance of adequate populations of critical mammal species in the Region. Further, better documentation of the occurrence and distribution of these two mammal species in Southeastern Wisconsin is needed.

CRITICAL FISH SPECIES

Fifteen fish species remaining in Southeastern Wisconsin have been identified by the Department of Natural Resources as being endangered, threatened, or of special concern. Three endangered fish species occur in the Region. They are the slender madtom (Noturus exilis), starhead topminnow (Fundulus dispar), and striped shiner (Luxilus chrysocephalus). The six threatened species in the Region include the pugnose shiner (Notropis anogenus), longear sunfish (Lepomis megalotis), greater redhorse (Moxostoma valenciennesi), redfin shiner (Lythrurus umbratilis), river redhorse (Moxostoma carinatum), and Ozark minnow (Notropis nubilus). Finally, six "special concern" species occur in the Region, including the lake chubsucker (Erimyzon sucetta), pugnose minnow (Opsopoeodus emiliae), American eel (Anguilla rostrata), least darter (Etheostoma microperca), lake herring (Coregonus artedi), and pirate perch (Aphredoderus sayanus). Table 86 lists each critical species and the watersheds and surface waters from which there are documented records of these species. In addition, several critical species have been identified from Southeastern Wisconsin surface waters, but are now believed to be extirpated from the Region. The redside dace (Clinostomus elongatus), a State-designated "special concern" species, was previously collected in the Menomonee River, Root River, Honey Creek, and Underwood Creek, but records only date to the early 1900s. The black redhorse (Moxostoma duquesnei), a species which has been proposed for "endangered" status in the State, was collected in the Root River in the mid-1800s, but there are no recent records for this species in the Region. The weed shiner (Notropis texanus), a State-designated "special concern" species, was also historically collected in the Oconomowoc River, Des Plaines River, and Fox River, but there are no recent records for this fish species in the Region.

Distribution maps were developed for the 15 critical fish species which occur in the inland waters of Southeastern Wisconsin. Map 48 displays the distribution of endangered and threatened species, while Map 49 displays the distribution of "special concern" species. Data used in developing the distribution maps were obtained from records provided by the Bureau of Research of the Wisconsin Department of Natural Resources. Other sources for critical species records include the works of Becker,[10] as well as unpublished records provided by Marlin Johnson, Associate Professor, Department of Biological Sciences, University of Wisconsin Center-Waukesha County; Mr. Steve Galarneau of the Wisconsin Department of Natural Resources, Southeast District;[11] Mr. Richard H. Radaj; [12] and the Commission staff. Only those records which date from the years 1960 to 1995 were used.

Critical aquatic habitats for fish are delineated on Map 50. These are based on the fish distribution maps and other available information regarding the physical characteristics of the waters involved, including the Commission's 1990 large-scale aerial photography. Physical characteristics which were

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[10]*George C. Becker, Fishes of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1983.*

[11]*Steve Galarneau, Stream Classification for Pleasant Prairie Ditch, April 17, 1995. Unpublished.*

[12]*Richard H. Radaj, Fish Inventory of the Des Plaines River Basin, Racine and Kenosha Counties, Wisconsin, 1978, and Inventory of S. E. Wisconsin Fish, Reptile, & Amphibian Species. Both unpublished.*

Table 86

LOCATIONS OF CRITICAL FISH SPECIES IN SURFACE WATERS OF SOUTHEASTERN WISCONSIN: 1960-1995

Species	Status	Watershed(s)	Surface Water(s)
Slender Madtom	Endangered	Rock River	Ashippun River Bark River Darien Creek Mason Creek Oconomowoc River Little Turtle Creek
Starhead Topminnow	Endangered	Fox River	Lake Beulah Fox River Mukwonago River Lower Phantom Lake Upper Phantom Lake
		Rock River	Bark River
Striped Shiner	Endangered	Fox River	Wind Lake
		Milwaukee River	Cedar Creek Milwaukee River Mole Creek Pigeon Creek Stony Creek
Pugnose Shiner	Threatened	Fox River	Bassett Creek Benedict Lake Lake Beulah Cross Lake Elizabeth Lake Fox River Long Lake (Kee Nong Go Mong Lake) Lulu Lake Marie Lake (Lake Mary) Mukwonago River Pewaukee Lake Upper Phantom Lake Silver Lake Waubeesee Lake
		Milwaukee River	Big Cedar Lake Gilbert Lake Lucas Lake Silver Lake
		Rock River	Bark River Nagawicka Lake Lower Nemahbin Lake Oconomowoc Lake Okauchee Lake Pike Lake
Longear Sunfish	Threatened	Fox River	Fox River Mukwonago River White River
		Milwaukee River	Milwaukee River Milwaukee River-East Branch
		Rock River	Rock River-East Branch

Table 86 (continued)

Species	Status	Watershed(s)	Surface Water(s)
Greater Redhorse	Threatened	Milwaukee River	Cedar Creek Milwaukee River Milwaukee River-North Branch Pigeon Creek
Redfin Shiner	Threatened	Des Plaines River	Des Plaines River
		Fox River	Muskego Creek
		Milwaukee River	Cedar Creek Milwaukee River Milwaukee River-North Branch Mole Creek Wallace Creek
		Rock River	Limestone Creek Rock River-East Branch
River Redhorse	Threatened	Fox River	Fox River White River
Ozark Minnow	Threatened	Rock River	Darien Creek Ladd Creek Ladd Creek-West Branch Little Turtle Creek Unnamed Turtle Creek tributary
Lake Chubsucker	Special concern	Des Plaines River	Benet Lake-Lake Shangrila Brighton Creek George Lake Hooker Lake Montgomery Lake Paddock Lake Lower Pleasant Prairie Ditch
		Fox River	Benedict Lake Lake Beulah Brock Lake Camp Lake Center Lake Cross Lake Lake Denoon Dyer Lake Eagle Spring Lake Elizabeth Lake Fox River Genesee Creek Honey Creek Leda Lake (Frieda Lake) Lulu Lake Marie Lake (Lake Mary) Mill Lake Mukwonago River Muskego Creek Nippersink Creek-East Branch Peterson Creek Pewaukee Lake Lower Phantom Lake Upper Phantom Lake Pleasant Lake Rock Lake

Table 86 (continued)

Species	Status	Watershed(s)	Surface Water(s)
Lake Chubsucker (continued)			Rockland Lake Silver Lake Spring Creek Spring Valley Creek (Ivanhoe Creek) Tombeau Lake Unnamed stream Unnamed ditch Voltz Lake Waubeesee Lake
		Milwaukee River	Cedar Creek Cedar Creek-North Branch Gilbert Lake Hasmer Lake Tilly Lake
		Rock River	Bark River Beaver Lake Crooked Lake Golden Lake Mason Creek Lower Nemahbin Lake Oconomowoc Lake Oconomowoc River Okauchee Lake Ottawa Lake Pine Lake Scuppernong Creek Scuppernong River Tripp Lake Turtle Creek Turtle Lake
		Root River	Root River Canal-West Branch Tess Corners Creek
Pugnose Minnow	Special concern	Fox River	Bassett Creek Camp Lake Mukwonago River Tichigan Lake Wind Lake
American Eel	Special concern	Rock River	Cravath Lake
Least Darter	Special concern	Des Plaines River	Paddock Lake
		Fox River	Benedict Lake Lake Beulah Fox River Geneva Lake Long Lake (Kee Nong Go Mong Lake) Mukwonago River Nippersink Creek-East Branch Rock Lake Sugar Creek White River

Table 86 (continued)

Species	Status	Watershed(s)	Surface Water(s)
Least Darter (continued)		Milwaukee River	Cedar Creek-North Branch Green Lake Mole Creek Silver Creek Silver Lake Wallace Creek
		Pike River	Sorenson Creek
		Rock River	Ashippun Lake Ashippun River Bark River Crooked Lake Darien Creek Upper Genesee Lake Limestone Creek Moose Lake Lower Nashotah Lake Upper Nashotah Lake Lower Nemahbin Lake Upper Nemahbin Lake Oconomowoc Lake Pike Lake Pike River Rock River-East Branch Rubicon River Scuppernong River Whitewater Creek
Lake Herring	Special concern	Fox River	Geneva Lake Pine Lake
Pirate Perch	Special concern	Des Plaines River	Brighton Creek Center Creek Des Plaines River Jerome Creek Kilbourn Road Ditch Pleasant Prairie Ditch Salem Branch

Source: Wisconsin Department of Natural Resources; George C. Becker, Fishes of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1983; local naturalists; and SEWRPC.

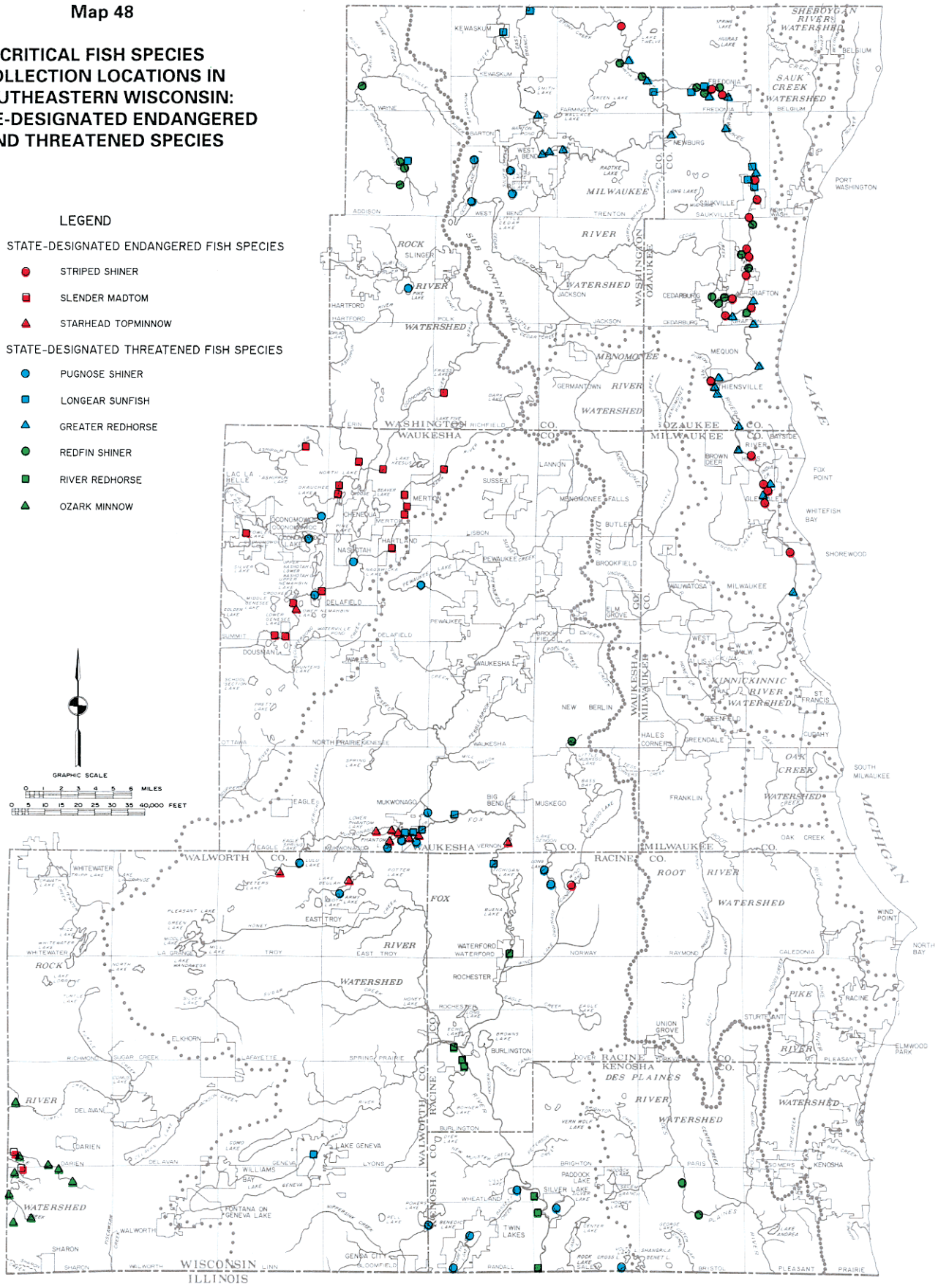
considered include the quality and size of buffer along water bodies, modifications to river channels such as ditching and straightening, and structures which may impede the movement of fish. The most important factor considered was the presence or absence of critical fish species.

The identification and delineation of critical aquatic habitats for fish in the Region's lakes was based almost entirely on the presence or absence of critical fish species. However, in some cases, lakes were chosen for critical fish habitat because there was a direct hydrological link to other critical habitat waters.

The rivers, streams, and lakes of the Region containing critical fish habitat were identified and delineated as aquatic habitats either 1) containing endangered or threatened, and in some cases "special concern," fish species habitat, or 2) containing only "special concern" fish species habitat. Stream-mile lengths were determined for each of the critical

Map 48

CRITICAL FISH SPECIES COLLECTION LOCATIONS IN SOUTHEASTERN WISCONSIN: STATE-DESIGNATED ENDANGERED AND THREATENED SPECIES

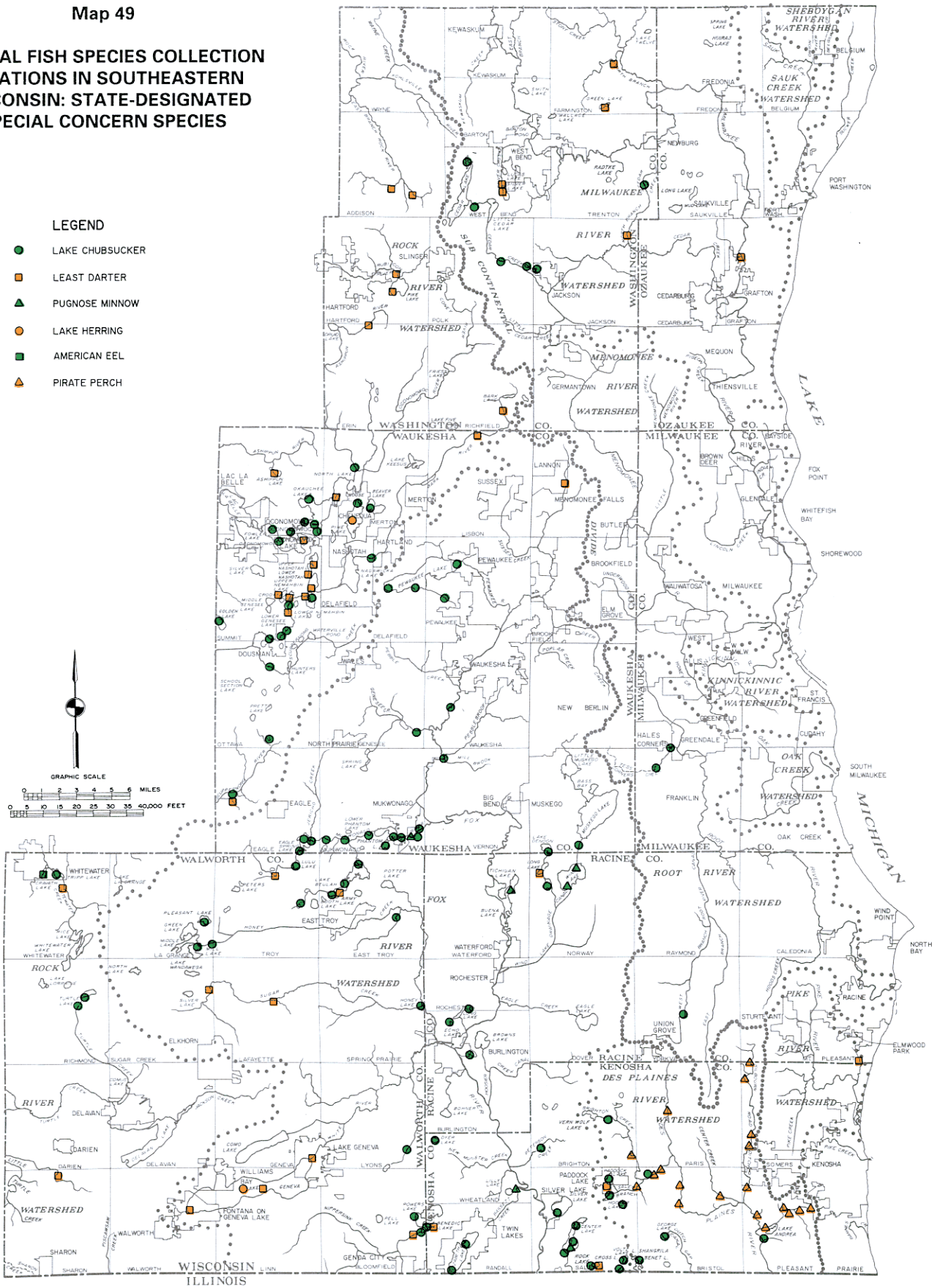


This map displays the distribution of State-designated endangered and threatened fish species collected from the inland waters of Southeastern Wisconsin.

Source: Wisconsin Department of Natural Resources; George C. Becker, Fishes of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1983; local naturalists; and SEWRPC.

Map 49

CRITICAL FISH SPECIES COLLECTION LOCATIONS IN SOUTHEASTERN WISCONSIN: STATE-DESIGNATED SPECIAL CONCERN SPECIES

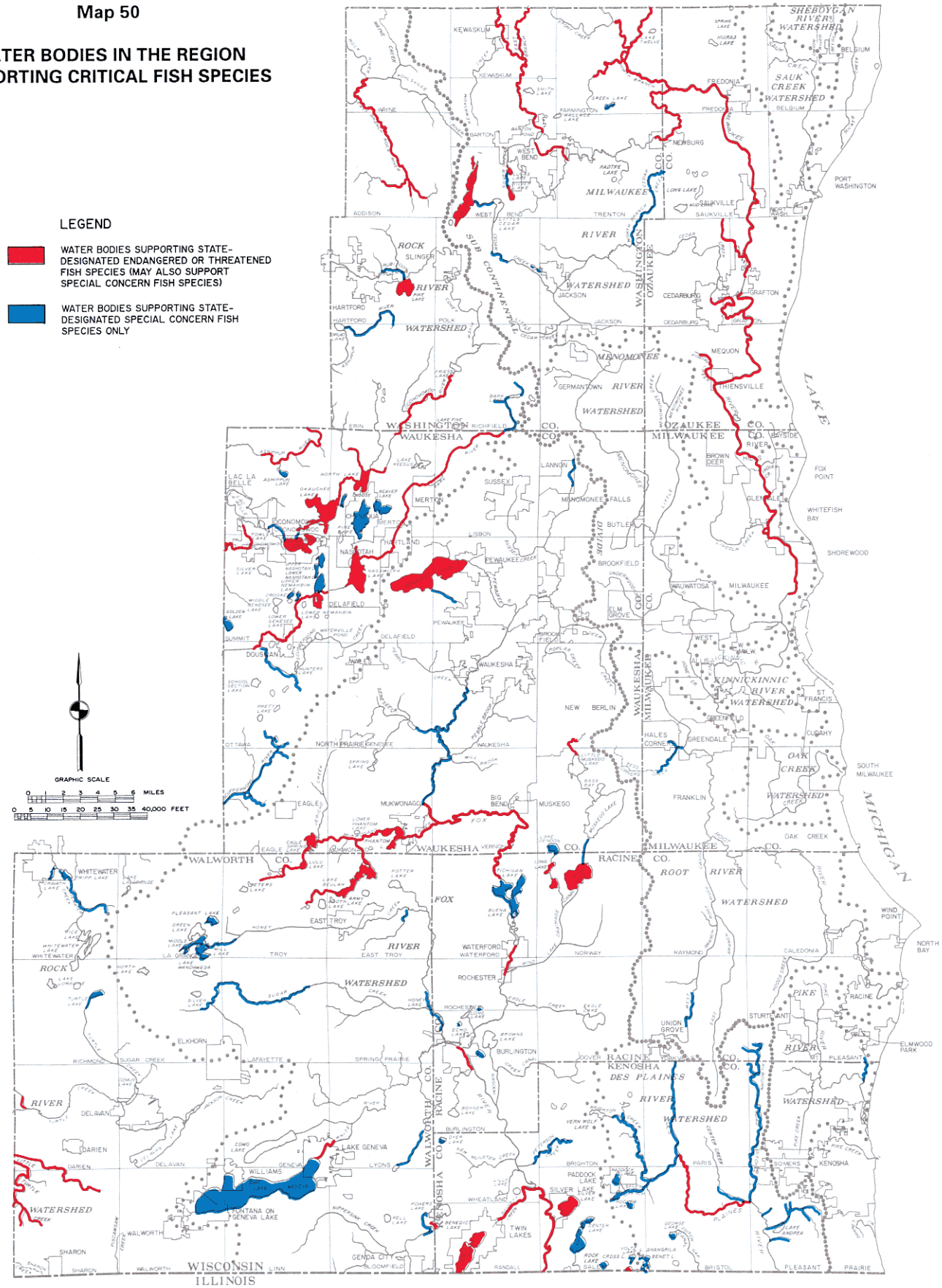


This map displays the distribution of State-designated "special concern" fish species collected from the inland waters of Southeastern Wisconsin.

Source: Wisconsin Department of Natural Resources; George C. Becker, Fishes of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1983; local naturalists; and SEWRPC.

Map 50

WATER BODIES IN THE REGION SUPPORTING CRITICAL FISH SPECIES



The delineation of water bodies in the Region supporting critical fish species is based on known distributions of critical fish species (see Maps 48 and 49) and other available information regarding the physical characteristics of the waters involved.

Source: Wisconsin Department of Natural Resources; Wisconsin Herpetological Atlas Project; George C. Becker, Fishes of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1983; Harold A. Mathiak, A River Survey of the Unionid Mussels of Wisconsin: 1973-1977, Sand Shell Press, Horicon, Wisconsin, 1979; local naturalists; and SEWRPC.

stream reaches involved. Tables 87 through 93 show critical fish habitat by stream-miles and the critical species found in those stream reaches for each county of the Region. Tables 94 through 98 list critical fish habitat by lake acreage and the critical fish species found in each of those habitats for each county of the Region involved.

TROUT STREAMS OF SOUTHEASTERN WISCONSIN

Streams capable of supporting trout species are typically cold, well oxygenated, and low in siltation. In Southeastern Wisconsin, this habitat type is generally found near the headwaters of relatively small streams in which upwelling of groundwater occurs. Much of the trout habitat in the Region has been degraded due to siltation, decreased groundwater flows, channelization, increased water temperature due to impoundment, and degradation of stream buffer area, including filling of wetlands and removal of vegetation. In spite of these circumstances, some streams in the Region do support trout species, mostly due to such management activities as stocking and habitat enhancement.

Three trout species are currently managed by the Wisconsin Department of Natural Resources in Southeastern Wisconsin streams. These include the brook trout (Salvelinus fontinalis), the brown trout (Salmo trutta), and the rainbow trout (Salmo gairdneri). The brook trout, the only regionally native trout species found in streams, is also the most sensitive to habitat degradation. Therefore, the presence of a viable brook trout population is indicative of high-quality stream conditions. The brown trout, an introduced and more tolerant species, has been known to replace the brook trout as stream conditions deteriorate. Finally, the rainbow trout, also an introduced species, generally requires annual stocking to maintain populations.

Wisconsin trout streams have been categorized into three classes for management purposes.[13] Class I trout streams contain high-quality habitat for trout. These streams contain intact spawning grounds, adequate food sources, and water quality excellent for sustaining trout populations. In these streams, stocking of hatchery trout is not required. Class II trout streams contain adequate food sources and living space, but not enough natural reproduction to utilize available resources. Therefore, some stocking of hatchery trout is needed in such streams. Class III trout streams have marginal trout habitat. Annual stocking is required in such streams, since they have no natural reproduction and little or no carry-over from year to year.

The Wisconsin Department of Natural Resources staff has delineated known trout streams that occur in the Region. These streams are shown on Map 51. A number of the trout streams, such as Genesee Creek and Bluff Creek, have been listed as trout streams in Wisconsin Department of Natural Resources publications while others have not been officially designated because, until recently, they were not known to contain trout or trout habitat.

MUSSEL SPECIES OF SOUTHEASTERN WISCONSIN

Twenty mussel species have been collected from Southeastern Wisconsin waters since the early 1970s (see Table 99). Of that total, six mussel species have been identified by the Wisconsin Department of Natural Resources as being endangered, threatened, or of special concern. Specifically, these include one endangered mussel species, the rainbow shell (Villosa iris iris); three threatened mussel species, the slippershell (Alasmidonta viridis), salamander mussel (Simpsonaias ambigua), and ellipse (Venustaconcha ellipsiformis ellipsiformis); and two "special concern" mussel species, the elktoe (Alasmidonta marginata) and creek heelsplitter (Lasmigona compressa). A total of 14 other mussel species were found in the Region and include the mucket (Actinonaias carinata), threeridge (Amblema plicata), floater (Anodonta grandis), cylindrical paper shell (Anodontoides ferussacianus), Liliput (Carunculina parva), spike (Elliptio dilatatus), Wabash pig toe (Fusconaia flava), fat mucket (Lampsilis radiata siliquoidea), pocketbook (Lampsilis ventricosa), white heelsplitter (Lasmigona complanata), fluted shell (Lasmigona costata), Ohio River pig toe (Pleurobema cordatum), pimple back (Quadrula pustulosa), and squaw foot (Strophitus undulatus).

The occurrence records of mussel species in Southeastern Wisconsin are based upon the latest comprehensive mussel survey for the State of

[13] *Wisconsin Department of Natural Resources, Wisconsin Trout Streams, [Wisconsin] Department of Natural Resources, Madison, Wisconsin, [1980].*

Table 87

KENOSHA COUNTY STREAM REACHES CONTAINING CRITICAL FISH SPECIES

Stream Reaches Containing Endangered or Threatened Species Habitat and Which May Contain Special Concern Species Habitat							
Watershed	Stream	Downstream Extent	Upstream Extent	Critical Stream-Miles	Critical Species	Occurrences	State Status
Des Plaines River	Des Plaines River	Mouth of Kilbourn Road Ditch (T1N, R22E, SW ¼ Section 7)	Mouth of Brighton Creek (T2N, R21E, SW ¼ Section 33)	7.5	Redfin shiner Pirate perch	2 2	Threatened Special concern
Fox River	Bassett Creek	Mouth of Bassett Creek (T1N, R19E, NW ¼ Section 12)	CTH F (T1N, R19E, SE ¼ Section 15)	3.0	Pugnose shiner Pugnose minnow	1 1	Threatened Special concern
	Fox River	Wisconsin-Illinois state line (T1N, R20E, SW ¼ Section 31)	STH 50-STH 83 (T1N, R19E, NW ¼ Section 1)	8.9	River redhorse	3	Threatened
Total Stream-Miles	--	--	--	19.4	--	--	--

Stream Reaches Containing Only Special Concern Species Habitat							
Watershed	Stream	Downstream Extent	Upstream Extent	Critical Stream-Miles	Critical Species	Occurrences	State Status
Des Plaines River	Brighton Creek	Mouth (T2N, R21E, SW ¼ Section 33)	18th Street (T2N, R20E, NE ¼ Section 23); 240th Avenue (T2N, R20E, NW ¼ Section 23)	8.9	Pirate perch Lake chubsucker	3 2	Special concern Special concern
	Center Creek	Mouth (T1N, R21E, SE ¼ Section 12)	STH 50 (T1N, R21E, NW ¼ Section 11)	1.9	Pirate perch	1	Special concern
	Des Plaines River	Mouth of Brighton Creek (T2N, R21E, SW ¼ Section 33)	CTH KR (T2N, R21E, NE ¼ Section 5)	5.9	Pirate perch	1	Special concern
	Jerome Creek	Mouth (T1N, R22E, NE ¼ Section 19)	Bain Station Road (T1N, R22E, SW ¼ Section 9); CTH T (T1N, R22E, SE ¼ Section 15); 89th Street (T1N, R22E, NW ¼ Section 14)	5.7	Pirate perch	5	Special concern
	Kilbourn Road Ditch	Mouth (T1N, R22E, SW ¼ Section 7)	Kenosha-Racine county line (T2N, R22E, NE ¼ Section 6)	10.0	Pirate perch	4	Special concern
	Lower Pleasant Prairie Ditch	Mouth (T1N, R22E, SW ¼ Section 20)	T1N, R22E, SE ¼ Section 20	0.8	Lake chubsucker	1	Special concern
	Pleasant Prairie Ditch	Mouth (T1N, R22E, SE ¼ Section 18)	T1N, R22E, SW ¼ of NW ¼ Section 17	0.5	Pirate perch	1	Special concern
	Salem Branch	Mouth (T1N, R21E, SW ¼ Section 6)	Hooker Lake (T1N, R20E, NE ¼ Section 11)	2.1	Pirate perch	1	Special concern
Fox River	Peterson Creek	T2N, R19E, E ½ Section 29	T2N, R20E, E ½ Section 29	3.2	Lake chubsucker	1	Special concern
Pike River	Sorenson Creek	Mouth (T2N, R23E, SE ¼ Section 6)	Kenosha-Racine county line (T2N, R23E, NE ¼ Section 6)	1.2	No records[a]	--	--
Total Stream-Miles	--	--	--	40.2	--	--	--

[a] *Least darter collected immediately north of the Kenosha Racine county line.*

Source: Wisconsin Department of Natural Resources; George C. Becker, Fishes of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1983; local naturalists; and SEWRPC.

Table 88

MILWAUKEE COUNTY STREAM REACHES CONTAINING CRITICAL FISH SPECIES

Stream Reaches Containing Endangered or Threatened Species Habitat and Which May Contain Special Concern Species Habitat							
Watershed	Stream	Downstream Extent	Upstream Extent	Critical Stream-Miles	Critical Species	Occurrences	State Status
Milwaukee River	Milwaukee River	N. Humboldt Avenue (T7N, R22E, NW ¼ Section 21)	Milwaukee-Ozaukee county line (T8N, R21E, NW ¼ Section 1)	12.7	Striped shiner Greater redhorse	5 4	Endangered Threatened
Total Stream-Miles	--	--	--	12.7	--	--	--

Stream Reaches Containing Only Special Concern Species Habitat							
Watershed	Stream	Downstream Extent	Upstream Extent	Critical Stream-Miles	Critical Species	Occurrences	State Status
Root River	Tess Corners Creek	Mouth (T5N, R21E, NW ¼ Section 4)	T5N, R21E, SE ¼ of NE ¼ Section 7; T6N, R21E, NW ¼ of SW ¼ Section 32	3.4	Lake chubsucker	2	Special concern
Total Stream-Miles	--	--	--	3.4	--	--	--

Source: Wisconsin Department of Natural Resources; George C. Becker, Fishes of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1983; local naturalists; and SEWRPC.

Table 89

OZAUKEE COUNTY STREAM REACHES CONTAINING CRITICAL FISH SPECIES

Stream Reaches Containing Endangered or Threatened Species Habitat and Which May Contain Special Concern Species Habitat							
Watershed	Stream	Downstream Extent	Upstream Extent	Critical Stream-Miles	Critical Species	Occurrences	State Status
Milwaukee River	Cedar Creek	Mouth (T10N, R21E, NE ¼ Section 36)	Dam upstream of Bridge Street (T10N, R21E, SE ¼ of NE ¼ Section 27)	4.7	Striped shiner Greater redhorse Redfin shiner	2 1 3	Endangered Threatened Threatened
	Milwaukee River	Ozaukee-Milwaukee county line (T9N, R21E, SW ¼ Section 36)	Dam at Lime Kiln Park (T10N, R21E, SW ¼ of NE ¼ Section 25)	12.9	Striped shiner Greater redhorse Redfin shiner	1 6 1	Endangered Threatened Threatened
	Milwaukee River	Dam in Grefton (T10N, R21E, NE ¼ Section 24)	Ozaukee-Washington county line (T12N, R21E, SW ¼ Section 30)	17.2	Striped shiner Redfin shiner Longear sunfish Greeter redhorse	7 5 5 4	Endangered Threatened Threatened Threatened
	Milwaukee River	Ozaukee-Washington county line (T12N, R21E, SW ¼ Section 31)	Ozaukee-Washington county line (T11N, R21E, NW ¼ of SW ¼ Section 7)	3.6	Greater redhorse	1	Threatened
	Milwaukee River-North Branch	Mouth (T12N, R21E, NE ¼ of SW ¼ Section 30)	Ozaukee-Washington county line (T12N, R21E, NW ¼ Section 30)	0.7	No records[a]	--	--
	Mole Creek	Mouth (T10N, R21E, NE ¼ Section 13)	Cedar Sauk Road (T10N, R21E, NE ¼ Section 2)	3.0	Striped shiner Redfin shiner Least darter	1 1 1	Endangered Threatened Special concern
	Pigeon Creek	Mouth (T9N, R21E, NW ¼ Section 23)	T9N, R21E, SW ¼ Section 10	2.4	Striped shiner Greater redhorse	1 1	Endangered Threatened
Total Stream-Miles	--	--	--	44.5	--	--	--

[a] *Many records both upstream and downstream of this section exist.*

Source: Wisconsin Department of Natural Resources; George C. Becker, Fishes of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1983; local naturalists; and SEWRPC.

Table 90

RACINE COUNTY STREAM REACHES CONTAINING CRITICAL FISH SPECIES

Stream Reaches Containing Endangered or Threatened Species Habitat and Which May Contain Special Concern Species Habitat							
Watershed	Stream	Downstream Extent	Upstream Extent	Critical Stream-Miles	Critical Species	Occurrences	State Status
Fox River	Fox River	Mouth of Spring Brook (T2N, R19E, NW ¼ Section 4)	Mouth of White River (T3N, R19E, NE ¼ Section 32)	1.2	River redhorse	2	Threatened
	Fox River	Mouth of Wind Lake Drainage Canal (T3N, R19E, SW ¼ Section 2)	Waterford Dam (T4N, R19E, NE ¼ Section 35)	1.7	River redhorse	1	Threatened
	Fox River	Tichigan Lake (T4N, R19E, NE ¼ Section 10)	Racine-Waukesha county line (T4N, R19E, NE ¼ Section 3)	1.9	Longear sunfish	1	Threatened
	White River	Mouth (T3N, R19E, NE ¼ Section 32)	Echo Lake Dam (T3N, R19E, NE ¼ Section 32)	0.2	River redhorse	1	Threatened
Total Stream-Miles	--	--	--	5.0	--	--	--

Stream Reaches Containing Only Special Concern Species Habitat							
Watershed	Stream	Downstream Extent	Upstream Extent	Critical Stream-Miles	Critical Species	Occurrences	State Status
Des Plaines River	Kilbourn Road Ditch	Racine-Kenosha county line (T3N, R22E, SE ¼ Section 31)	T3N, R22E, Section 30; T3N, R21E, Section 36	2.1	Pirate perch	1	Special concern
Fox River	Honey Creek	Spring Prairie Road (T3N, R19E, SE ¼ Section 19)	Racine-Walworth county line (T3N, R19E, SW ¼ Section 18)	1.8	No records[a]	--	--
	Muskego Creek	Wind Lake (T4N, R20E, SE ¼ Section 4)	Racine-Waukesha county line (T4N, R20E, NE ¼ Section 4)	0.6	No records[b]	--	--
Pike River	Sorenson Creek	Racine-Kenosha county line (T3N, R23E, SE ¼ of SE ¼ Section 31)	T3N, R23E, NW ¼ of SE ¼ Section 31	0.5	Least darter	1	Special concern
Root River	Root River Canal-West Branch	CTH A (T3N, R21E, SE ¼ Section 16)	5Bth Road (T3N, R21E, SE ¼ Section 21)	2.5	Lake chubsucker	1	Special concern
Total Stream-Miles	--	--	--	7.5	--	--	--

[a] *Lake chubsucker collected immediately west of Racine-Walworth county line.*

[b] *Lake chubsucker collected immediately north of Racine-Waukesha county line.*

Source: Wisconsin Department of Natural Resources; George C. Becker, Fishes of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1983; local naturalists; and SEWRPC.

Wisconsin, completed by Mr. Harold A. Mathiak,[14] and the use of the Commission's 1990 large-scale aerial photography to ensure that the collection sites have not been altered since the time of that survey. The other data sources for mussel occurrences in Southeastern Wisconsin include the files prepared by the Bureau of Endangered Resources of the Wisconsin Department of Natural Resources. Map 52 displays the location of collection sites which were sampled by Mathiak in Southeastern Wisconsin. Using Mathiak's distribution maps for each species, Table 99, which lists the respective watersheds and streams in which each species occurs, was developed. However, other undocumented mussel beds may well exist in the Region.

[14] *Harold A. Mathiak, A River Survey of the Unionid Mussels of Wisconsin: 1973-1977, Sand Shell Press, Horicon, Wisconsin, 1979.*

Table 91

WALWORTH COUNTY STREAM REACHES CONTAINING CRITICAL FISH SPECIES

Stream Reaches Containing Endangered or Threatened Species Habitat and Which May Contain Special Concern Species Habitat							
Watershed	Stream	Downstream Extent	Upstream Extent	Critical Stream-Miles	Critical Species	Occurrences	State Status
Fox River	Mukwonago River	Lulu Lake (T4N, R17E, SE ¼ Section 2)	T4N, R17E, NW ¼ of SE ¼ Section 9	3.0	Starhead topminnow	1	Endangered
					Least darter	1	Special concern
	Mukwonago River	Walworth-Waukesha county line (T4N, R17E, NE ¼ Section 2)	Lulu Lake (T4N, R17E, NE ¼ Section 2)	0.4	No records[a]	--	--
	Mukwonago River-unnamed tributary	Walworth-Waukesha county line (T4N, R18E, NW ¼ Section 4)	Lake Beulah (T4N, R18E, NW ¼ Section 4)	0.3	No records[a]	--	--
	Unnamed stream (drains into Pickerel Lake)	Pickerel Lake (T4N, R17E, NW ¼ Section 13)	Unnamed pond (T4N, R17E, SE ¼ Section 14)	0.9	Lake chubsucker[b]	1	Special concern
	Unnamed stream	Lake Beulah (T4N, R18E, NW ¼ Section 18)	Pickerel Lake (T4N, R17E, NW ¼ Section 13)	1.1	No records[b]	--	--
	White River	USH 12 (T2N, R18E, SW ¼ Section 30)	Geneva Lake (T2N, R17E, SW ¼ Section 36)	1.7	Longear sunfish	1	Threatened
					Least darter	1	Special concern
Rock River	Darien Creek	Walworth-Rock county line (T2N, R15E, NW ¼ Section 31)	CTH K (T1N, R15E, NE ¼ Section 11)	6.5	Slender madtom	1	Endangered
					Ozark minnow	4	Threatened
					Least darter	1	Special concern
	Ladd Creek	Mouth (T1N, R15E, SW ¼ Section 7)	CTH B (T1N, R15E, SE ¼ Section 17)	2.1	Ozark minnow	1	Threatened
	Ladd Creek-West Branch	Mouth (T1N, R15E, NE ¼ Section 18)	CTH B (T1N, R15E, SW ¼ Section 18)	1.2	Ozark minnow	1	Threatened
	Little Turtle Creek	Walworth-Rock county line (T1N, R15E, NW ¼ Section 18)	Walworth-Rock county line (T2N, R15E, NW ¼ Section 31)	5.7	Slender madtom	1	Endangered
					Ozark minnow	2	Threatened
	Turtle Creek-unnamed tributery	Mouth (T2N, R15E, SE ¼ of NE ¼ Section 18)	Christie Road (T2N, R15E, SW ¼ of SE ¼ Section 7)	0.8	Ozark minnow	1	Threatened
Total Stream-Miles	--	--	--	23.7	--	--	--

Stream Reaches Containing Only Special Concern Species Habitat							
Watershed	Stream	Downstream Extent	Upstream Extent	Critical Stream-Miles	Critical Species	Occurrences	State Status
Fox River	Honey Creek	Walworth-Racine county line (T3N, R18E, SE ¼ Section 13)	T3N, R18E, SE ¼ of SE ¼ Section 12	0.9	Lake chubsucker	1	Special concern
	Honey Creek	T4N, R17E, SW ¼ of SW ¼ Section 29	STH 67 (T4N, R16E, NW ¼ Section 36)	2.0	Lake chubsucker	1	Special concern
	Nippersink Creek-East Branch	USH 12 (T1N, R18E, SW ¼ Section 24)	Tombeau Lake (T1N, R18E, SE ¼ Section 24)	0.2	Least darter	1	Special concern
	Nippersink Creek-East Branch	Tombeau Lake (T1N, R18E, NE ¼ Section 24)	Powers Lake (T1N, R18E, SE ¼ Section 13)	1.5	Lake chubsucker	1	Special concern
	Spring Creek	Mouth (T4N, R18E, NE ¼ Section 23)	STH 20 (T4N, R18E, SW ¼ Section 23)	0.6	Lake chubsucker	1	Special concern
	Spring Valley Creek (Ivanhoe Creek)	Lake Ivanhoe (T2N, R18E, SW ¼ Section 35)	T2N, R18E, S ½ Section 24	3.0	Lake chubsucker	1	Special concern
	Sugar Creek	CTH N (T3N, R17E, SW ¼ Section 12)	Foster Road (T3N, R16E, SW ¼ Section 13)	9.8	Least darter	2	Special concern
Stream Reaches Containing Only Special Concern Species Habitat							
Watershed	Stream	Downstream Extent	Upstream Extent	Critical Stream-Miles	Critical Species	Occurrences	State Status
Rock River	Turtle Creek	Turtle Lake Road (T3N, R15E, SE ¼ of NW ¼ Section 14)	Turtle Lake (T3N, R15E, NE ¼ Section 14)	0.2	Lake chubsucker	1	Special concern
	Whitewater Creek	Tripp Lake (T4N, R15E, NW ¼ Section 10)	T4N, R15E, NW ¼ Section 24	3.8	Least darter	1	Special concern
Total Stream-Miles	--	--	--	22.0	--	--	--

[a] *Records for critical species exist both upstream and downstream of this reach.*

[b] *Records for critical species exist downstream of this reach, which has an excellent buffer.*

Source: Wisconsin Department of Natural Resources; George C. Becker, Fishes of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1983; local naturalists; and SEWRPC.

Table 92

WASHINGTON COUNTY STREAM REACHES CONTAINING CRITICAL FISH SPECIES

Stream Reaches Containing Endangered or Threatened Species Habitat and Which May Contain Special Concern Species Habitat							
Watershed	Stream	Downstream Extent	Upstream Extent	Critical Stream-Miles	Critical Species	Occurrences	State Status
Milwaukee River	Milwaukee River	Washington-Ozaukee county line (T12N, R20E, SE ¼ Section 25)	Washington-Ozaukee county line (T12N, R20E, SE ¼ Section 36)	2.1	Longear sunfish	1	Threatened
	Milwaukee River	Washington-Ozaukee county line (T11N, R20E, SE ¼ Section 12)	Dam in Village of Newburg (T11N, R20E, NE ¼ Section 12)	0.6	No records[a]	--	--
	Milwaukee River	T11N, R20E, SE ¼ Section 18	Dam just north of STH 33 (T11N, R19E, SE ¼ Section 11)	3.1	Greater redhorse	3	Threatened
	Milwaukee River	Dam in City of West Bend (T11N, R19E, SE ¼ of SE ¼ Section 2)	Washington-Fond du Lac county line (T12N, R19E, NE ¼ Section 4)	11.5	Greater redhorse Longear sunfish	1 1	Threatened Threatened
	Milwaukee River-East Branch	Mouth (T12N, R19E, SW ¼ Section 14)	Washington-Fond du Lac county line (T12N, R19E, NE ¼ Section 2)	4.2	Longear sunfish	1	Threatened
	Milwaukee River-North Branch	Washington-Ozaukee county line (T12N, R20E, NE ¼ Section 25)	Washington-Sheboygan county line (T12N, R20E, NW ¼ Section 1)	7.3	Greater redhorse Redfin shiner	2 1	Threatened Threatened
	Stony Creek	Mouth (T12N, R20E, NW ¼ Section 14)	Boltonville Road (T12N, R20E, NW ¼ Section 10)	3.2	Striped shiner	1	Endangered
	Wallace Creek	Mouth (T12N, R20E, SW ¼ Section 14)	Shalom Drive (T12N, R20E, SW ¼ Section 21)	4.0	Redfin shiner Least darter	1 1	Threatened Special concern
Rock River	Limestone Creek	Mouth (T11N, R18E, SW ¼ of SE ¼ Section 22)	Crooked Road (T11N, R18E, NW ¼ of NW ¼ Section 28)	2.3	Redfin shiner Least darter	1 1	Threatened Special concern
	Oconomowoc River	Washington-Waukesha county line (T9N, R18E, SW ¼ Section 35)	Little Friess Lake (T9N, R19E, SW ¼ Section 17)	5.8	Slender madtom	1	Endangered
	Rock River-East Branch	Mouth of Kohlsville River (T12N, R18E, NW ¼ Section 29)	T11N, R18E, SE ¼ Section 27; T11N, R18E, SW ¼ of SE ¼ Section 26	12.0	Longear sunfish Redfin shiner Least darter	1 3 1	Threatened Threatened Special concern
Total Stream-Miles	--	--	--	56.1	--	--	--

Stream Reaches Containing Only Special Concern Species Habitat							
Watershed	Stream	Downstream Extent	Upstream Extent	Critical Stream-Miles	Critical Species	Occurrences	State Status
Milwaukee River	Cedar Creek	Schweitzer Dam (T10N, R19E, NW ¼ Section 14)	CTH C (T10N, R19E, SW ¼ Section 10)	1.3	Lake chubsucker	1	Special concern
	Cedar Creek	Little Cedar Lake (T11N, R19E, NW ¼ Section 33)	Big Cedar Lake (T11N, R19E, NW ¼ Section 32)	1.2	Lake chubsucker	1	Special concern
	Cedar Creek-North Branch	Mouth (T10N, R20E, NW ¼ Section 12)	CTH Y (T11N, R20E, NE ¼ Section 24)	6.9	Lake chubsucker Least darter	1 1	Special concern Special concern
	Silver Creek	Paradise Valley Lake (T11N, R19E, NW ¼ Section 27)	Silver Lake (T11N, R19E, NW ¼ Section 27)	0.2	Least darter	1	Special concern
	Silver Creek	Lucas Lake (T11N, R19E, SW ¼ Section 22)	Paradise Valley Lake (T11N, R19E, SW ¼ Section 22)	0.3	No records[a]	--	--
Stream Reaches Containing Only Special Concern Species Habitat							
Watershed	Stream	Downstream Extent	Upstream Extent	Critical Stream-Miles	Critical Species	Occurrences	State Status
Rock River	Ashippun River	Druid Lake (T9N, R18E, NE ¼ Section 6)	T10N, R18E, SE ¼ Section 34	4.3	Least darter	1	Special concern
	Bark River	Washington-Waukesha county line (T9N, R19E, SW ¼ Section 35)	Bark Lake (T9N, R19E, NW ¼ Section 26; T9N, R19E, NW ¼ Section 27)	3.4	Least darter	1	Special concern
	Rubicon River	T10N, R18E, NW ¼ of NW ¼ Section 22	STH 60 (T10N, R18E, NW ¼ Section 23)	1.9	Least darter	1	Special concern
Total Stream-Miles	--	--	--	19.5	--	--	--

[a] *Least darter records exist immediately upstream.*

Source: Wisconsin Department of Natural Resources; George C. Becker, Fishes of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1983; local naturalists; and SEWRPC.

Table 93

WAUKESHA COUNTY STREAM REACHES CONTAINING CRITICAL FISH SPECIES

Stream Reaches Containing Endangered or Threatened Species Habitat and Which May Contain Special Concern Species Habitat							
Watershed	Stream	Downstream Extent	Upstream Extent	Critical Stream-Miles	Critical Species	Occurrences	State Status
Fox River	Fox River	Waukesha-Racine county line (T5N, R19E, SE ¼ Section 34)	T5N, R18E, SE ¼ Section 13	12.7	Starhead topminnow	1	Endangered
					Longear sunfish	1	Threatened
					Pugnose shiner	1	Threatened
	Mukwonago River	Eagle Spring Lake (T5N, R17E, SE ¼ Section 35)	Waukesha-Walworth county line (T5N, R18E, SE ¼ Section 35)	0.2	No records[a]	--	--
	Mukwonago River	Lower Phantom Lake (T5N, R18E, SW ¼ Section 27)	Eagle Spring Lake (T5N, R17E, NW ¼ Section 36)	7.9	Starhead topminnow	1	Endangered
					Lake chubsucker	4	Special concern
	Mukwonago River	Mouth (T5N, R19E, NW ¼ Section 30)	Lower Phantom Lake (T5N, R18E, SE ¼ Section 26)	2.3	Starhead topminnow	2	Endangered
					Pugnose shiner	2	Threatened
					Longear sunfish	3	Threatened
					Lake chubsucker	3	Special concern
					Pugnose minnow	1	Special concern
	Mukwonago River-unnamed tributary	Mouth (T5N, R18E, NE ¼ Section 32)	Waukesha-Walworth county line (T5N, R18E, SW ¼ Section 33)	0.9	No records[a]	--	--
	Muskego Creek	Little Muskego Lake (T5N, R20E, NW ¼ Section 4)	T6N, R20E, NE ¼ of SW ¼ Section 33	1.3	Redfin shiner	1	Threatened
Rock River	Ashippun River	Dam at Monterey (T8N, R17E, SW ¼ Section 9)	Waukesha-Dodge county line (T8N, R17E, NE ¼ Section 2)	6.8	Slender madtom	1	Endangered
	Bark River	T6N, R17E, NE ¼ Section 5	Dam (T7N, R18E, NW ¼ Section 19)	9.0	Starhead topminnow	1	Endangered
					Slender madtom	4	Endangered
					Lake chubsucker	4	Special concern
					Leest darter	2	Special concern
	Bark River	Nagawicka Lake (T7N, R18E, NE ¼ Section 8)	Merton Mill Pond (T8N, R18E, SE ¼ Section 13)	8.2	Slender madtom	4	Endangered
					Pugnose shiner	--[b]	Threatened
					Lake chubsucker	1	Special concern
	Bark River	T8N, R18E, SE ¼ Section 13	Waukesha-Washington county line (T8N, R19E, NW ¼ Section 2)	5.3	Slender madtom	1	Endangered
					Least darter	1	Special concern
	Mason Creek	North Lake (T8N, R18E, NE ¼ Section 17)	West Shore Drive (T8N, R18E, NW ¼ Section 8)	1.9	Slender madtom	1	Endangered
					Lake chubsucker	1	Special concern
	Oconomowoc River	Waukesha-Jefferson county line (T7N, R17E, SW ¼ Section 6)	2nd Street (T8N, R17E, SW ¼ Section 32)	4.2	Slender madtom	1	Endangered
	Oconomowoc River	Okeuchee Lake (T8N, R18E, SE ¼ Section 19)	North Lake (T8N, R18E, SE ¼ Section 17)	1.8	Slender madtom	2	Endangered
	Oconomowoc River	North Lake (T8N, R18E, NW ¼ Section 16)	Dam (T8N, R18E, NW ¼ Section 15)	1.1	Slender madtom	1	Endangered
	Oconomowoc River	Dam in Monches (T8N, R18E, NE ¼ Section 3)	Waukesha-Washington county line (T8N, R18E, NW ¼ Section 2)	0.3	No records[c]	--	--
Total Stream-Miles	--	--	--	63.9	--	--	--

Table 93 (continued)

Stream Reaches Containing Only Special Concern Species Habitat							
Watershed	Stream	Downstream Extent	Upstream Extent	Critical Stream-Miles	Critical Species	Occurrences	State Status
Fox River	Fox River	T5N, R18E, SE ¼ Section 13	STH 59 (T6N, R19E, SW ¼ Section 16)	11.0	Lake chubsucker	2	Special concern
	Fox River	CTH W (T8N, R20E, NE ¼ of NE ¼ Section 20)	Menomonee Avenue (T8N, R20E, NW ¼ of SW ¼ Section 9)	2.8	Least darter	1	Special concern
	Genesee Creek	Mouth (T6N, R19E, SW ¼ Section 30)	Mill pond (T6N, R18E, SW ¼ Section 25)	1.1	Lake chubsucker	1	Special concern
	Muskego Creek	Waukesha-Racine county line (T5N, R20E, SE ¼ Section 33)	Big Muskego Lake (T5N, R20E, NE ¼ Section 33)	0.8	Lake chubsucker	1	Special concern
	Unnamed ditch	Pewaukee Lake (T7N, R19E, SW ¼ Section 18)	T7N, R19E, NE ¼ of SW ¼ Section 20	1.5	Lake chubsucker	1	Special concern
Rock River	Oconomowoc River	Fowler Lake (T8N, R17E, SE ¼ Section 33)	Dam below Oconomowoc Lake (T7N, R17E, NE ¼ Section 3)	1.7	Lake chubsucker	1	Special concern
	Oconomowoc River	Oconomowoc Lake (T7N, R17E, NW ¼ Section 2)	Dam below Okauchee Lake (T8N, R17E, NW ¼ of SE ¼ Section 35)	0.4	Lake chubsucker	1	Special concern
	Scuppernong Creek	Mouth (T6N, R17E, NW ¼ Section 4)	Hunter Lake (T6N, R17E, SW ¼ Section 11; T6N, R17E, SE ¼ Section 14)	6.8	Lake chubsucker	1	Special concern
	Scuppernong River	Waukesha-Jefferson county line (T5N, R17E, SW ¼ of SW ¼ Section 18)	T5N, R17E, SE ¼ of SW ¼ Section 16; T5N, R17E, NE ¼ Section 3; T6N, R17E, SE ¼ Section 34; T6N, R17E, SW ¼ of NW ¼ Section 34; T6N, R17E, NW ¼ of NE ¼ Section 33	10.0	Lake chubsucker	2	Special concern
					Least darter	1	Special concern
Total Stream-Miles	--	--	--	36.1	--	--	--

[a] *Records of critical species exist both upstream and downstream of this stream reach.*

[b] *Specific locations of collection (occurrences) were not available.*

[c] *Record of a critical species exists upstream in Washington County.*

Source: Wisconsin Department of Natural Resources; George C. Becker, Fishes of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1983; local naturalists; and SEWRPC.

In the Fox River watershed, six streams were sampled, including the Fox River, Nippersink Creek, the Mukwonago River, the White River, Sugar Creek, and Jerome Creek, as shown on Map 52. The Fox River was sampled at 11 sites, Sites No. 3 through No. 13, where a total of 14 species was collected, including a single threatened species, the slippershell, and a single "special concern" species, the elktoe. Nippersink Creek was sampled at only one site, Site No. 14, but nine species were found there, including a single "special concern" species, the creek heelsplitter. The Mukwonago River was sampled at four sites, Sites No. 20 through No. 23, where seven species were found, including a State-designated endangered species, the rainbow shell; two threatened species, the slippershell and ellipse; and a "special concern" species, the creek heelsplitter. The White River was sampled at three sites, Sites No. 15 through No. 17, where seven species were collected, including the elktoe, a "special concern" species. Both Sugar Creek sample sites, Sites No. 18 and No. 19,

Table 94

KENOSHA COUNTY LAKES CONTAINING CRITICAL FISH SPECIES

Lakes Containing Endangered or Threatened Species Habitat and Which May Contain Special Concern Species Habitat				
Watershed	Lake	Acres	Critical Species	State Status
Fox River	Benedict Lake[a]	58	Pugnose shiner Lake chubsucker Least darter	Threatened Special concern Special concern
	Cross Lake[b]	62	Pugnose shiner Lake chubsucker	Threatened Special concern
	Elizabeth Lake[c]	682	Pugnose shiner Lake chubsucker	Threatened Special concern
	Marie Lake (Lake Mary)	315	Pugnose shiner Lake chubsucker	Threatened Special concern
	Silver Lake	464	Pugnose shiner Lake chubsucker	Threatened Special concern
Total Acres	--	1,581	--	--

Lakes Containing Only Special Concern Species Habitat				
Watershed	Lake	Acres	Critical Species	State Status
Des Plaines River	George Lake	59	Lake chubsucker	Special concern
	Hooker Lake	87	Lake chubsucker	Special concern
	Montgomery Lake	55	Lake chubsucker	Special concern
	Paddock Lake	112	Lake chubsucker Least darter	Special concern Special concern
	Lake Shangrila-Benet Lake[d]	180	Lake chubsucker	Special concern
Fox River	Camp Lake	461	Lake chubsucker Pugnose minnow	Special concern Special concern
	Center Lake	129	Lake chubsucker	Special concern
	Dyer Lake	56	Lake chubsucker	Special concern
	Rock Lake	51	Lake chubsucker Least darter	Special concern Special concern
	Voltz Lake	52	Lake chubsucker	Special concern
Total Acres	--	1,242	--	--

[a] *Does not include 20 acres in Walworth County.*

[b] *Does not include 25 acres in Lake County, Illinois.*

[c] *Does not include 183 acres in McHenry County, Illinois.*

[d] *Does not include six acres in Lake County, Illinois.*

Source: Wisconsin Department of Natural Resources; George C. Becker, Fishes of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1983; local naturalists; and SEWRPC.

Table 95

RACINE COUNTY LAKES CONTAINING CRITICAL FISH SPECIES

Lakes Containing Endangered or Threatened Species Habitat and Which May Contain Special Concern Species Habitat				
Watershed	Lake	Acres	Critical Species	State Status
Fox River	Long Lake (Kee Nong Go Mong Lake)	103	Pugnose shiner Least darter	Threatened Special concern
	Waubeesee Lake	145	Pugnose shiner Lake chubsucker	Threatened Special concern
	Wind Lake	890	Striped shiner Pugnose minnow	Endangered Special concern
Total Acres	--	1,138	--	--

Lakes Containing Only Special Concern Species Habitat				
Watershed	Lake	Acres	Critical Species	State Status
Fox River	Brock Lake	13	Lake chubsucker	Special concern
	Lake Denoon[a]	6	Lake chubsucker	Special concern
	Leda Lake (Frieda Lake)	14	Lake chubsucker	Special concern
	Rockland Lake	46	Lake chubsucker	Special concern
	Tichigan Lake	892	Pugnose minnow	Special concern
Total Acres	--	971	--	--

[a]*Does not include 156 acres in Waukesha County.*

Source: Wisconsin Department of Natural Resources; George C. Becker, Fishes of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1983; local naturalists; and SEWRPC.

contained five species, including a single threatened species, the ellipse. No species were collected from either of the Jerome Creek sites, Sites No. 24 and No. 25.

In the Southeastern Wisconsin portion of the Milwaukee River watershed, the Cedar Creek tributary and the Milwaukee River main stem were sampled for mussel species as shown on Map 52. In the Milwaukee River, at Sites No. 27 through No. 39, a total of 11 species was collected, including two "special concern" species, the elktoe and creek heelsplitter. In Cedar Creek, at Sites No. 40 through No. 42, a total of 10 species was collected, including a single threatened species, the ellipse, and a single "special concern" species, the creek heelsplitter.

Mathiak sampled four streams in the Southeastern Wisconsin portion of the Rock River watershed, including Turtle Creek, the Oconomowoc River, the Ashippun River, and the Bark River, as shown on Map 52. At the Turtle Creek sites, Sites No. 44 through No. 47, a total of 10 species was collected, including the elktoe, a "special concern" species. Nine species were collected from the Oconomowoc River sites, Sites No. 50 through No. 53, including a threatened species, the ellipse, and a "special concern" species, the creek heelsplitter. The Ashippun River sites, Sites No. 54 through No. 58, contained nine mussel species, including the elktoe, a "special concern" species. A total of four species was collected from the Bark River sites, Sites No. 48 and No. 49, including a threatened species, the ellipse. It should also be noted that the salamander mussel, a threatened species, was collected from Oconomowoc Lake.

Within the Des Plaines River watershed, only the main stem of the Des Plaines River was sampled at two sites, Sites No. 1 and No. 2. Three species

Table 96

WALWORTH COUNTY LAKES CONTAINING CRITICAL FISH SPECIES

Lakes Containing Endangered or Threatened Species Habitat and Which May Contain Special Concern Species Habitat				
Watershed	Lake	Acres	Critical Species	State Status
Fox River	Benedict Lake[a]	20	Pugnose shiner Lake chubsucker Least darter	Threatened Special concern Special concern
	Lake Beulah	834	Starhead topminnow Pugnose shiner Lake chubsucker Least darter	Endangered Threatened Special concern Special concern
	Lulu Lake	84	Pugnose shiner Lake chubsucker	Threatened Special concern
	Pickerel Lake	32	No records[b]	--
Total Acres	--	970	--	--

Lakes Containing Only Special Concern Species Habitat				
Watershed	Lake	Acres	Critical Species	State Status
Fox River	Geneva Lake	5,262	Least darter Lake herring	Special concern Special concern
	Middle Lake	259	No records[c]	Special concern
	Mill Lake	271	Lake chubsucker	Special concern
	Pleasant Lake	155	Lake chubsucker	Special concern
	Tombeau Lake	34	Lake chubsucker	Special concern
Rock River	Cravath Lake	65	American eel	Special concern
	Tripp Lake	115	Lake chubsucker	Special concern
	Turtle Lake	140	Lake chubsucker	Special concern
Total Acres	--	6,301	--	--

[a] *Does not include 58 acres in Kenosha County.*

[b] *No records from Lake itself exist, but good potential for critical species exists because critical species were taken both upstream and downstream of the Lake.*

[c] *No records, but connected to Mill Lake, which contains a critical species.*

Source: Wisconsin Department of Natural Resources; George C. Becker, Fishes of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1983; local naturalists; and SEWRPC.

were collected at these sites. None was identified as endangered, threatened, or of special concern.

Similarly, within the Root River watershed, only the main stem of the Root River was sampled. At a total of seven sampling sites, Sites No. 59 through No. 65, three species were collected. None was identified as endangered, threatened, or of special concern.

Within the Pike River watershed, only the main stem of the Pike River was sampled. One site, Site No. 43, was involved, from which only one

Table 97

WASHINGTON COUNTY LAKES CONTAINING CRITICAL FISH SPECIES

Lakes Containing Endangered or Threatened Species Habitat and Which May Contain Special Concern Species Habitat				
Watershed	Lake	Acres	Critical Species	State Status
Milwaukee River	Big Cedar Lake	932	Pugnose shiner	Threatened
	Gilbert Lake	44	Pugnose shiner Lake chubsucker	Threatened Special concern
	Lucas Lake	78	Pugnose shiner	Threatened
	Silver Lake	118	Pugnose shiner Least darter	Threatened Special concern
Rock River	Loew's Lake	22	No records[a]	--
	Pike Lake	522	Pugnose shiner Least darter	Threatened Special concern
Total Acres	--	1,716	--	--

Lakes Containing Only Special Concern Species Habitat				
Watershed	Lake	Acres	Critical Species	State Status
Milwaukee River	Green Lake	71	Least darter	Special concern
	Hasmer Lake	15	Lake chubsucker	Special concern
	Paradise Valley Lake	9	No records[a]	--
	Tilly Lake	15	Lake chubsucker	Special concern
Total Acres	--	110	--	--

[a]*No records from Lake itself exist, but good potential for critical species exists because critical species were taken both upstream and downstream of the Lake.*

Source: Wisconsin Department of Natural Resources; George C. Becker, Fishes of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1983; local naturalists; and SEWRPC.

species, the white heelsplitter, was collected. The white heelsplitter has not been identified in Wisconsin as an endangered, threatened, or "special concern" species.

Within the Sauk Creek watershed, Sauk Creek was sampled at a single site, Site No. 66. No mussel species were collected at this site.

Finally, the Menomonee River main stem, in the Menomonee River watershed, was sampled at only one site, Site No. 26. No mussel species were collected at this site.

Eight stream reaches in Southeastern Wisconsin contained large numbers of mussel species. A total of 14 species of mussels was taken at two sites, Sites No. 12 and No. 20, in an area adjacent to the confluence of the Mukwonago River and Fox River, making it a very species-rich area. Of the 14 mussel species collected from the two sites, five critical species were identified, including one endangered species, the rainbow shell; two threatened species, the slippershell and ellipse; and two "special concern" species, the elktoe and creek heelsplitter. Nippersink Creek, also in the Fox River watershed, was sampled at a single site, Site No. 14, but contained nine species, a relatively large number for one site. Of the nine species collected, a single "special concern" species, the creek heelsplitter, was identified.

In the Milwaukee River watershed, the Milwaukee River main stem and Cedar Creek both had species-rich stream reaches. A total of 10 mussel species was found at four sites, Sites No. 32 through No. 35,

Table 98

WAUKESHA COUNTY LAKES CONTAINING CRITICAL FISH SPECIES

Lakes Containing Endangered or Threatened Species Habitat and Which May Contain Special Concern Species Habitat				
Watershed	Lake	Acres	Critical Species	State Status
Fox River	Eagle Spring Lake	311	Lake chubsucker[a]	Special concern
	Pewaukee Lake	2,493	Pugnose shiner Lake chubsucker	Threatened Special concern
	Lower Phantom Lake	433	Starhead topminnow Lake chubsucker	Endangered Special concern
	Upper Phantom Lake	107	Starhead topminnow Pugnose shiner Lake chubsucker	Endangered Threatened Special concern
Rock River	Nagawicka Lake	957	Pugnose shiner	Threatened
	Lower Nemahbin Lake	271	Pugnose shiner Lake chubsucker Least darter	Threatened Special concern Special concern
	North Lake	437	No records[b]	--
	Oconomowoc Lake	767	Pugnose shiner Lake chubsucker Least darter	Threatened Special concern Special concern
	Okauchee Lake	1,187	Pugnose shiner Lake chubsucker	Threatened Special concern
Total Acres	--	6,963	--	--

Lakes Containing Only Special Concern Species Habitat				
Watershed	Lake	Acres	Critical Species	State Status
Fox River	Lake Denoon[c]	156	Lake chubsucker	Special concern
Rock River	Ashippun Lake	84	Least darter	Special concern
	Beaver Lake	316	Lake chubsucker	Special concern
	Crooked Lake	58	Lake chubsucker Least darter	Special concern Special concern
	Upper Genesee Lake	32	Least darter	Special concern
	Golden Lake[d]	198	Lake chubsucker	Special concern
	Moose Lake	81	Least darter	Special concern
	Lower Nashotah Lake	90	Least darter	Special concern
	Upper Nashotah Lake	133	Least darter	Special concern
	Upper Nemahbin Lake	283	Least darter	Special concern
	Ottawa Lake	26	Lake chubsucker	Special concern
	Pine Lake	703	Lake chubsucker Lake herring	Special concern Special concern
Total Acres	--	2,160	--	--

[a]No records of endangered or threatened species from Eagle Spring Lake exist, but endangered and threatened species have been taken both upstream and downstream of the Lake.

[b]No records from Lake itself exist, but good potential for critical species exists because critical species were taken both upstream and downstream of the Lake.

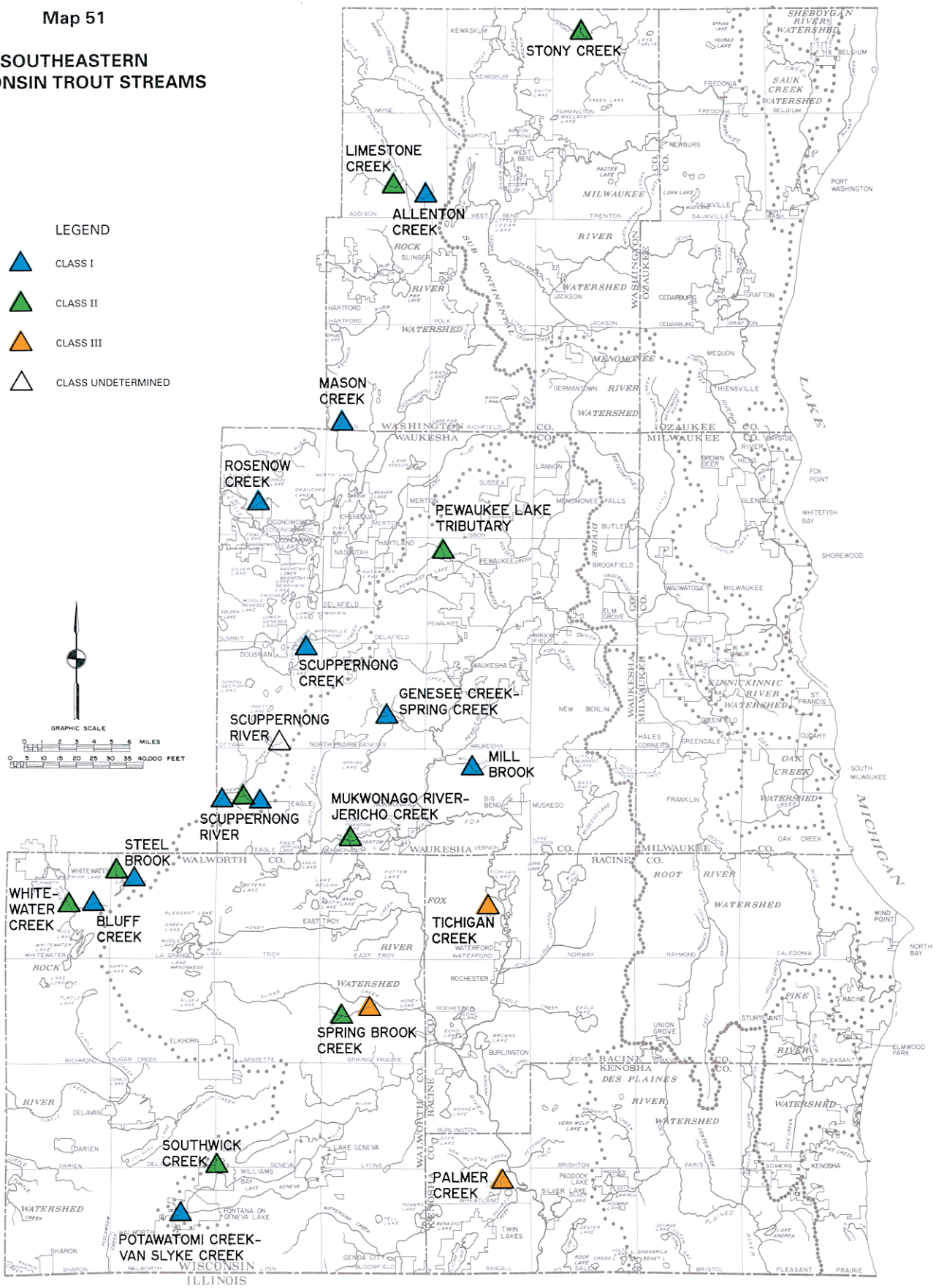
[c]Does not include six acres in Racine County.

[d]Does not include 52 acres in Jefferson County.

Source: Wisconsin Department of Natural Resources; George C. Becker, Fishes of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1983; local naturalists; and SEWRPC.

Map 51

SOUTHEASTERN WISCONSIN TROUT STREAMS



This map identifies the locations of known trout streams in Southeastern Wisconsin. Class I trout streams contain high-quality trout habitat and require no stocking of hatchery trout. Class II trout streams contain adequate food sources and living space, but not enough natural reproduction to utilize available resources. Some stocking of hatchery trout is therefore required in such streams. Class III trout streams contain marginal trout habitat and therefore require annual stocking.

Source: Edward R. Schumacher, Inland Fisheries Supervisor, Wisconsin Department of Natural Resources; Wisconsin Department of Natural Resources, Wisconsin Trout Streams, Wisconsin Department of Natural Resources, Madison, Wisconsin, 1980; and SEWRPC.

Table 99

MUSSEL SPECIES OF SOUTHEASTERN WISCONSIN STREAMS

Species	Common Name	Status[a]	Watershed(s)	Stream(s)
Actinonaias carinata	Mucket	--	Fox River	Fox River
				Nippersink Creek
			Rock River	Turtle Creek
Alasmidonta marginata	Elktoe	Special concern	Fox River	Fox River
				White River
			Milwaukee River	Milwaukee River
			Rock River	Ashippun River
				Turtle Creek
Alasmidonta viridis	Slippershell	Threatened	Fox River	Fox River
				Mukwonago River
Amblema plicata	Three-ridge	--	Fox River	Mukwonago River
				White River
			Rock River	Ashippun River
				Bark River
				Turtle Creek
Anodonta grandis	Floater	--	Des Plaines River	Des Plaines River
			Fox River	Fox River
				Sugar Creek
			Milwaukee River	Cedar Creek
				Milwaukee River
			Rock River	Ashippun River
				Bark River
				Oconomowoc River
				Turtle Creek
			Root River	Root River
Anodontoides ferussacianus	Cylindrical paper shell	--	Fox River	Fox River
				Nippersink Creek
				Sugar Creek
				White River
			Milwaukee River	Cedar Creek
				Milwaukee River
			Rock River	Oconomowoc River
				Turtle Creek
Carunculina parva	Liliput	--	Des Plaines River	Des Plaines River
			Fox River	Fox River
			Milwaukee River	Cedar Creek
			Root River	Root River

Table 99 (continued)

Species	Common Name	Status[a]	Watershed(s)	Stream(s)
Elliptio dilatatus	Spike	- -	Fox River	Fox River
			Milwaukee River	Milwaukee River
			Rock River	Ashippun River
				Oconomowoc River
Fusconaia flava	Wabash pig toe	- -	Fox River	Nippersink Creek
				Sugar Creek
			Milwaukee River	Cedar Creek
				Milwaukee River
			Rock River	Ashippun River
				Oconomowoc River
				Turtle Creek
Lampsilis radiata siliquoidea	Fat mucket	- -	Fox River	Fox River
				Mukwonago River
				White River
			Milwaukee River	Milwaukee River
			Rock River	Ashippun River
				Bark River
				Oconomowoc River
Lampsilis ventricosa	Pocketbook	- -	Fox River	Fox River
				Nippersink Creek
				White River
			Milwaukee River	Milwaukee River
			Rock River	Ashippun River
				Turtle Creek
Lasmigona complanata	White heelsplitter	- -	Des Plaines River	Des Plaines River
			Fox River	Fox River
				Nippersink Creek
			Milwaukee River	Cedar Creek
				Milwaukee River
			Pike River	Pike River
			Rock River	Ashippun River
				Oconomowoc River
				Turtle Creek
			Root River	Root River
Lasmigona compressa	Creek heelsplitter	Special concern	Fox River	Mukwonago River
				Nippersink Creek
			Milwaukee River	Cedar Creek
				Milwaukee River
			Rock River	Oconomowoc River

Table 99 (continued)

Species	Common Name	Status[a]	Watershed(s)	Stream(s)
Lasmigona costata	Fluted shell	--	Fox River	Fox River
				Nippersink Creek
				White River
			Milwaukee River	Cedar Creek
				Milwaukee River
Pleurobema cordatum	Ohio River pig toe	--	Fox River	Fox River
				Nippersink Creek
				Sugar Creek
				White River
			Milwaukee River	Cedar Creek
			Rock River	Turtle Creek
Quadrula pustulosa	Pimple back	--	Fox River	Fox River
Simpsonaias ambigua	Salamander mussel	Threatened	Rock River	Oconomowoc Lake
Strophitus undulatus	Squaw foot	--	Fox River	Fox River
				Mukwonago River
				Nippersink Creek
			Milwaukee River	Cedar Creek
				Milwaukee River
			Rock River	Ashippun River
				Oconomowoc River
				Turtle Creek
Venustaconcha ellipsiformis ellipsiformis	Ellipse	Threatened	Fox River	Mukwonago River
				Sugar Creek
			Milwaukee River	Cedar Creek
			Rock River	Bark River
				Oconomowoc River
Villosa iris iris	Rainbow shell	Endangered	Fox River	Mukwonago River

[a] *As designated on the Wisconsin Natural Heritage Inventory Working List of the Bureau of Endangered Resources, Wisconsin Department of Natural Resources.*

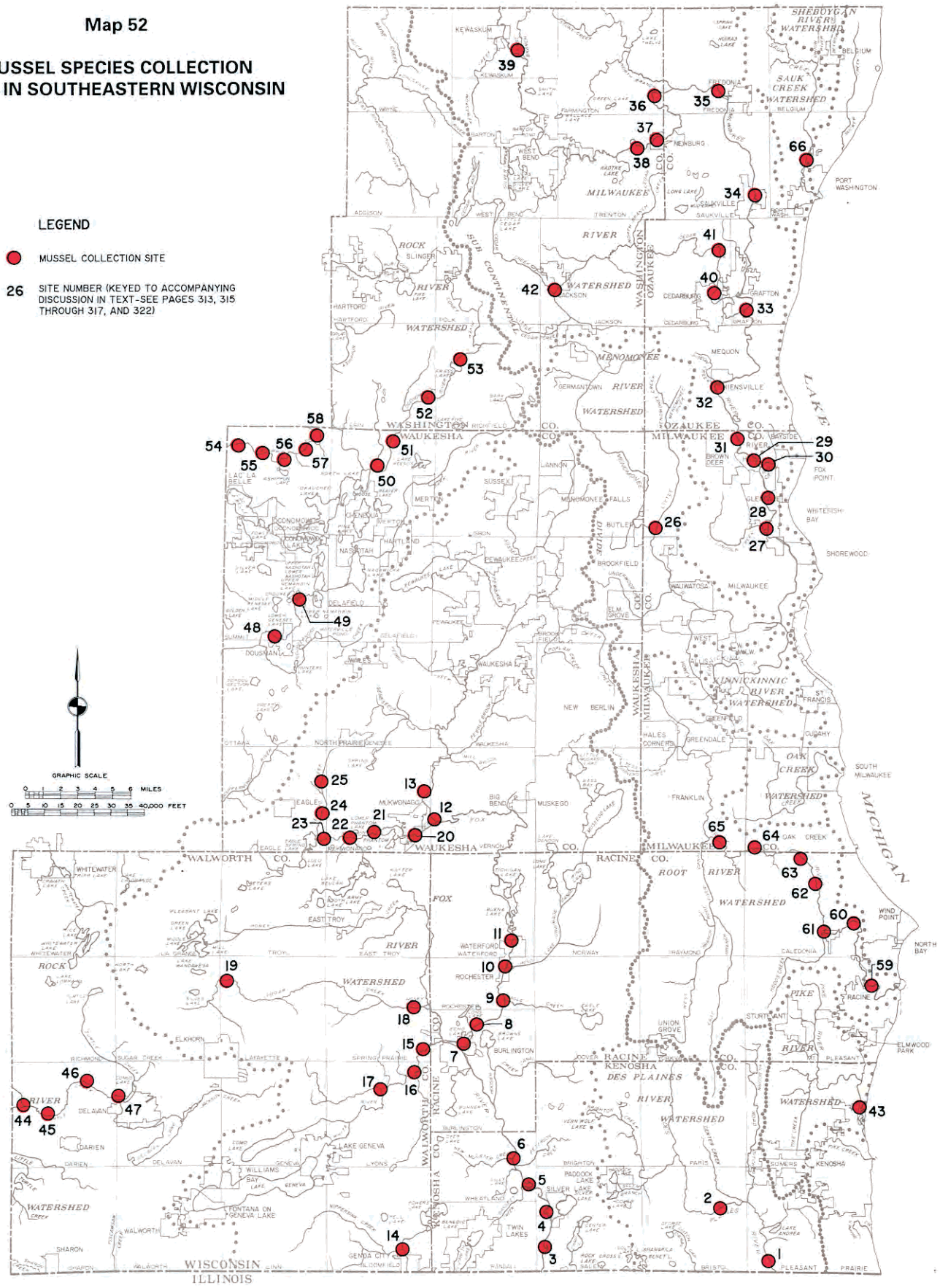
Source: Harold A. Mathiak, A River Survey of the Unionid Mussels of Wisconsin: 1973-1977, Sand Shell Press, Horicon, Wisconsin, 1979.

sampled on the Milwaukee River in Ozaukee County. Of the 10 species collected, two "special concern" species were identified, the elktoe and creek heelsplitter. From the Milwaukee River in Washington County, Sites No. 36 through No. 39, nine species of mussels were collected, including two "special concern" species, the elktoe and creek heelsplitter. A total of nine mussel species, including one "special concern" species, the creek heelsplitter, was taken in the lower reaches of Cedar Creek at Sites No. 40 and No. 41.

In the Rock River watershed, Sites No. 44 through No. 47 in Turtle Creek yielded a total of 10 species of mussels, including one "special concern" species, the elktoe. Other species-rich stream reaches in the watershed include the Oconomowoc River, Sites No. 50 through No. 53, and the Ashippun River, Sites No. 54 through No. 58. These two stream reaches each contained nine species. Of the nine species collected from the Oconomowoc River, two critical species were identified, one, the ellipse, a threatened species, and the other, the creek heel-

Map 52

MUSSEL SPECIES COLLECTION SITES IN SOUTHEASTERN WISCONSIN



This map displays the locations of mussel species collection sites in Southeastern Wisconsin sampled by Harold A. Mathiak.

Source: Harold A. Mathiak, A River Survey of the Unionid Mussels of Wisconsin: 1973-1977, Sand Shell Press, Horicon, Wisconsin, 1979.

splitter, a "special concern" species. Of the nine species collected from the Ashippun River, one "special concern" species, the elktoe, was identified.

AQUATIC HABITAT AREAS OF SOUTHEASTERN WISCONSIN

The aquatic habitat areas of Southeastern Wisconsin, represented by lakes and streams, are valuable resources which contribute materially to the Region's flora and fauna, as well as the aesthetic values of the Region. As such, these surface-water resources need to be evaluated in order to determine their relative quality with respect to the Region's natural areas, critical species, and critical species habitats. The types of aquatic habitats within the Region are set forth in Table 2 in Chapter II of this report (see pages 34-35). In an effort to rank the Region's surface-water resources with respect to their natural area and critical species habitat quality, an assessment scheme was developed which used existing data from Commission and Wisconsin Department of Natural Resources files.

Streams

Major stream reaches of Southeastern Wisconsin were identified and ranked using available information from the Commission files and those of the Wisconsin Department of Natural Resources. Stream reaches considered for critical habitat status were based upon those reaches initially defined in SEWRPC Memorandum Report No. 93, A Regional Water Quality Management Plan for Southeastern Wisconsin: An Update and Status Report, March 1995. In that report, major stream reaches were defined as "perennial streams which maintain, at a minimum, a small, continuous flow throughout the year except under unusual drought conditions." Initially defined stream reaches were identified for further analysis if they fell into one or more of the following categories: 1) stream reaches supporting State-designated endangered, threatened, or "special concern" fish species; 2) stream reaches supporting State-designated endangered, threatened, or "special concern" mussel species; 3) stream reaches supporting extensive mussel beds of non-listed mussel species; 4) stream reaches supporting suitable habitat area for State-designated endangered, threatened, or "special concern" aquatic amphibians or reptiles; and 5) stream reaches located adjacent to or encompassed by an identified Natural Area. An evaluation scheme was developed (see Table 100) to further analyze the Region's streams using, for each stream reach analyzed, available data concerning water quality, physical characteristics of the stream channel, wildlife habitat within and adjacent to the stream reach, including trout species habitat, and suitable buffer lands adjacent to the stream reach. Point values were assigned and scores tabulated for every stream reach listed in SEWRPC Memorandum Report No. 93. Clearly, in reviewing existing information, certain data held more credence for use in the point-based evaluation scheme than did other data. For example, since data regarding fish species were generally more complete and considered to be very important in stream evaluation, they were weighted more heavily than other data considered.

Scores were tabulated for each stream reach, and the initial list of streams was edited to add those stream reaches which were not initially selected, but had adequate scores, and to shorten or exclude initially included stream reaches in cases where such reaches were determined to lack sufficient habitat conditions to support State-designated critical species over time or the stream reaches concerned generally provided poor habitat. For example, the lake chubsucker, a State-designated "special concern" fish species, was collected from the West Branch of the Root River Canal. However, this reach was eliminated from further consideration because of other factors, such as low fish populations and diversity and major modifications to the stream channel. These factors indicated that long-term maintenance of a stream environment of a quality sufficient to support a significant aquatic diversity, including the lake chubsucker, was unlikely.

Upon completion of this initial screening of streams, the stream reaches were ranked in a manner based on the Commission ranking system established for Natural Areas in the Region. Significant stream reaches were identified as Aquatic Areas of statewide or greater significance (AQ-1); Aquatic Areas of countywide or regional significance (AQ-2); or Aquatic Areas of local significance (AQ-3). It should be noted, however, that the ranking of streams was not purely reliant on scores tabulated using the evaluation scheme. Other factors which could not be incorporated in the evaluation scheme were considered when determining the final rank for an Aquatic Area. For example, the Milwaukee River contains the striped shiner, a State-designated endangered fish species, over much of its reach in Southeastern Wisconsin. Of this species, Becker stated that "[t]o ensure its continuation in Wis-

Table 100

AQUATIC AREA ASSESSMENT SCHEME FOR STREAMS

Water Quality

Chemical Data[a]

+3: No water quality problems documented
+1: No more than one water quality problem
0: Sufficient data not available
-1: Two water quality problems
-2: Three water quality problems
-3: Four or more water quality problems

Physical Data

+2: Low streambed sedimentation
0: Moderate streambed sedimentation or data not available
-2: High streambed sedimentation

Physical Characteristics

Channel Modifications[b]

+2: No physical modifications to the channel
+1: Few modifications to the channel
0: Moderate modifications to the channel
-1: Major modifications to the channel

Total Reach Length

+2: Stream reach length (including adjacent critical stream reaches upstream and downstream) more than 15 miles
+1: Stream reach length 10 to 15 miles
0: Stream reach length less than 10 miles

Connection with Critical Aquatic Areas

+2: Connection with critical aquatic areas on both the upstream and downstream ends
+1: Connection with critical aquatic area on either the upstream or downstream end
0: No connection to critical aquatic areas

Wildlife

Fish Population and Diversity[c]

+4: Excellent
+2: Good
0: Fair or data not available
-1: Poor

Critical Fish Species

+5: Presence of endangered fish species (may also contain threatened or "special concern" fish species, or both)
+4: Presence of threatened fish species (may also contain "special concern" fish species)
+2: Presence of "special concern" fish species
0: No critical fish species documented

Critical-Aquatic-Amphibian-and-Reptile-Species-Suitable Habitat within or Adjacent to the Stream Channel

+3: Presence of endangered aquatic herptile species habitat (may also contain threatened or "special concern" aquatic herptile species habitat, or both)
+2: Presence of threatened aquatic herptile species habitat (may also contain "special concern" aquatic herptile species habitat)
+1: Presence of "special concern" aquatic herptile species habitat
0: No critical aquatic herptile species habitat

Critical Mussel Species

+5: Presence of endangered mussel species (may also contain threatened or "special concern" mussel species, or both)
+4: Presence of threatened mussel species (may also contain "special concern" mussel species)
+2: Presence of "special concern" mussel species
+1: Supports mussel beds of nonlisted mussel species
0: Reach not sampled for mussel species
-1: No presence of mussel species when sampled

Table 100 (continued)

Wildlife (continued)
Trout Species Habitat
+2: Class I trout stream
+1: Class II trout stream
0: Class III trout stream or data not available
Biotic Index Rating[d]
+3: Excellent
+2: Very Good
+1: Good
0: Fair or data not available
-1: Poor
-2: Very Poor
Buffer
Corridor Encompassing the Stream Channel
+3: Primary environmental corridor encompassing more than 90 percent of the stream reach
+2: Primary environmental corridor encompassing between 50 percent and 90 percent of the stream reach
+1: Secondary environmental corridor encompassing more than 50 percent of the stream reach
0: More than 50 percent of the stream channel not encompassed by corridor of any kind
Highest possible score: +36
Lowest possible score: -10

[a]*Chemical water quality data include dissolved oxygen, ammonia, total phosphorus, fecal coliform, and toxic substances concentrations.*

[b]*Physical modifications to the channel were defined as major if 50 percent or more of the stream reach was modified by structural measures or was deepened or straightened; moderate if 25 percent to 50 percent of the stream reach was modified; and few if less than 25 percent of the reach was modified.*

[c]*Based upon Wisconsin Department of Natural Resources and SEWRPC fishery surveys and stream appraisal documentation, and professional judgment of area fish managers.*

[d]*Biotic Index Ratings are based upon either the Index of Biotic Integrity (IBI), as set forth in U. S. Department of Agriculture, Forest Service, General Technical Report NC-149, Using the Index of Biotic Integrity (IBI) to Measure Environmental Quality in Warmwater Streams of Wisconsin, April 1992, or the Hilsenhoff Biotic Index (HBI), as set forth in Wisconsin Department of Natural Resources Technical Bulletin No. 132, Using a Biotic Index to Evaluate Water Quality in Streams, 1982.*

Source: Wisconsin Department of Natural Resources and SEWRPC.

consin, it is imperative that the Milwaukee River be watched; perhaps a section of the river should be set aside for the protection of the striped shiner, since it is the only known reservoir of this species in the state."[15] Therefore, even though two connected reaches of the Milwaukee River together extending from the origin of its main stem just west of Waubeka to STH 57, in Ozaukee County, had assessment scores generally associated with a stream of AQ-2 quality, these reaches were assigned the higher rank of AQ-1 because of the importance of these reaches to the striped shiner. In addition, since little information was available for some of the streams within the Region, default point values were also used in the evaluation scheme for these situations. As a result, some stream reaches may have been underestimated or overestimated with regard to stream-water quality. Therefore, the initial stream rankings by the Commission staff were reviewed by the Technical Advisory Committee, and some adjustments were made in those rankings on the basis of the collective judgment of the Committee.

The identified critical stream reaches for Southeastern Wisconsin are shown on Map 53. Their total mileages, assessment-scheme scores, and ranks are set forth by watershed in Table 101.

[15]*George C. Becker, Fishes of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1983, p. 525.*

Map 53

CRITICAL AQUATIC HABITAT AREAS OF SOUTHEASTERN WISCONSIN

LEGEND

- AQ-1: AQUATIC AREAS OF STATEWIDE OR GREATER SIGNIFICANCE
- AQ-2: AQUATIC AREAS OF COUNTYWIDE OR REGIONAL SIGNIFICANCE
- AQ-3 AQUATIC AREAS OF LOCAL SIGNIFICANCE
- 200 INDENTIFICATION NUMBER (SEE TABLE 101 FOR STREAM REACHES AND TABLE 103 FOR LAKES)

GRAPHIC SCALE

0 4 MILES

0 8000 16000 24000 FEET

Rankings of Aquatic Areas in Southeastern Wisconsin are based on evaluation schemes for lakes and streams using available data for each area regarding water quality, physical characteristics of the lake or stream reach, wildlife richness and diversity, including critical aquatic species, and adjacent buffer lands. Initial rankings were reviewed by the Technical Advisory Committee, and some adjustments were made on the basis of the collective judgment of the Committee.

Source: Wisconsin Department of Natural Resources; Wisconsin Herpetological Atlas Project; George C. Becker, Fishes of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1983; Harold A. Mathiak, A River Survey of the Unionid Mussels of Wisconsin: 1973-1977, Sand Shell Press, Horicon, Wisconsin, 1979; local naturalists; and SEWRPC.

Table 101

CRITICAL STREAM REACHES OF SOUTHEASTERN WISCONSIN

Watershed	Map 53 Reference Number	Stream Reach	Stream-Miles	Rank[a]	Assessment Score	Description and Comments
Des Plaines River	1	Brighton Creek and Salem Branch	14.4	AQ-3 (RSH)	7	Critical fish species present
	2	Des Plaines River upstream from STH 50	1.8	AQ-3 (RSH)	3	Critical fish species present
	3	Des Plaines River downstream from STH 50	15.7	AQ-3 (RSH)	7	Bisects a large wetland complex supporting critical herptile species habitat
	4	Kilbourn Road Ditch	14.8	AQ-3 (RSH)	0	Sedimentation and other water quality problems exist, but this reach is an important reservoir for the pirate perch, a "special concern" fish species
	--	Total stream-miles and stream reaches	46.7	4	--	--
Fox River	5	Fox River downstream from IH 43 to Waterford Impoundment	13.7	AQ-1 (RSH)	23	Good water quality; important reservoir for critical fish, herptile, and mussel species
	6	Mukwonago River upstream from Eagle Spring Lake	6.3	AQ-1 (RSH)	23	Stream of good overall quality; bisects corridor of high-quality Natural Areas, including the Lulu Lake complex
	7	Mukwonago River downstream from Eagle Spring Lake to Phantom Lakes	9.7	AQ-1 (RSH)	31	Excellent overall quality; excellent Biotic Index Rating;[b] good water quality and fish population and diversity; bisects high-quality Natural Areas
	8	Mukwonago River downstream from Phantom Lakes	2.3	AQ-1 (RSH)	31	Excellent overall quality; very important reservoir for critical fish and mussel species
	--	Total stream-miles and stream reaches	32.0	4	--	--
	9	Fox River downstream from Pebble Creek inflow to IH 43	13.3	AQ-2 (RSH)	16	Critical fish, herptile, and mussel species habitat; overall mussel species richness
	10	Fox River downstream from Waterford Impoundment to Echo Lake inflow	10.6	AQ-2 (RSH)	19	Critical fish, herptile, and mussel species habitat
	11	Fox River downstream from Echo Lake inflow to Spring Brook inflow	1.3	AQ-2 (RSH)	13	Good population of the river redhorse, a threatened fish species
	12	Genesee Creek and Spring Creek	9.7	AQ-2 (RSH)	19	Good overall watar quality and fish population and diversity; Genesee Creek and Spring Creek are Class I trout streams
	13	Jericho Creek	6.9	AQ-2 (RSH)	14	Good water quality, including low streambed sedimentation
	14	Mill Brook	3.5	AQ-2 (RSH)	14	Good fish population and diversity; critical herptile habitat adjacent to stream; Class I trout stream
	15	Potawatomi, Van Slyke, and Southwick Creeks	3.1	AQ-2	13	All cold-water trout streams with good fish populations
	16	White River	22.5	AQ-2 (RSH)	15	Critical fish species and a good assemblage of mussel species
	--	Total stream-miles and stream reaches	70.9	8	--	--
	17	Bassett Creek	4.5	AQ-3 (RSH)	13	Records of critical fish species; good water quality
	18	Eagle Creek downstream from Eagle Lake	0.6	AQ-3 (RSH)	9	Bisects suitable habitat for Blanding's turtle, a threatened herptile species

Table 101 (continued)

Watershed	Map 53 Reference Number	Stream Reach	Stream-Miles	Rank[a]	Assessment Score	Description and Comments
Fox River (continued)	19	Eagle Creek upstream from Fox River	1.1	AQ-3	11	Bisects an identified Natural Area, Eagle Creek Woods
	20	Fox River upstream from Mill Road	5.2	AQ-3 (RSH)	3	Critical fish species present
	21	Fox River downstream from Spring Brook inflow to CTH JB	4.7	AQ-3	6	Link between upstream and downstream critical Aquatic Areas
	22	Fox River downstream from CTH JB to Wisconsin-Illinois state line	14.1	AQ-3 (RSH)	12	Good mussel species assemblage and population of the river redhorse, a threatened fish species
	23	Honey Creek-upper reaches	3.8	AQ-3 (RSH)	4	Critical fish species present
	24	Honey Creek-lower reaches	17.4	AQ-3 (RSH)	6	Critical fish species present
	25	Lake Ivanhoe Creek	2.7	AQ-3 (RSH)	8	Critical fish species present; low streambed sedimentation and low in modifications to channel
	26	Muskego Canal	2.4	AQ-3 (RSH)	5	Critical fish species present
	27	New Munster Creek downstream from CTH KD	1.5	AQ-3	9	Good water quality
	28	Nippersink Creek	10.4	AQ-3 (RSH)	8	Good mussel species assemblage
	29	Palmer Creek	3.5	AQ-3	6	Class III trout stream
	30	Pebble Brook and Mill Creek	4.8	AQ-3	12	Good fish population and diversity; low streambed sedimentation and low in modifications to channel
	31	Pebble Creek and Brandy Brook	6.8	AQ-3	5	Cold-weter stream which bisects a Naturel Area, Pebble Creek Wetlands
	32	Peterson Creek	4.4	AQ-3 (RSH)	7	Critical fish species present
	33	Pewaukee Lake tributary	2.3	AQ-3	6	Class II trout stream
	34	Pewaukee River	1.5	AQ-3 (RSH)	4	Good fish population and diversity
	35	Poplar Creek	2.4	AQ-3 (RSH)	2	Critical herptile species habitat
	36	Spring Creek (Walworth County)	2.0	AQ-3 (RSH)	6	Critical fish species present
	37	Sugar Creek and Spring Brook Creek	30.9	AQ-3 (RSH)	13	Critical fish, herptile, and mussel species habitat; Spring Brook Creek is a Class II and Class III trout stream
	--	Total stream-miles and stream reaches	127.0	21	--	--
Menomonee River	38	Menomonee River downstream from STH 145 to CTH Q	3.8	AQ-3	5	Bisects identified Natural Areas
	39	Menomonee River downstream from CTH Q to Lilly Road	3.8	AQ-3	4	Link between upstream and downstream critical Aquatic Areas
	40	Menomonee River downstream from Lilly Road to Good Hope Road	2.4	AQ-3	6	Bisects identified Natural Area
	41	Menomonee River downstream from Good Hope Road to Silver Spring Drive	2.7	AQ-3	6	Bisects identified Natural Areas

Table 101 (continued)

Watershed	Map 53 Reference Number	Stream Reach	Stream-Miles	Rank[a]	Assessment Score	Description and Comments
Menomonee River (continued)	42	Menomonee River downstream from Silver Spring Drive to Hampton Avenue	2.1	AQ-3	3	Bisects identified Natural Area
	43	Menomonee River downstream from Hampton Avenue to Capitol Drive	1.3	AQ-3	3	Bisects identified Natural Area
	44	Menomonee River downstream from Capitol Drive to North Avenue	2.7	AQ-3	4	Bisects identified Natural Areas
	45	North Branch, Menomonee River upstream from STH 145	10.0	AQ-3	6	Bisects identified Natural Areas
	46	West Branch, Menomonee River	4.2	AQ-3	9	Good fish population and diversity; good Biotic Index Rating[b]
	--	Total stream-miles and stream reaches	33.0	9	--	--
Direct Drainage to Lake Michigan	47	Fish Creek	2.3	AQ-3	2	Bisects Fairy Chasm State Natural Area
	--	Total stream-miles and stream reaches	2.3	1	--	--
Milwaukee River	48	Cedar Creek upstream from Little Cedar Lake	1.4	AQ-1 (RSH)	18	Good water quality; good fish population and diversity; critical fish and herptile species habitat
	49	Milwaukee River downstream from Washington-Fond du Lac county line to CTH H	5.4	AQ-1 (RSH)	21	Excellent Biotic Index Rating;[b] good water quality and fish population and diversity
	50	Milwaukee River main stem upstream from STH 33	11.1	AQ-1 (RSH)	16	Important reservoir for critical fish species, including the striped shiner, an endangered fish species, and three threatened fish species
	51	Milwaukee River downstream from STH 33 to STH 57 (includes Mole Creek)	8.7	AQ-1 (RSH)	15	Important reservoir for the striped shiner; good overall fish population and diversity
	52	Riveredge Creek	1.6	AQ-1 (RSH)	16	A slow, cold, spring-fed stream, with excellent water quality; contains a very diverse invertebrate assemblage; a designated State Natural Area
	--	Total stream-miles and stream reaches	28.2	5	--	--
	53	Cedar Creek downstream from Little Cedar Lake to Little Cedar Creek inflow	6.6	AQ-2 (RSH)	16	Contains critical mussel and fish species habitat
	54	Cedar Creek downstream from STH 60	6.7	AQ-2 (RSH)	16	Good fish population and diversity, including three criticel fish species; good assemblage of mussel species
	55	East Branch, Milwaukee River downstream from Washington-Fond du Lac county line	5.0	AQ-2 (RSH)	13	Low sedimentation and few modifications to channel; bisects the Milwaukee River Floodplain Forest State Natural Area
	56	Milwaukee River downstream from CTH H to Woodford Drive	4.9	AQ-2 (RSH)	13	Good water quality; critical fish species present
	57	Milwaukee River downstream from STH 33 to main stem	9.9	AQ-2 (RSH)	13	Excellent Biotic Index Rating;[c] critical fish species present; good assemblage of mussel species

Table 101 (continued)

Watershed	Map 53 Reference Number	Stream Reach	Stream-Miles	Rank[a]	Assessment Score	Description and Comments
Milwaukee River (continued)	58	Milwaukee River downstream from STH 57 to CTH C	4.5	AQ-2 (RSH)	13	Critical fish species present, including the striped shiner; Biotic Index Rating[c] of Good
	59	North Branch, Milwaukee River	8.5	AQ-2 (RSH)	14	Good overall fish population and diversity, including critical fish species; Biotic Index Rating[b] of Good to Excellent
	60	Pigeon Creek	2.4	AQ-2 (RSH)	17	Good overall fish population and diversity, including critical fish species; critical plant species adjacent to and within the channel
	61	Wallace Creek	8.6	AQ-2 (RSH)	14	Good overall fish population and diversity, including critical fish species
	--	Total stream-miles and stream reaches	57.1	9	--	--
	62	Cedar Creek downstream from Little Cedar Creek inflow to CTH M	9.8	AQ-3	5	Good fish population and diversity; bisects Jackson Swamp, an identified Natural Area
	63	Cedar Creek downstream from CTH M to STH 60	9.5	AQ-3	12	Good fish population and diversity; good mussel species assemblage
	64	North Branch, Cedar Creek	7.3	AQ-3 (RSH)	10	Critical fish species; bisects an identified Natural Area, Reinartz Cedar Swamp
	65	Friedens Creek	3.2	AQ-3 (RSH)	9	Biotic Index Rating[c] of Very Good
	66	Kewaskum Creek	4.7	AQ-3	8	Good fish population and diversity
	67	Milwaukee River downstream from Woodford Drive to STH 33	13.6	AQ-3 (RSH)	10	Critical fish species present
	68	Milwaukee River downstream from CTH C to Mequon Road	13.4	AQ-3 (RSH)	11	Good fish population and diversity and mussel species richness
	69	Milwaukee River downstream from Mequon Road to Brown Deer Road	3.8	AQ-3 (RSH)	8	Biotic Index Rating[c] of Good; critical fish species present
	70	Milwaukee River downstream from Brown Deer Road to Port Washington Road	8.1	AQ-3 (RSH)	8	Critical fish species present
	71	Milwaukee River downstream from Port Washington Road to North Avenue	3.8	AQ-3 (RSH)	7	Critical fish species present
	72	Milwaukee River downstream from North Avenue to Walnut Street	0.9	AQ-3 (RSH)	5	Critical fish species present
	73	Quaas Creek	4.9	AQ-3 (RSH)	12	Good fish population and diversity
	74	Silver Creek	5.9	AQ-3 (RSH)	7	Critical fish species present; Biotic Index Rating[c] of Good
	75	Stony Creek	3.1	AQ-3 (RSH)	10	Critical fish species present; Class II trout stream
	--	Total stream-miles and stream reaches	92.0	14	--	--

Table 101 (continued)

Watershed	Map 53 Reference Number	Stream Reach	Stream-Miles	Rank[a]	Assessment Score	Description and Comments
Pike River	76	Pike Creek	1.7	AQ-3	1	Bisects identified Natural Area
	77	Pike River downstream from Pike Creek (includes Sorenson Creek)	3.8	AQ-3 (RSH)	1	Bisects identified Natural Area; critical fish species present
	--	Total stream-miles and stream reaches	5.5	2	--	--
Rock River	78	Bark River upstream from Nagawicka Lake	19.3	AQ-1 (RSH)	20	Good overall fish population and diversity; important reservoir for critical fish and herptile species
	79	Bark River downstream from Nagawicka Lake to Scuppernong Creek inflow	9.7	AQ-1 (RSH)	20	Important reservoir for two endangered fish species, the slender madtom and starhead topminnow; critical mussel species also present
	80	Bluff Creek	1.9	AQ-1 (RSH)	16	High-quality fast, hard, cold-water Class I trout stream with springs and spring runs which run through a designated State Natural Area
	81	Oconomowoc River downstream from Friess Lake to North Lake	12.3	AQ-1 (RSH)	20	Contains critical fish, herptile, and mussel species habitat; bisects high-quality Natural Areas
	--	Total stream-miles and stream reaches	43.2	4	--	--
	82	Allenton Creek	3.4	AQ-2 (RSH)	13	Class I trout stream with good fish population and diversity
	83	Bark River downstream from Scuppernong Creek inflow	2.6	AQ-2 (RSH)	15	Contains critical herptile and fish species habitat
	84	Mason Creek	6.5	AQ-2 (RSH)	12	Class I trout stream; Biotic Index Rating[b] of Good; critical fish species present
	85	Oconomowoc River downstream from North Lake to Okauchee Lake	1.8	AQ-2 (RSH)	15	Good water quality; Biotic Index Rating[b] of Good
	86	Scuppernong Creek	10.2	AQ-2 (RSH)	18	Good fish population and diversity, including critical fish species habitat; good water quality
	87	Scuppernong River	14.9	AQ-2 (RSH)	17	Class I and II trout stream with good fish population and diversity; bisects large wetland complex with high-quality Natural Areas
	88	Turtle Creek upstream from Comus Lake	10.2	AQ-2 (RSH)	12	Critical herptile species habitat
	89	Turtle Creek downstream from Comus Lake to STH 11	3.3	AQ-2 (RSH)	15	Critical herptile species habitat; good mussel species richness, including a "special concern" mussel species, the elktoe
	90	Turtle Creek downstream from STH 11 to Walworth-Rock county line	7.1	AQ-2 (RSH)	17	Critical herptile species habitat
	--	Total stream-miles and stream reaches	60.0	9	--	--
	91	Ashippun River upstream from Druid Lake	4.3	AQ-3 (RSH)	6	Critical fish species present
	92	Ashippun River downstream from Druid Lake to Washington-Dodge county line	5.2	AQ-3 (RSH)	6	Critical herptile species habitat

Table 101 (continued)

Watershed	Map 53 Reference Number	Stream Reach	Stream-Miles	Rank[a]	Assessment Score	Description and Comments
Rock River (continued)	93	Ashippun River downstream from Waukesha-Dodge county line to Ashippun Lake inflow	7.2	AQ-3 (RSH)	10	Critical fish species present
	94	Ashippun River downstream from Ashippun Lake inflow	4.2	AQ-3 (RSH)	7	Good mussel species assemblage, including the elktoe, a "special concern" species
	95	Darien Creek	8.8	AQ-3 (RSH)	10	Critical fish species present
	96	East Branch, Rock River downstream from CTH D	4.4	AQ-3 (RSH)	10	Critical fish species present
	97	East Branch, Rock River upstream from CTH D	14.3	AQ-3 (RSH)	11	Critical fish species present
	98	Kohlsville River	1.9	AQ-3	6	A cold-water stream
	99	Limestone Creek	5.8	AQ-3 (RSH)	11	Good fish population and diversity, including critical species records
	100	Little Oconomowoc River	5.7	AQ-3 (RSH)	9	Biotic Index Rating[b] of Excellent; upper reaches bisect a high-quality Natural Area, Murphy Lake-McConville Lake Wetland Complex
	101	Little Turtle Creek and Ladd Creek	8.6	AQ-3 (RSH)	10	Critical fish and herptile species habitat
	102	Oconomowoc River upstream from Friess Lake	2.8	AQ-3 (RSH)	10	Critical herptile species habitat
	103	Oconomowoc River downstream from Okauchee Lake to Oconomowoc Lake	0.4	AQ-3 (RSH)	7	Critical fish species present
	104	Oconomowoc River downstream from STH 16 to Fowler Lake	1.7	AQ-3 (RSH)	6	Critical fish species present
	105	Oconomowoc River downstream from Lac La Belle to Waukesha-Jefferson county line	5.0	AQ-3 (RSH)	11	Critical fish species present
	106	Rosenow Creek	2.7	AQ-3	9	Class I trout stream
	107	Rubicon River upstream from Pike Lake	2.8	AQ-3 (RSH)	5	Critical herptile species habitat
	108	Rubicon River downstream from Pike Lake	6.7	AQ-3 (RSH)	4	Critical fish species present
	109	Steel Brook Creek	4.0	AQ-3	9	Class I and II trout stream with good fish population and diversity
	110	Wayne Creek	3.5	AQ-3	10	Good fish population and diversity
	111	Whitewater Creek	5.9	AQ-3 (RSH)	8	Critical fish and herptile species; a portion runs through Clover Valley Fen State Natural Area
	--	Total stream-miles and stream reaches	105.9	21	--	--
Root River	112	Husher Creek	1.9	AQ-3	6	Bisects an identified Natural Area, Root River Riverine Forest
	113	Root River downstream from Ryan Road to County Line Road	3.4	AQ-3	3	Bisects an identified Natural Area, Root River Wet-Mesic Woods-West
	114	Root River downstream from County Line Road to Nicholson Road	5.7	AQ-3 (RSH)	10	Bisects identified Natural Areas

Table 101 (continued)

Watershed	Map 53 Reference Number	Stream Reach	Stream-Miles	Rank[a]	Assessment Score	Description and Comments
Root River (continued)	115	Root River downstream from Nicholson Road to STH 38	12.5	AQ-3 (RSH)	7	Critical herptile species habitat
	116	Root River downstream from STH 38 to Spring Street	3.0	AQ-3 (RSH)	6	Critical herptile species habitat
	117	Root River Canal	2.4	AQ-3	2	Bisects an identified Natural Area, Root River Canal Woods
	118	Tess Corners-Whitnall Park Creek	4.2	AQ-3 (RSH)	2	Critical fish species present
	--	Total stream-miles and stream reaches	33.1	7	--	--

[a]*AQ-1 identifies Aquatic Areas of statewide or greater significance*
AQ-2 identifies Aquatic Areas of countywide or regional significance
AQ-3 identifies Aquatic Areas of local significance
RSH, or Rare Species Habitat, identifies those Aquatic Areas which support habitat for endangered, threatened, or "special concern" species officially designated by the Wisconsin Department of Natural Resources

[b]*Based upon the Index of Biotic Integrity (IBI) discussed in U. S. Department of Agriculture, Forest Service, General Technical Report NC-149, Using the Index of Biotic Integrity (IBI) to Measure Environmental Quality in Warmwater Streams of Wisconsin, April 1992.*

[c]*Based upon the Hilsenhoff Biotic Index (HBI) discussed in Wisconsin Department of Natural Resources Technical Bulletin No. 132, Using a Biotic Index to Evaluate Water Quality in Streams, 1982.*

Source: Wisconsin Department of Natural Resources; Wisconsin Herpetological Atlas Project; George C. Becker, Fishes of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1983; Harold A. Mathiak, A River Survey of the Unionid Mussels of Wisconsin: 1973-1977, Sand Shell Press, Horicon, Wisconsin, 1979; local naturalists; and SEWRPC.

More than 13 stream-miles of Cedar Creek have been designated as an Aquatic Area of countywide or regional significance. Certain reaches of Cedar Creek have also been classified as Geological Area sites of statewide or greater significance, such as the reach shown above, located in Section 26 of the Town of Cedarburg, Ozaukee County.

Source: Joanne Kluessendorf and Donald G. Mikulic.

Lakes

For the purposes of this study, lakes were generally defined as surface-water bodies having a water-surface area of 10 acres or more. Initially defined lakes were identified for further analysis if they fell into one or more of the following categories: 1) lakes supporting State-designated endangered, threatened, or "special concern" fish species; 2) lakes supporting suitable habitat area for State-designated endangered, threatened, or "special concern" aquatic amphibians or reptiles; and 3) lakes located adjacent to or encompassed by an identified Natural Area. An evaluation scheme was developed to classify the lakes considered using, for each lake analyzed, available data concerning water quality, wildlife habitat within and adjacent to the lake, lake size, undeveloped buffer areas adjacent to the lake, and known physical characteristics of the lake. The scheme is summarized in Table 102. Point values were assigned and scores tabulated for those lakes initially selected and all major lakes within the Region, defined as lakes having a water-surface area of 50 acres or more.

The initial list of lakes was edited to add those lakes which were not initially selected, but had adequate scores, and to exclude initially selected lakes of lesser quality which had poor scores.

Table 102

AQUATIC AREA ASSESSMENT SCHEME FOR LAKES

Water Quality
Trophic Status (Wisconsin Trophic State Index Values)[a]
+5: Below 44 (oligotrophic)
+4: 44-48 (oligomesotrophic or mildly mesotrophic)
+3: 49-53 (mesotrophic)
+2: 54-64 (mesoeutrophic or mildly eutrophic)
+1: 65-75 (eutrophic)
0: Above 75 (hypereutrophic)
Wildlife
Critical Fish Species
+5: Presence of endangered fish species (may also contain threatened or "special concern" fish species, or both)
+4: Presence of threatened fish species (may also contain "special concern" fish species)
+2: Presence of "special concern" fish species
0: No critical fish species documented
Critical-Aquatic-Amphibian-and-Reptile-Species-Suitable Habitat within or Adjacent to the Lakeshore
+3: Presence of endangered aquatic herptile species habitat (may also contain threatened or "special concern" aquatic herptile species habitat, or both)
+2: Presence of threatened aquatic herptile species habitat (may also contain "special concern" aquatic herptile species habitat)
+1: Presence of "special concern" aquatic herptile species habitat
0: No critical aquatic herptile species habitat
Wildlife Habitat
+1: Outstanding wildlife habitat
0: Data not available
-1: No outstanding wildlife habitat
Size
Surface-Water Area
+3: Greater than 100 acres
+2: 50 to 100 acres
+1: 10 to 49 acres
0: Less than 10 acres
Buffer
Development of Shoreline
+3: Less than 5 percent development of shoreline
+2: 5 percent to 24 percent development of shoreline
+1: 25 percent to 50 percent development of shoreline
0: More than 50 percent development of shoreline
Physical Characteristics
Connection with Critical Aquatic Areas
+2: Connection to critical aquatic areas at both the inlet and outlet of the lake
+1: Connection to critical aquatic area at either inlet or outlet of the lake
0: No connection to critical aquatic areas
Highest possible score: +22 Lowest possible score: -1

[a]*Wisconsin Trophic State Index values were calculated using total phosphorus, chlorophyll-a, and Secchi disk water chemistry data.*

Source: Wisconsin Department of Natural Resources and SEWRPC.

Upon completion of this initial screening of lakes, the lakes were ranked using the same system as that described above for stream reaches. As with the ranking of stream reaches, the ranking of lakes was not based solely on the scores tabulated using the lake evaluation scheme. For example, Peat Lake in Kenosha County had an assessment-scheme score usually associated with a lake of AQ-3 quality. Given its status as a designated State Scientific Area, however, Peat Lake was assigned a rank of AQ-2. Data for lakes having a water-surface area of less than 50 acres were not provided in SEWRPC Memorandum Report No. 93, the principal source of data on water quality. Consequently, water quality data for the smaller lakes had to be estimated based upon available information on water quality for larger lakes in each geographic locality involved.

The identified critical lake habitat within Southeastern Wisconsin is shown on Map 53. Data on total lake acreages, assessment-scheme scores, and ranks are set forth by watershed in Table 103.

SIGNIFICANT GEOLOGICAL SITES IN SOUTHEASTERN WISCONSIN

The survey of scientifically and historically important bedrock geological sites in Southeastern Wisconsin was conducted by a team of experienced geologists well acquainted with the bedrock geology and paleontology of eastern Wisconsin, the work of early geologists in the area, the location of bedrock exposures, and the history of the nonmetallic-mineral-mining industry in the Region.[16] Work on the inventory began by gathering information from all known sources, including published literature, library archives of manuscripts, letters and unpublished reports, field notes and maps of earlier geologists, personal field notes and maps, and new field examination. The geological sites listed in this report were drawn from a potential 270 bedrock exposures known to have existed in the Region over the last 150 years.

An effort was made to field-check all known sites to determine if they still existed, to assess their present condition, and to assess their scientific, educational, or historical importance. Approximately 230 sites were located and checked. Some sites could not be found on the basis of old descriptions or maps because the surrounding landscape had changed dramatically or the information was too imprecise. Other sites had been destroyed since the times of the initial descriptions as a result of urban development, mining operations, highway construction, or natural deterioration. Difficulties in gaining access to properties prevented verification of the existence of several sites. Operating quarries were checked, but very few contained geological features worthy of consideration, and all had significant problems regarding safety and access. The 57 bedrock geological sites finally included in the inventory were selected on the basis of scientific importance, significance in industrial history, natural aesthetic quality, ecological qualities, educational value, and public access potential. Because these factors are not static, the status and value of individual sites may change over time and additional sites may come into existence.

A total of 86 significant geological areas, including the 57 bedrock geological sites noted above and 29 sites containing glacial features, was identified as existing within the Region in 1993. Those sites are listed in Table 104 and shown on Map 54. Twenty-three of the 86 sites were classified as areas of statewide or greater significance (GA-1), 28 as areas

A total of 86 significant geological areas was identified in Southeastern Wisconsin. Twenty-three of these sites were classified as being of statewide or greater significance, including the Soldiers' Home Reef, shown above, a designated National Historic Landmark in the History of Science located in the City of Milwaukee.

Source: Joanne Kluessendorf and Donald G. Mikulic.

[16] *The team consisted of Dr. Joanne Kluessendorf of the University of Illinois-Champaign-Urbana and Dr. Donald G. Mikulic of the Illinois State Geological Survey.*

Table 103

CRITICAL LAKES OF SOUTHEASTERN WISCONSIN

Watershed	Map 53 Reference Number	Lake	Acreage	Rank[a]	Assessment Score	Description[b] and Comments
Des Plaines River	119	Benet Lake-Lake Shangrila	180[c]	AQ-3 (RSH)	7	A shallow drained lake with critical fish species present
	120	East Lake Flowage	123	AQ-3	7	A drainage lake with good wildlife habitat
	121	Friendship Lake	11	AQ-3	7	A drainage lake encompassed by Friendship Lake Marsh, an identified Natural Area
	122	George Lake	59	AQ-3 (RSH)	7	A drainage lake with critical fish species present; good waterfowl habitat
	123	Hooker Lake	87	AQ-3 (RSH)	7	A drainage lake with critical fish species present
	124	Montgomery Lake	46	AQ-3 (RSH)	6	A drained lake with critical fish species present
	125	Mud Lake	22	AQ-3	6	A drained lake adjacent to an identified Natural Area, Mud Lake Sedge Meadow
	126	Paddock Lake	112	AQ-3 (RSH)	8	A drained lake with critical fish species present
	--	Total acreage and number of lakes	640	8	--	--
Fox River	127	Beulah Lake	834	AQ-1 (RSH)	16	An impounded series of natural drainage lakes serving as an important reservoir for critical fish species, including the endangered starhead topminnow; also serves as a spawning and nursery area for fish and habitat for waterfowl
	128	Lulu Lake	84	AQ-1 (RSH)	16	A drainage lake with excellent overall quality; good water quality with spring seeps from the basin; critical herptile and fish species present; aesthetically outstanding; important component of the Mukwonago River environmental corridor
	129	Lower Phantom Lake	433	AQ-1 (RSH)	18	An impounded seepage-drainage lake with critical fish species present; important component of the Mukwonago River environmental corridor
	130	Upper Phantom Lake	107	AQ-1 (RSH)	15	A seepage lake with critical fish species present; a refuge for waterfowl during hunting season
	131	Pickerel Lake	30	AQ-1 (RSH)	15	A natural drainage lake with spring activity; encompassed by Pickerel Lake Fen State Natural Area; undeveloped shoreline
		Total acreage and number of lakes	1,488	5	--	--
	132	Benedict Lake	78	AQ-2 (RSH)	10	A drained lake with good overall fish populations; critical fish species present
	133	Big Muskego Lake	2,073	AQ-2 (RSH)	11	A large, shallow drainage lake occupying part of an old glacial lake bed; critical bird species present, including two endangered species; large Natural Area, Muskego Lake Marsh, covers much of shoreline
	134	Buena Lake	241	AQ-2	10	Part of the Fox River Impoundment in Waterford; good fish population and diversity

Table 103 (continued)

Watershed	Map 53 Reference Number	Lake	Acreage	Rank[a]	Assessment Score	Description[b] and Comments
Fox River (continued)	135	Dyer Lake	56	AQ-2 (RSH)	10	A shallow drainage lake with critical fish species present; adjacent wetlands are good habitat for waterfowl and other wildlife
	136	Eagle Spring Lake	311	AQ-2 (RSH)	13	An impounded drainage lake which occupies a critical position in the Mukwonago River environmental corridor; critical species present
	137	Elizabeth Lake	682[d]	AQ-2 (RSH)	14	A drainage lake with critical fish, herptile, and bird species present
	138	Geneva Lake	5,262	AQ-2 (RSH)	11	A deep spring lake, the largest lake in the Region; critical fish species present; good overall fish diversity
	139	Kee Nong Go Mong Lake (Long Lake) (Town of Norway, Racine County)	88	AQ-2 (RSH)	12	A drainage lake with critical fish species present; shoreline and adjoining wetlands important for waterfowl and other wildlife
	140	Long Lake (Towns of Burlington and Rochester, Racine County)	102	AQ-2 (RSH)	10	A shallow drainage lake which is a component of the valuable environmental corridor in western Racine County; prime waterfowl habitat
	141	Lake Mary	315	AQ-2 (RSH)	10	A drained lake with critical fish species present; good overall fishery
	142	Mill Lake	271	AQ-2 (RSH)	12	A drainage lake which is part of the impounded Lauderdale Lakes; critical fish species present; good overall fishery
	143	Peat Lake	92	AQ-2	8	A drained lake which is the central feature of Peat Lake Scientific Area; important nesting and feeding refuge for waterfowl
	144	Pewaukee Lake	2,493	AQ-2 (RSH)	13	An impounded spring lake with critical fish and herptile species present; migratory waterfowl use the Lake
	145	Pleasant Lake	155	AQ-2 (RSH)	12	A spring lake with critical fish species present; migratory waterfowl use the Lake
	146	Silver Lake (Kenosha County)	464	AQ-2 (RSH)	13	A drainage lake with critical fish species present; adjacent wetlands to north are valuable for wildlife
	147	Spring Lake (Waukesha County)	105	AQ-2 (RSH)	13	A seepage lake with good water quality; important area for spring and fall migration
	148	Tichigan Lake	892	AQ-2 (RSH)	14	Part of the Fox River Impoundment in Waterford; critical fish and herptile species present; adjacent identified Natural Areas; high-value waterfowl habitat
	149	Waubeesee Lake	129	AQ-2 (RSH)	13	A deep drainage lake with critical fish species present; adjacent wetlands good for wildlife
	150	Wind Lake	936	AQ-2 (RSH)	13	A drainage lake with critical fish and herptile species present
	--	Total acreage and number of lakes	14,745	19	--	--
	151	Army Lake	78	AQ-3 (RSH)	6	A shallow spring lake with an adjacent Natural Area, Army Lake Lowlands
	152	Bass Bay	104	AQ-3	7	A satellite of Big Muskego Lake containing good fish populations

Table 103 (continued)

Watershed	Map 53 Reference Number	Lake	Acreage	Rank[a]	Assessment Score	Description[b] and Comments
Fox River (continued)	153	Bohner Lake	135	AQ-3	8	A drainage lake with good water quality
	154	Booth Lake	113	AQ-3 (RSH)	9	A shallow seepage lake with good water quality
	155	Brock Lake	11	AQ-3 (RSH)	8	A drainage lake with an undeveloped shoreline; is a component of a high-quality environmental corridor in western Racine County
	156	Browns Lake	396	AQ-3	7	A drained lake; headwaters of a tributary to the Fox River
	157	Camp Lake	461	AQ-3 (RSH)	8	A shallow drainage lake with critical fish species present; ideal conditions for waterfowl and marsh furbearers
	158	Center Lake	129	AQ-3 (RSH)	9	A drainage lake; well-rounded fishery; critical fish species present
	159	Lake Como	946	AQ-3	5	A shallow, impounded seepage lake; adjacent wetlands considered prime wildlife habitat
	160	Cross Lake	62[e]	AQ-3 (RSH)	8	A drained lake with critical fish species present
	161	Lake Denoon	162	AQ-3 (RSH)	6	A deep seepage lake with critical fish species present; marsh west of Lake is of value to wildlife
	162	Eagle Lake	520	AQ-3 (RSH)	7	A shallow drainage lake with adjacent marshlands important for waterfowl and herptile species habitat and fish-spawning habitat
	163	Four Dollar Flowage	20	AQ-3 (RSH)	7	Within the Bong State Recreation Area; good wildlife habitat
	164	Green Lake	311	AQ-3	8	A spring lake which is part of the impounded Lauderdale Lakes; good water quality and fish diversity
	165	Honey Lake	44	AQ-3 (RSH)	7	A drainage lake with an adjacent Natural Area, Honey Lake Marsh and Sedge Meadow
	166	Lake Ivanhoe	42	AQ-3	8	A drainage lake with an undeveloped shoreline; adjacent Natural Area, Lake Ivanhoe Fen and Sedge Meadow
	167	Leda Lake	13	AQ-3 (RSH)	8	A drained lake with an undeveloped shoreline; component of high-quality environmental corridor in western Racine County
	168	Middle Lake	259	AQ-3	9	A spring-drainage lake which contains a natural spring area which remains open all winter, giving birds a winter refuge; good water quality
	169	Peters Lake	64	AQ-3 (RSH)	9	A shallow seepage lake with good wildlife habitat
	170	Potter Lake	162	AQ-3 (RSH)	7	A shallow seepage lake with wetlands to the west of high value to wildlife
	171	Powers Lake	459	AQ-3	8	A drainage lake with good water quality
	172	Rainbow Springs Lake	35	AQ-3 (RSH)	8	A seepage lake with a mostly undeveloped shoreline
	173	Refuge Flowage	11	AQ-3 (RSH)	7	Within the Bong State Recreation Area; good wildlife habitat

Table 103 (continued)

Watershed	Map 53 Reference Number	Lake	Acreage	Rank[a]	Assessment Score	Description[b] and Comments
Fox River (continued)	174	Rock Lake	46	AQ-3 (RSH)	5	A drained lake with critical fish species present
	175	Saylesville Mill Pond	45	AQ-3 (RSH)	8	An impounded drainage lake along Genesee Creek; link between critical aquatic areas
	176	Silver Lake (Walworth County)	85	AQ-3	5	A seepage lake which is an identified Natural Area
	177	Swan Lake	27	AQ-3 (RSH)	9	A spring lake with an undeveloped shoreline encompassed by Swan Lake Wetland Complex, an identified Natural Area
	178	Swift Lake	19	AQ-3 (RSH)	7	A seepage lake with suitable habitat for Blanding's turtle, a threatened species
	179	Tombeau Lake	35	AQ-3 (RSH)	8	A drainage lake with critical fish species present
	180	Unnamed lake (T4N, R17E, Section 9)	19	AQ-3 (RSH)	9	A drained, undeveloped lake which is a component of the upper Mukwonago River environmental corridor
	181	Unnamed lake (T4N, R17E, Section 10)	10	AQ-3 (RSH)	9	An undeveloped lake surrounded by sedge meadow end marsh; component of the upper Mukwonago River corridor
	182	Unnamed lake (T4N, R17E, Sections 13, 14, 23, 24)	24	AQ-3 (RSH)	10	A spring lake located at the headwaters of the stream entering Pickerel Lake
	183	Unnamed lake (T4N, R17E, Section 19)	32	AQ-3 (RSH)	6	A shallow lake with suitable habitat for Blanding's turtle, a threatened species
	184	Unnamed lake (T5N, R18E, Section 29)	15	AQ-3 (RSH)	7	A pond in Mukwonago Park with suitable habitat for Blanding's turtle, a threatened species
	185	Voltz Lake	52	AQ-3 (RSH)	6	A drained lake with critical fish species present
	186	Lake Wandawega	119	AQ-3	5	A shallow seepage lake with adjacent wetlands considered prime wildlife habitat
	187	Willow Springs Lake	40	AQ-3 (RSH)	7	Adjacent to Spring Lake Sedge Meadow and Fens, an identified Natural Area
	188	Wood Lake	20	AQ-3 (RSH)	8	A drained lake which is a component of the valuable Mukwonago River environmental corridor
	--	Total acreage and number of lakes	5,125	38	--	--
Direct Drainage to Lake Michigan	189	Quarry Lake (T12N, R23E, Section 19)	19	AQ-3	6	An abandoned limestone quarry which is an identified Geological Area site adjacent to an identified Natural Area, Harrington Beach Lacustrine Forest
	--	Total acreage and number of lakes	19	1	--	--
Milwaukee River	190	Big Cedar Lake	932	AQ-1 (RSH)	15	A deep spring-drainage lake at the headwaters of Cedar Creek; critical fish and herptile species present; good water quality

Table 103 (continued)

Watershed	Map 53 Reference Number	Lake	Acreage	Rank[a]	Assessment Score	Description[b] and Comments
Milwaukee River (continued)	191	Gilbert Lake	44	AQ-1 (RSH)	17	An undeveloped spring lake surrounded by tamarack swamp, bog, sedge meadow, and marsh at the headwaters of Cedar Creek; critical fish and herptile species present
	192	Long Lake (Ozaukee County)	34	AQ-1 (RSH)	9	A shallow seepage lake with an undeveloped shoreline and wilderness charactar within the Cedarburg Bog State Natural Area; a variety of plant communities surrounds the Lake; critical herptile habitat
	193	Mud Lake (Ozaukee County)	245	AQ-1 (RSH)	11	A shallow, undeveloped seepage lake within the Cedarburg Bog State Natural Area; a variety of plant communities surrounds the Lake
	--	Total acreage and number of lakes	1,255	4	--	--
	194	Big Bienborn Lake (Horn Lake)	12	AQ-2 (RSH)	8	A seepage lake adjacent to the Cedarburg Bog State Natural Area
	195	Little Cedar Lake	246	AQ-2 (RSH)	10	A drainage lake with adjacent wetlands which support good habitat for critical herptile species such as the bullfrog
	196	Lucas Lake	78	AQ-2 (RSH)	14	A largely undeveloped drainage lake with good water quality and critical fish species present
	197	Silver Lake (Washington County)	118	AQ-2 (RSH)	11	A drainage lake with critical fish species present; wetland to west offers diversity of wildlife and plant communities
	198	Smith Lake	86	AQ-2 (RSH)	9	A shallow seepage lake with adjacent high-quality wetlands; an identified Natural Area
	199	Watts Lake	7[f]	AQ-2	8	A deep spring lake within the Cedarburg Bog State Natural Area; an undeveloped shoreline
	--	Total acreage and number of lakes	547	6	--	--
	200	Green Lake (Washington County)	71	AQ-3 (RSH)	7	A seepage lake with critical fish species present; extensive wetlands adjacent to Lake
	201	Hasmer Lake	15	AQ-3 (RSH)	6	A drainage lake with critical fish species present
	202	Huiras Lake	26	AQ-3	6	A undeveloped seepage lake encompassed by an identified Natural Area, Huiras Lake Woods and Bog
	203	Mueller Lake	14	AQ-3 (RSH)	8	A spring lake with an adjacent Natural Area, Big Cedar Lake Bog; critical herptile habitat
	204	Radtke Lake	10	AQ-3	6	An undeveloped seepage lake within an identified Natural Area, Camp Wowitan Wetlands
	205	Spring Lake (Ozaukee County)	57[g]	AQ-3	8	A seepage lake with adjacent wetlands important for breeding and feeding habitat for wildlife
	206	Tilly Lake	13	AQ-3 (RSH)	7	A spring lake with critical fish species present

Table 103 (continued)

Watershed	Map 53 Reference Number	Lake	Acreage	Rank[a]	Assessment Score	Description[b] and Comments
Milwaukee River (continued)	207	Lake Twelve	53	AQ-3	7	A spring lake with a mostly undisturbed shoreline; good wildlife habitat
	208	Unnamed lake (T11N, R21E, Section 20)	13	AQ-3 (RSH)	8	A seepage lake with suitable habitat for Blanding's turtle, a threatened species
	209	Unnamed lake (T12N, R19E, Sections 24, 25)	18	AQ-3 (RSH)	6	Suitable habitat for Blanding's turtle, a threatened species
	--	Total acreage and number of lakes	290	10	--	--
Rock River	210	Loew's Lake	23	AQ-1 (RSH)	17	An undeveloped drainage lake located in the heart of the valuable upper Oconomowoc River environmental corridor
	211	Nagawicka Lake	957	AQ-1 (RSH)	15	A deep drainage lake in the Bark River valley, an important reservoir for critical fish species; critical fish species present in Lake; adjacent to Natural Area, Nagawicka Lake Bog and Oak Woods
	--	Total acreage and number of lakes	980	2	--	--
	212	Ashippun Lake	84	AQ-2 (RSH)	11	A spring lake with a relatively large and diverse fish community, including critical species; large wetland complex to northwest contains high-quality waterfowl habitat
	213	Beck Lake	16	AQ-2 (RSH)	11	An undeveloped seepage lake encompassed by a high-quality Natural Area, Murphy Lake-McConville Lake Wetland Complex
	214	Comus Lake	117	AQ-2 (RSH)	10	An impounded drainage lake surrounded by a wetland complex; important critical herptile habitat
	215	Crooked Lake	58	AQ-2 (RSH)	14	A shallow drainage lake in the Bark River valley; critical fish species present
	216	Dutchman Lake	31	AQ-2 (RSH)	10	A seepage-drainage lake in the Scuppernong Creek corridor; good water quality and waterfowl habitat
	217	Golden Lake	198[h]	AQ-2 (RSH)	12	A spring lake with good water quality; critical fish and herptile species present
	218	Hunter Lake	65	AQ-2 (RSH)	11	A spring-drainage lake in the Scuppernong Creek corridor
	219	McConville Lake	14	AQ-2 (RSH)	11	An undeveloped seepage lake encompassed by a high-quality Natural Area, Murphy Lake-McConville Lake Wetland Complex
	220	Merton Millpond	38	AQ-2 (RSH)	10	An impoundment of the Bark River; a valuable reservoir for critical fish species
	221	Murphy Lake	16	AQ-2 (RSH)	11	An undeveloped seepage lake encompassed by a high-quality Natural Area, Murphy Lake-McConville Lake Wetland Complex
	222	Lower Nashotah Lake	90	AQ-2 (RSH)	10	A spring lake with good water quality; critical fish species present

Table 103 (continued)

Watershed	Map 53 Reference Number	Lake	Acreage	Rank[a]	Assessment Score	Description[b] and Comments
Rock River (continued)	223	Upper Nashotah Lake	133	AQ-2 (RSH)	10	A spring lake with critical fish species present
	224	Lower Nemahbin Lake	271	AQ-2 (RSH)	13	A drainage lake with critical fish species present
	225	Upper Nemahbin Lake	283	AQ-2 (RSH)	11	A drainage lake with critical fish species present
	226	North Lake (Waukesha County)	437	AQ-2 (RSH)	10	A drainage lake; an important reservoir in the Oconomowoc River watershed
	227	Oconomowoc Lake	767	AQ-2 (RSH)	14	A drainage lake with good water quality; critical fish species present
	228	Okauchee Lake	1,187	AQ-2 (RSH)	14	A drainage lake with critical fish species present; area near inlet of Oconomowoc River contains good herptile species habitat
	229	Ottawa Lake	28	AQ-2 (RSH)	13	A spring lake with good water quality; adjacent to Ottawa Lake Fen State Natural Area; valuable habitat for waterfowl
	230	Pike Lake	522	AQ-2 (RSH)	14	A drainage lake with critical fish and herptile species present; important spawning area for game fish
	231	Pine Lake	703	AQ-2 (RSH)	10	A spring lake with critical fish species present
	232	School Section Lake	125	AQ-2 (RSH)	10	An impounded drainage lake with adjacent wetlands which are valuable to wildlife
	233	Silver Lake (Waukesha County)	222	AQ-2 (RSH)	10	A seepage lake with good water quality
	234	Tripp Lake	115	AQ-2 (RSH)	13	An impoundment of Whitewater Creek with critical fish and herptile species habitat; wading birds use the Lake
	235	Turtle Lake	140	AQ-2 (RSH)	14	A spring lake with critical fish and herptile species present
	236	Unnamed lake (T9N, R19E, Section 17)	13	AQ-2 (RSH)	10	A drainage lake; a component of the Oconomowoc River corridor
	--	Total acreage and number of lakes	5,673	25	--	--
	237	Amy Bell Lake	26	AQ-3 (RSH)	5	A seepage lake encompassed by a Natural Area, Amy Bell Lake and Lowlands
	238	Bark Lake	65	AQ-3 (RSH)	7	A spring-drainage lake located at the headwaters of the Bark River
	239	Beaver Lake	316	AQ-3 (RSH)	9	A spring-seepage lake with critical fish species present
	240	Bowron Lake	25	AQ-3 (RSH)	7	A spring lake with an adjacent Natural Area, Bark River Marsh
	241	Cravath Lake	65	AQ-3 (RSH)	6	A shallow impoundment with the only recent regional record of the American eel, a "special concern" fish species
	242	Druid Lake	124	AQ-3	8	A drainage lake within the Ashippun River watershed
	243	Duck Lake	12	AQ-3 (RSH)	8	A seepage lake with suitable habitat for Blanding's turtle, a threatened species

Table 103 (continued)

Watershed	Map 53 Reference Number	Lake	Acreage	Rank[a]	Assessment Score	Description[b] and Comments
Rock River (continued)	244	Lake Five	102	AQ-3	6	A seepage lake with good water quality; adjacent Natural Area, Lake Five Woods
	245	Forest Lake	41	AQ-3 (RSH)	9	A mostly undeveloped seepage lake with suitable habitat for Blanding's turtle, a threatened species
	246	Fowler Lake	78	AQ-3	7	A drainage lake within the Oconomowoc River corridor; good water quality
	247	Friess Lake	119	AQ-3 (RSH)	9	A drainage lake in the Oconomowoc River corridor; important for waterfowl
	248	Lower Genesee Lake	66	AQ-3 (RSH)	6	A spring lake with good water quality
	249	Middle Genesee Lake	102	AQ-3 (RSH)	8	A seepage lake with good water quality
	250	Upper Genesee Lake	37	AQ-3 (RSH)	9	A spring lake with critical fish species present
	251	Henrietta Lake	15	AQ-3 (RSH)	6	A seepage lake with critical herptile species present; Henrietta Lake Bog, an identified Natural Area, at south end
	252	Lake Keesus	237	AQ-3	5	A spring lake with adjacent Natural Areas, Lake Keesus Fen-Meadow and Camp Whitcomb Lowland
	253	Lac La Belle	1,117	AQ-3	8	A drainage lake within the Oconomowoc River corridor
	254	Larkin Lake	41	AQ-3 (RSH)	9	A spring lake; an identified Natural Area
	255	Loraine Lake	133	AQ-3	6	A seepage lake with an adjacent Natural Area, Lake Loraine Marsh
	256	Moose Lake	81	AQ-3 (RSH)	7	A spring lake with critical fish species present
	257	Mud Lake (Washington County)	23	AQ-3	6	An undeveloped seepage lake encompassed by a Natural Area, Mud Lake Meadow
	258	Lake No. 10	40	AQ-3	7	An undeveloped seepage lake which is an identified Natural Area
	259	Reagons Lake	16	AQ-3 (RSH)	6	A spring lake with valuable wildlife habitat
	260	Rice Lake	137	AQ-3 (RSH)	8	A impounded drainage lake with habitat for the bullfrog, a "special concern" species
	261	Spring Lake (T6N, R17E, Section 3)	14	AQ-3 (RSH)	8	A seepage lake with critical herptile species habitat
	262	Unnamed lake (T6N, R17E, Section 16)	12	AQ-3 (RSH)	8	An undeveloped lake with wilderness character
	263	Unnamed lake (T7N, R17E, Section 25)	29	AQ-3 (RSH)	8	A kettle lake with critical herptile species habitat
	264	Unnamed lake (T7N, R17E, Section 25; T7N, R18E, Section 30)	10	AQ-3 (RSH)	8	A kettle lake with critical herptile species habitat
	265	Utica Lake	14	AQ-3 (RSH)	8	A spring lake with critical herptile species habitat
	266	Waterville Pond	68	AQ-3 (RSH)	8	A Scuppernong Creek impoundment with critical herptile species habitat

Table 103 (continued)

Watershed	Map 53 Reference Number	Lake	Acreage	Rank[a]	Assessment Score	Description[b] and Comments
Rock River (continued)	267	Whitewater Lake	640	AQ-3 (RSH)	6	An impoundment with critical herptile species habitat
	--	Total acreage and number of lakes	3,805	31	--	--

[a] *AQ-1 identifies Aquatic Areas of statewide or greater significance*
AQ-2 identifies Aquatic Areas of countywide or regional significance
AQ-3 identifies Aquatic Areas of local significance
RSH, or Rare Species Habitat, identifies those Aquatic Areas which support endangered, threatened, or "special concern" species officially designated by the Wisconsin Department of Natural Resources

[b] *"Drainage lakes" are lakes that have both an inlet and an outlet and whose main water source is stream drainage*
"Seepage lakes" are lakes which have no inlet or outlet and whose main source of water is direct precipitation and runoff supplemented by groundwater
"Spring lakes" are lakes which have no inlet but do have an outlet and whose main source of water is groundwater flowing directly into the basin and from the immediate drainage area
"Drained lakes" are lakes which have no inlet but do have an outlet and which are not groundwater-fed; their primary source of water is from precipitation and runoff from the immediate drainage area

[c] *Does not include six acres in Lake County, Illinois.*

[d] *Does not include 183 acres in McHenry County, Illinois.*

[e] *Does not include 25 acres in Lake County, Illinois.*

[f] *Even though Watts Lake is less than 10 acres in surface area, it was included in this listing due to its known high quality.*

[g] *Does not include nine acres in Sheboygan County.*

[h] *Does not include 52 acres in Jefferson County.*

Source: Wisconsin Department of Natural Resources; Wisconsin Herpetological Atlas Project; George C. Becker, Fishes of Wisconsin, University of Wisconsin Press, Madison, Wisconsin, 1983; Harold A. Mathiak, A River Survey of the Unionid Mussels of Wisconsin: 1973-1977, Sand Shell Press, Horicon, Wisconsin, 1979; local naturalists; and SEWRPC.

of countywide or regional significance (GA-2), and 35 as sites of local significance (GA-3), as shown in Table 104. Among the seven counties of the Region, Waukesha County contained the highest number of GA-1 sites, with eight; the highest number of GA-2 sites, with seven; the highest number of GA-3 sites, with 13; and the highest number of total sites, with 28. Two additional sites, one GA-1 site and one GA-2 site, were located partly in Waukesha County and partly in adjacent counties. Milwaukee County contained the second highest number of GA-1 sites, with six. Only one significant geological area was identified in Kenosha County.

SIGNIFICANT ARCHAEOLOGICAL SITES IN SOUTHEASTERN WISCONSIN

Data provided by the State Archaeologist at the State Historical Society of Wisconsin indicate that 2,043 historic and prehistoric archaeological sites have been identified in Southeastern Wisconsin. Among the seven counties of the Region, Milwaukee County contains the highest number of historic sites, with 50, while Waukesha County contains the highest number of prehistoric sites, with 511. Fourteen sites are listed on the National Register of Historic Places (see Table 105 and Map 55). Waukesha County contained five such sites, Milwaukee and Kenosha Counties each had three, Walworth County had two, and Washington County had one. The remaining sites, ranging from occurrences of single arrowheads to campsites and village sites, have not been evaluated in detail.

SUMMARY

A total of 447 designated Natural Areas, totaling 57,649 acres, or 3.3 percent of the Region, was identified as existing in Southeastern Wisconsin in 1994. These were distributed into 40 NA-1 Natural Area sites, the highest category, totaling 8,700

Table 104

SIGNIFICANT GEOLOGICAL AREAS IN SOUTHEASTERN WISCONSIN: 1993

Map 54 Reference Number	Site Name	Classification Code[a]	County	Location	Ownership	Description and Comments
1	Horlickville Bluffs and Quarries	GA-1	Racine	T3N, R23E Section 6 Town of Mt. Pleasant	Private	Natural bluffs and old quarries along Root River, with exposures of richly fossiliferous Racine Dolomite reef strata. Site has produced the largest known diversity of fossil marine organisms from any Silurian reef in the world. Considered for designation as a National Historic Landmark in the History of Science
2	Lulu Lake Glacial Lake and Crevasse Filling	GA-1	Walworth	T4N, R17E Section 2 Town of Troy	Department of Natural Resources, The Nature Conservancy, and other private	A near-classic example of a kettle lake located on a pitted outwash terrace. It is associated with the end moraine of the Lake Michigan lobe. Also present is a good example of a crevasse filling
3	Scuppernong Creek Spillway	GA-1	Waukesha	T6N, R18E Sections 5, 6 Town of Genesee T7N, R18E Sections 32, 33 Town of Delafield	Private	One of the finest examples of a glacial spillway remaining in the United States. Studied on a national and international basis. Associated with several other interlobate glacial features including kames, a kame delta, and kettles
4	Johnston Quarry and Kilns	GA-1	Waukesha	T6N, R18E Section 24 Town of Genesee	Private	Two quarries excavated in Silurian Waukesha Dolomite in side of 20-foot-high bedrock hill. Contains fossil cephalopods. Listed on National Register of Historic Places
5	Carroll College Quarry	GA-1	Waukesha	T6N, R19E Section 3 City of Waukesha	Carroll College	Covered rock exposures of first quarry opened in Waukesha County. Visited by many prominent 19th-century geologists; source of large fossil collections, including those of major museums across the United States. The type section of the Waukesha Dolomite
6	Jones Quarry	GA-1	Waukesha	T7N, R18E Sections 23, 24 Town of Delafield	Private	Undisturbed 19th-century quarry remains only source of rich Ordovician fossil biota in Southeastern Wisconsin. To east is an excellent exposure of the Niagara Escarpment
7	Pewaukee Stone Pits, Quarries, and Outcrops	GA-1	Waukesha	T7N, R19E Section 9 Village of Pewaukee	Wisconsin Department of Transportation, Village of Pewaukee, and private	Small stone pits, quarries, and outcrops expose only reef known in the Waukesha Dolomite in Southeastern Wisconsin. This reef is older than any other fossil reef in the area
8	Sussex Lime Kiln	GA-1	Waukesha	T8N, R19E Section 23 Village of Sussex	Private	One of the best unaltered late-19th-century kilns remaining in Southeastern Wisconsin. Eligible for listing on the National Register of Historic Places
9	Menomonee Falls Reef	GA-1	Waukesha	T8N, R20E Section 10 Village of Menomonee Falls	Private	Series of natural outcrops which form a river gorge, as well as old quarry exposures and lime kilns, situated along the Menomonee River. Falls form from exposure-resistant reef rock. One of the earliest bedrock sites described in Southeastern Wisconsin, having been noted by Increase Lapham in the 1840s

Table 104 (continued)

Map 54 Reference Number	Site Name	Classification Code[a]	County	Location	Ownership	Description and Comments
10	Raasch's Dome	GA-1	Waukesha	T8N, R20E Section 17 Village of Lannon	Private	Elliptical rock dome with sides that dip as much as 20 degrees away from center. Excellent example of an unusual geologic feature
11	Hartung Quarry	GA-1	Milwaukee	T7N, R21E Section 8 City of Milweukee	City of Milwaukee	Abandoned building-stone quarry in Racine Dolomite. Formerly one of the most famous fossil-collecting localities in the Midwest. Fine specimens of the Wisconsin State fossil, Calymene celebra, a trilobite, have been found here
12	Schoonmaker Reef	GA-1	Milwaukee	T7N, R21E Section 22 City of Wauwatosa	Private	Racine Dolomite reef rock exposed in old quarry wall. As this was the first fossil reef in North America to be interpreted as such, it is the most important geological site in Southeastern Wisconsin. Fossils found here are now located in museums across the country. Under consideration for designation as a National Historic Landmark in the History of Science
13	Soldiers' Home Reef	GA-1	Milwaukee	T7N, R21E Section 35 City of Milwaukee	Zablocki Veterans Affairs Medical Center	Relatively undisturbed Menomonee River bluff containing 450-foot-long reef. Has international significance in the history of geology for its key role in first recognition of fossil reefs in North America. A National Historic Landmark in the History of Science
14	Estabrook Park-Lincoln Park Area	GA-1	Milwaukee	T7N, R22E Sections 4, 5 City of Glendale Village of Shorewood	Milwaukee County	Scattered outcrops and old quarry exposures along the Milwaukee River, representing the best and most extensive exposures of the highly fossiliferous Milwaukee Formation in the State
15	Brown Deer Railroad Cut	GA-1	Milwaukee	T8N, R21E Section 11 Village of Brown Deer	CP Rail System	Northernmost exposure of the Devonian Milwaukee Formation, first described by T. C. Chamberlin in 1877. Locality from which the type specimen of the Devonian fish Rhynchodus excavatus was collected
16	Whitefish Bay Shore Exposure	GA-1	Milwaukee	T8N, R22E Section 21 Village of Fox Point	Private	Low natural outcrop of the Devonian Milwaukee Formation, extending for 200 feet along the Lake Michigan shoreline. Studied by early prominent geologists
17	Thiensville Roadcut and Quarry	GA-1	Ozaukee	T9N, R21E Section 10 City of Mequon	Ozaukee County and private	Road cut and small old quarry provide only sizable exposure of the Devonian Thiensville Formation anywhere
18	Ozaukee Buried Forest	GA-1	Ozaukee	T9N, R21E Section 17 City of Mequon	Private	Old water-filled sand quarry contains remnants of ancient forest
19	Milwaukee River-Grafton Outcrops and Lime Kiln Park	GA-1	Ozaukee	T10N, R21E Section 24 Village of Grafton	Ozaukee County and private	Undisturbed, 40-foot-high rock outcrops along the Milwaukee River, containing the best and most extensive exposures of Silurian Racine Dolomite in the Region. Historically used for scientific research

Table 104 (continued)

Map 54 Reference Number	Site Name	Classification Code[a]	County	Location	Ownership	Description and Comments
20	Cedar Creek-Anschuetz Quarries	GA-1	Ozaukee	T10N, R21E Section 26 Town of Cedarburg	Private	Outcrops and abandoned quarries along Cedar Creek that were main supply of stone for area buildings
21	Phyllocarid Quarry	GA-1	Ozaukee	T12N, R21E Section 29 Town of Fredonia	Private	Small, partially water-filled quarry in Upper Silurian Waubakee Dolomite. Only site in Wisconsin where Silurian phyllocarid fossils have been found
22	Friess Lake (Hogsback) Crevasse Filling	GA-1	Washington	T9N, R19E Section 19 Town of Richfield	Private	Excellent example of a crevasse filling
23	Kettle Moraine Interlobate Moraine	GA-1	Washington, Waukesha, and Walworth	Western portion of Region	Department of Natural Resources, Washington County, Waukesha County, and private	Interlobate moraine consisting of a complex system of irregular, knobby ridges, trending northeast-southwest across the western portion of the Region
24	Kenosha Dunes and Buried Forest	GA-2	Kenosha	T1N, R23E Sections 7, 8 City of Kenosha	The Nature Conservancy and City of Kenosha	About 0.5 mile of frontage on Lake Michigan containing well-developed dunes and ancient hardwood forest buried beneath dunes
25	Wind Point	GA-2	Racine	T4N, R23E Section 27 Village of Wind Point	Racine County	Low natural outcrops, exposing highly fossiliferous Racine Dolomite reef rock, extending several hundred feet along Lake Michigan shore
26	Sugar Creek Quarry	GA-2	Walworth	T3N, R18E Section 16 Town of Spring Prairie	Private	Small abandoned quarry on south bank of Sugar Creek. Only exposure of geologically important fossiliferous Kankakee Dolomite in Wisconsin
27	Whitewater Quarry	GA-2	Walworth	T4N, R15E Section 8 Town of Whitewater	Private	Old quarry with one of few exposures of Galena Dolomite in Region
28	Whitewater Lake-Rice Lake Eskers	GA-2	Walworth	T4N, R15E Sections 26, 35 Town of Whitewater	Department of Natural Resources and private	Two eskers separating Whitewater Lake from Rice Lake
29	John Muir Trail Kettle Holes	GA-2	Walworth	T4N, R16E Section 9 Town of LaGrange	Department of Natural Resources	Large, sphagnum-filled kettle holes
30	Casselman's Quarry	GA-2	Walworth	T4N, R18E Section 11 Town of East Troy	Private	Small quarry excavated in Silurian Mayville Dolomite. One of the few bedrock exposures in Walworth County
31	Scuppernong Pitted Outwash	GA-2	Waukesha	T5N, R17E Sections 7-9, 16-20 Town of Eagle	Department of Natural Resources and private	A large, pitted outwash plain
32	Eagle Esker	GA-2	Waukesha	T5N, R17E Sections 28, 29 Town of Eagle	Department of Natural Resources and private	Good example of an esker with a local relief of between 40 feet and 65 feet
33	Eagle Kettle Hole	GA-2	Waukesha	T5N, R17E Section 30 Town of Eagle	Department of Natural Resources	Deepest kettle hole in Waukesha County (approximately 90 feet deap)
34	Delafield Drumlin Fields	GA-2	Waukesha	T6N, R18E Sections 1, 2 Town of Genesee T7N, R18E Sections 34, 35, 36 Town of Delafield	Waukesha County and private	A very well developed example of a drumlin field

Table 104 (continued)

Map 54 Reference Number	Site Name	Classification Code[a]	County	Location	Ownership	Description and Comments
35	Delafield Interurban Cut	GA-2	Waukesha	T7N, R18E Sections 23, 24 Town of Delafield	Private	Fossil-rich exposure of lower Mayville Dolomite along abandoned interurban railway line
36	Menomonee Park Quarry and Domes	GA-2	Waukesha	T8N, R20E Sections 7, 8 Village of Menomonee Falls	Waukesha County and private	Natural and human-made exposures of Racine Dolomite. Contains some of the least-disturbed rock-controlled geomorphology in Waukesha County
37	Menomonee River Outcrop	GA-2	Waukesha	T8N, R20E Section 36 Village of Butler Village of Menomonee Falls	Private	Low outcrops of Racine Dolomite interreef strata along Menomonee River
38	Root River Outcrops	GA-2	Milwaukee	T5N, R21E Section 3 City of Franklin	Milwaukee County	Natural outcrops of Racine Dolomite reef rocks
39	Warnimont Park Clay Banks	GA-2	Milwaukee	T6N, R22E Sections 25, 36 City of Cudahy	Milwaukee County	Clay banks along Lake Michigan shore
40	Lime Ridge	GA-2	Milwaukee	T7N, R21E Section 25 T7N, R22E Section 30 City of Milwaukee	Wisconsin Department of Transportation, Wisconsin Electric Power Company, and other private	Reef-controlled bedrock hill along Menomonee River bluff. Abundant fossils formerly collected here. Studied by Increase Lapham in 1836
41	Menomonee River Outcrops	GA-2	Milwaukee	T7N, R21E Sections 26, 27 City of Milwaukee City of Wauwatosa	Milwaukee County and private	Exposures of Racine Dolomite in bed of Menomonee River and outcrops along south bank
42	McGovern Park	GA-2	Milwaukee	T8N, R21E Section 35 City of Milwaukee	Milwaukee County	Excellent example of bedrock-glacier interaction; most accessible roche moutonnée in the Region
43	Virmond Park Clay Banks	GA-2	Ozaukee	T9N, R22E Section 28 City of Mequon	Ozaukee County	Clay banks along Lake Michigan shoreline
44	Groth Quarry	GA-2	Ozaukee	T10N, R21E Section 35 City of Cedarburg	City of Cedarburg	One of the more important geological sites in the area because of its prominence in the fossil reef studies of eminent geologists. Contains unique reef fossil biota
45	Druecker's Lime Kiln	GA-2	Ozaukee	T11N, R22E Section 9 Town of Port Washington	Private	Nineteenth-century patented lime kiln, possibly only remaining example
46	Sauk Creek	GA-2	Ozaukee	T11N, R22E Section 29 Town of Port Washington	Private	Unquarried riverbank and low falls exhibiting natural outcrops of Silurian Racine Dolomite
47	Harrington Beach State Park	GA-2	Ozaukee	T12N, R23E Section 19 Town of Belgium	Department of Natural Resources	Large, water-filled quarry and restored pot kiln, and extensive exposures of Devonian rock containing abundant, highly diverse marine fossils
48	Erin Esker	GA-2	Washington	T9N, R18E Sections 10, 15, 16, 21 Town of Erin	Private	A good example of an esker, easily observed on an agricultural landscape. Some development impacts

Table 104 (continued)

Map 54 Reference Number	Site Name	Classification Code[a]	County	Location	Ownership	Description and Comments
49	Little Menomonee River Reef District	GA-2	Washington, Ozaukee, and Waukesha	T9N, R20E Sections 35, 36 Village of Germantown T9N, R21E Sections 19, 20, 30 City of Mequon T8N, R20E Section 2 Village of Menomonee Falls	Private	Silurian Racine Dolomite reef rock exposures. Has considerable importance in scientific research. Contains a wide variety of reef features
50	Myra Esker	GA-2	Washington	T11N, R20E Sections 15, 16 Town of Trenton	Private	A well-developed, little-disturbed east-west-tending esker covered by natural vegetation
51	Kewaskum Conical Kame	GA-2	Washington	T12N, R19E Section 3 Town of Kewaskum	Private	A well-developed. isolated conical kame which serves as the "gateway" to the Northern Unit of the Kettle Moraine landscape
52	Burlington Crevasse Filling	GA-3	Racine	T2N, R19E Sections 4, 9 Town of Burlington	Private	Good example of crevasse fill
53	Root River Outcrops	GA-3	Racine	T4N, R22E Section 26 Town of Caledonia	Private	Low outcrops of Racine Dolomite along Root River; one of few places in Racine County where rock is exposed
54	Cliffside Park Clay Banks	GA-3	Racine	T4N, R23E Sections 7, 8 Town of Caledonia	Racine County	Clay banks along Lake Michigan shoreline
55	Turtle Creek Glacial Spillway	GA-3	Walworth	T2N, R15E Sections 5-8, 11-13, 18 Town of Darien T3N, R15E Sections 26, 35, 36 Town of Richmond	Department of Natural Resources and private	A good example of a glacial spillway
56	Lyons Glacial Deposits	GA-3	Walworth	T2N, R18E Sections 12-15, 21-29 Town of Lyons	Private	Outstanding examples of kettle and kame topography
57	Morainic Triple Point	GA-3	Walworth	T3N, R15E Section 9 Town of Richmond	Private	Point where the interlobate moraine ends, and the Johnstown and Darien terminal moraines begin
58	Voree Quarry	GA-3	Walworth	T3N, R18E Section 36 Town of Spring Prairie	Private	Old, water-filled quarry, exposing the unusual Brandon Bridge Formation of dolomite rock
59	Spirits Wash Bowl	GA-3	Walworth	T4N, R16E Section 4 Town of LaGrange	Department of Natural Resources	A kettle hole
60	Nordic Trail Kettle Holes	GA-3	Walworth	T4N, R16E Sections 10, 11 Town of LaGrange	Department of Natural Resources and private	Huge, water-filled kettle holes
61	Stark Road Quarry	GA-3	Waukesha	T5N, R17E Section 10 Town of Eagle	Department of Natural Resources	Exposed wall of small, old quarry containing good exposure of Niagara Escarpment
62	Brady's Rock	GA-3	Waukesha	T5N, R17E Section 10 Town of Eagle	Department of Natural Resources and private	Natural rock bluff along west edge of Kettle Moraine representing some of the southernmost exposures of Niagara Escarpment in Wisconsin

Table 104 (continued)

Map 54 Reference Number	Site Name	Classification Code[a]	County	Location	Ownership	Description and Comments
63	Scuppernong Glacial Lake	GA-3	Waukesha	T5N, R17E Sections 3-5, 8, 9, 16-18 Town of Eagle	Department of Natural Resources and private	Eastern edge of extensive glacial lake
64	Jericho Creek Outcrop	GA-3	Waukesha	T5N, R17E Section 24 Town of Eagle	Private	Natural outcrops of Mayville Dolomite along banks of Jericho Creek, first studied by Increase Lapham in 1840s
65	Hunter's bluff	GA-3	Waukesha	T6N, R17E Sections 11, 14 Town of Ottawa	Private	Natural rock bluff along west side of Kettle Moraine representing some of the southernmost exposures of Niagara Escarpment in Wisconsin
66	Unnamed bluff	GA-3	Waukesha	T6N, R17E Section 22 Town of Ottawa	Private	Natural bluff exposing Niagara Escarpment
67	Unnamed Quarry	GA-3	Waukesha	T6N, R17E Section 14 Town of Ottawa	Private	Old quarry with exposures of Niagara Escarpment
68	Prospect Hill Drumlin	GA-3	Waukesha	T6N, R20E Sections 29-32 City of New Berlin	Private	A conspicuous drumlin
69	Tessmann Drumlin	GA-3	Waukesha	T7N, R18E Section 36 Town of Delafield	Private	Drumlin with a local relief of 80 feet
70	Audley's Quarry	GA-3	Waukesha	T7N, R18E Section 20 City of Delafield	Private	Old quarry with exposure of Niagara Escarpment
71	Merton Esker	GA-3	Waukesha	T8N, R18E Section 4 Town of Merton	Private	Perfectly preserved, northwest-southeast, 50-foot-high esker
72	Sussex Railroad Cut	GA-3	Waukesha	T8N, R19E Section 21 Town of Lisbon	Union Pacific Railroad	Cuts through low bedrock hill along railway right-of-way expose Lannon beds of the Racine Dolomite, rocks that supplied the Lannon stone industry
73	Derrick Quarry	GA-3	Waukesha	T8N, R20E Section 8 Village of Menomonee Falls	Private	Small abandoned Lannon stone quarry, noted for containing only surviving 19th-century-style wooden stone-hoisting derrick
74	Lincoln Creek	GA-3	Milwaukee	T7N, R21E Section 1 City of Milwaukee	Milwaukee County	Only exposure of Waubakee Dolomite in Milwaukee County, found along Lincoln Creek. Historically of prime importance in understanding the bedrock geology of eastern Wisconsin
75	Brazelton's Creek Outcrop	GA-3	Milwaukee	T8N, R21E Section 10 Village of Brown Deer	Private	Low outcrops of fossiliferous Racine Dolomite reef rock
76	Mill Road Reef	GA-3	Milwaukee	T8N, R21E Section 29 City of Milwaukee	Milwaukee County	Small reef-controlled rock hill, containing well-exposed fossiliferous Racine Dolomite reef
77	Riveredge Bluff	GA-3	Ozaukee	T11N, R21E Section 6 Town of Saukville	Riveredge Nature Center	Rock bluff of massive Racine Dolomite on south bank of Milwaukee River
78	Saukville Reef	GA-3	Ozaukee	T11N, R21E Section 26 Town of Saukville	Private	Small quarries exposing Racine Dolomite reef
79	Waubeka Quarry	GA-3	Ozaukee	T12N, R21E Section 29 Town of Fredonia	Private	Small, abandoned quarry exhibiting an uncommonly exposed type section

Table 104 (continued)

Map 54 Reference Number	Site Name	Classification Code[a]	County	Location	Ownership	Description and Comments
80	Fredonia Quarries	GA-3	Ozaukee	T12N, R21E Section 34 Town of Fredonia	Private	Two small, undisturbed mid-19th-century quarries and several outcrops of Racine Dolomite
81	Belgium Abandoned Shoreline	GA-3	Ozaukee	T12N, R22E Section 36 Town of Belgium	Private	Gravel and sand beaches and wind-cut cliffs and terraces indicating higher ancient lake levels
82	Germantown Roadcut	GA-3	Washington	T9N, R20E Section 22 Village of Germantown	Private	Road cut providing excellent cross-section through Racine Dolomite, revealing fossils and rock types
83	Lac Lawrann Kame and Esker	GA-3	Washington	T11N, R19E Section 1 City of West Bend	City of West Bend	Good example of keme-and-esker formation
84	Camp Wowitan Esker	GA-3	Washington	T11N, R20E Sections 27, 28 Town of Trenton	YMCA and private	Well-developed northeast-southwest-trending esker
85	Trenton Quarry and Lime Kiln	GA-3	Washington	T11N, R20E Section 34 Town of Trenton	Private	Small quarry exposing massive Silurian Dolomite. Primitive, relatively undisturbed kilns
86	Kewaskum Quarry and Lime Kiln	GA-3	Washington	T12N, R19E Section 6 Town of Kewaskum	Private	Old quarry and lime kiln exposing dolomite containing abundant brachiopod fossils. Relatively undisturbed remnant of lime-burning operation

[a] *GA-1 identifies Geological Area sites of statewide or greater significance*
GA-2 identifies Geological Area sites of countywide or regional significance
GA-3 identifies Geological Area sites of local significance

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

acres, or 0.5 percent of the Region; 122 NA-2 Natural Area sites totaling 21,191 acres, or 1.2 percent of the Region; and 285 NA-3 Natural Area sites totaling 27,758 acres, or 1.6 percent of the Region. Of the seven counties of the Region, Waukesha County contained the highest numbers of, respectively, Natural Area sites overall, with 105; NA-1 Natural Area sites, with nine; NA-2 Natural Area sites, with 30; and NA-3 Natural Area sites, with 66. Kenosha County contained the fewest Natural Area sites, having 39 sites overall. Washington County contained the greatest amount of Natural Area acreage, with 15,970 acres, or 5.8 percent of the County, while Milwaukee County contained the lowest such acreage, with 2,284 acres, or 1.5 percent of the County.

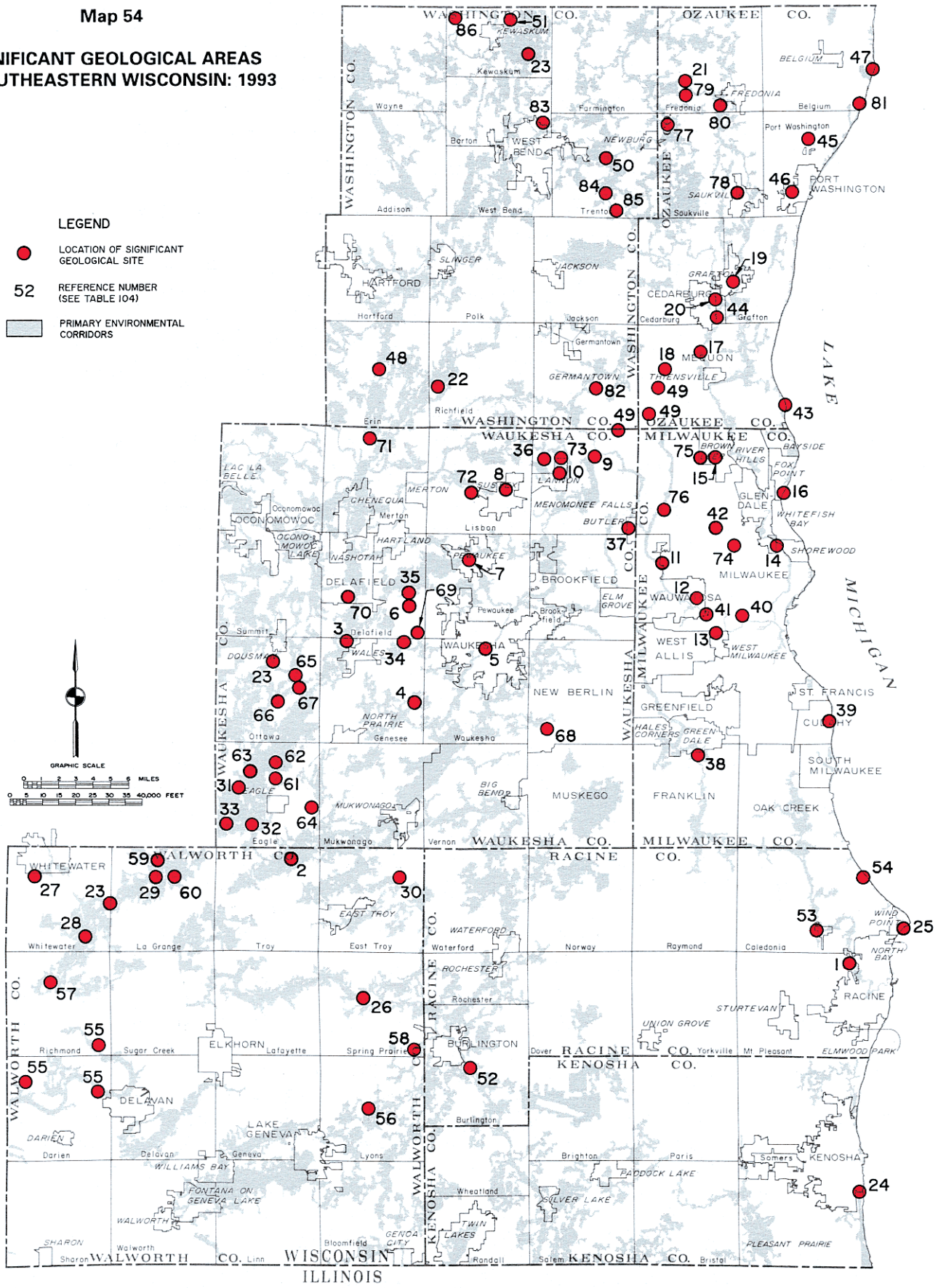
A total of 818 critical plant species site occurrences, distributed among 86 endangered, threatened, and "special concern," or rare, plant species, was found within the Region. Of these, 689 occurrences were located within the boundaries of Natural Area sites. The remaining 129 occurrences were found on a total of 111 sites. These sites were designated as Critical Plant Species Habitat sites.

A total of 658 square miles was identified as constituting significant wildlife habitat within the Region in 1985. Of this total, 284 square miles, or 43 percent, consisted of Class I wildlife habitat, the highest category; 221 square miles, or 34 percent, consisted of Class II wildlife habitat; and 153 square miles, or 23 percent, consisted of Class III wildlife habitat. Over 50 percent of the total significant wildife habitat in the Region occurs as upland hardwood forest or grassland.

A total of 120 sites was identified within the Region in 1994 as providing habitat for endangered, threatened, "special concern" or rare, and uncommon bird species, including sites providing habitat for six endangered species, six threatened species, and 32 rare or "special concern" species. The habitat areas were examined as they appeared on the

Map 54

SIGNIFICANT GEOLOGICAL AREAS IN SOUTHEASTERN WISCONSIN: 1993



This map identifies the 86 scientifically and historically significant geological areas located within Southeastern Wisconsin. These areas include glacial features and bedrock geology sites.

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

Table 105

ARCHAEOLOGICAL SITES IN SOUTHEASTERN WISCONSIN
LISTED ON THE NATIONAL REGISTER OF HISTORIC PLACES

Site Name	County	Location	Date Listed	Description
Wehmhoff Mound	Kenosha	T2N, R19E, Section 26	November 21, 1985	Lone effigy mound
Chesrow	Kenosha	T1N, R23E, Section 19	November 30, 1978	Paleo-Indian campsite
Barnes Creek	Kenosha	T1N, R23E, Section 19	July 20, 1977	Prehistoric multi-component campsite
Lake Park Mound	Milwaukee	T7N, R22E, Section 15	April 22, 1993	Late prehistoric mound in City of Milwaukee
Light Vessel #57	Milwaukee	T6N, R22E, Section 10	December 23, 1991	1891 shipwreck
Spring Grove Mounds-Garden Beds	Milwaukee	T8N, R22E, Section 19	June 27, 1979	Burial mounds and Indian garden remnants
Maples Mound Group	Walworth	T4N, R15E, Section 6	June 7, 1991	Effigy mound group
Mile Long	Walworth	T2N, R16E, Sections 20, 21	June 23, 1977	Prehistoric multi-component campsite and village
Lizard Mound Park	Washington	T12N, R20E, Section 32	December 15, 1970	Large effigy mound group
Barforth Blood Mound Group	Waukesha	T5N, R18E, Section 13	September 2, 1982	Middle Woodland mound group
Goodwin-McBean	Waukesha	T5N, R19E, Section 15	September 17, 1982	Late Woodland village and former mound group
Dewey Group	Waukesha	T5N, R19E, Section 28	December 19, 1978	Large effigy mound group
Nicolai-Peterson	Waukesha	T5N, R19E, Section 25	September 2, 1982	Middle and Late Woodland campsite and mounds
Big Bend Group #2	Waukesha	T5N, R19E, Section 24	December 19, 1978	Effigy mound group

Source: State Historical Society of Wisconsin.

Commission's 1990 large-scale aerial photography. It has been presumed that any habitat site which appeared to be intact on such photography supported the bird species involved in 1990. Of the 120 identified bird habitat sites, 87 are located wholly within Natural Areas. Of the remaining 33 sites, 30 are considered Critical Bird Species Habitat sites. The remaining three sites do not support any endangered, threatened, or rare species, and are therefore not considered Critical Bird Species Habitat sites.

Suitable habitat areas for eight endangered, threatened, and "special concern" herptile species and three regionally uncommon herptile species were identified within Southeastern Wisconsin in 1990. These included habitat areas for five endangered species, Blanchard's cricket frog, the queen snake, the eastern massasauga, the western ribbon snake, and the northern ribbon snake; one threatened species, Blanding's turtle; two "special concern" species, the bullfrog and the pickerel frog; and three regionally uncommon species, the spotted salamander, the four-toed salamander, and Butler's garter snake.

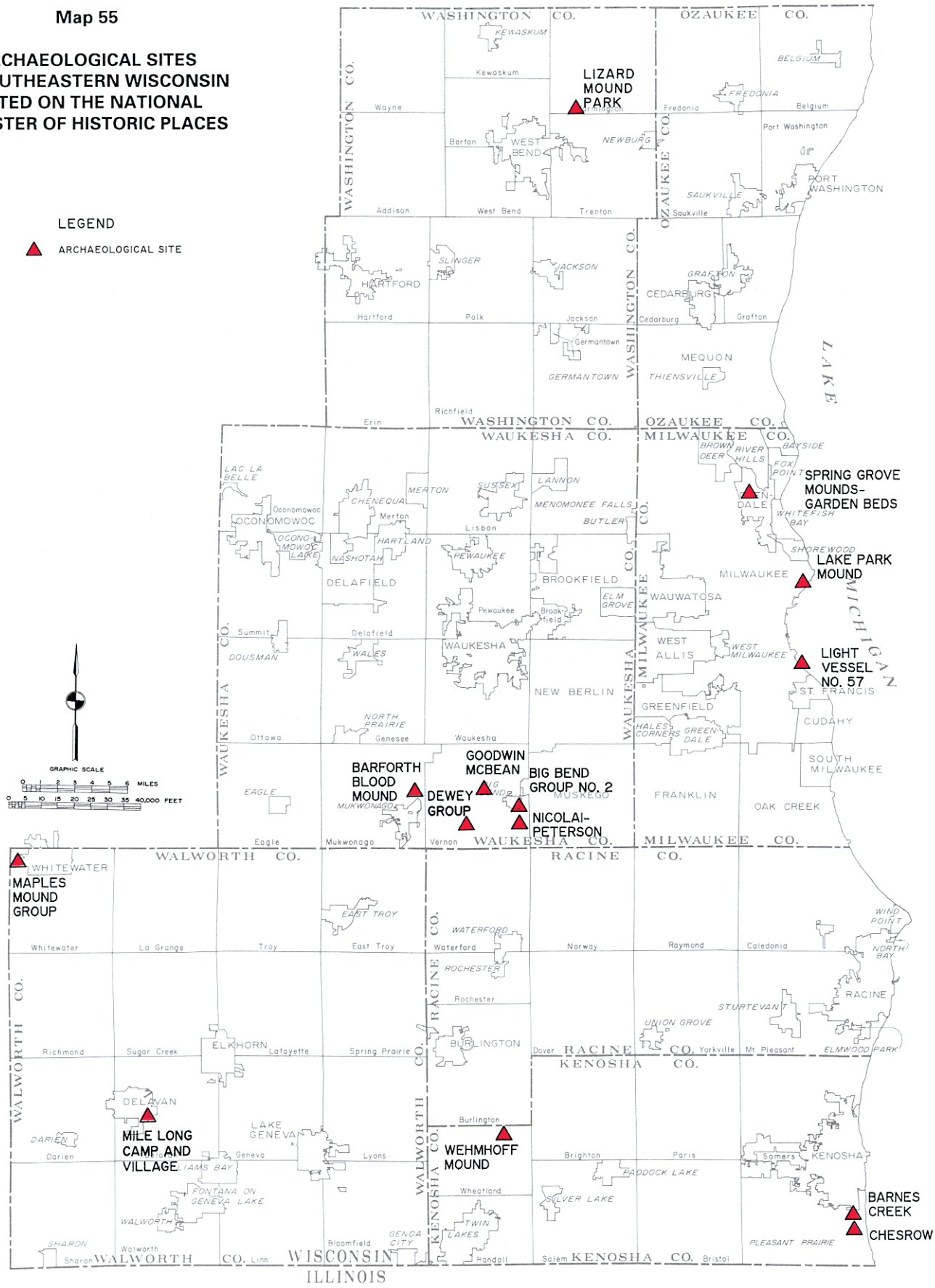
Reliable records of two critical mammal species, the bobcat and Franklin's ground squirrel, have been reported in Southeastern Wisconsin since 1970. The presence of the bobcat has been reported in and near the Southern Unit of the Kettle Moraine State Forest, while the presence of Franklin's ground squirrel has been reported in such publicly owned areas as the Bong State Recreation Area in Kenosha County, the Vernon Marsh Wildlife Area in Waukesha County, and Mukwonago Park in Waukesha County. One Critical Mammal Species Habitat site, the Mukwonago Park Oak Opening in Waukesha County, has been identified in the Region.

Distribution maps were prepared for the 15 critical fish species which were known to occur in the inland surface waters of Southeastern Wisconsin in 1995. These include three endangered species, six threatened species, and six "special concern" species.

Of the 20 mussel species known to occur in the surface waters of Southeastern Wisconsin since 1970, one, the rainbow shell, is endangered; three, the slippershell, salamander mussel, and ellipse, are threatened; and two, the elktoe and creek

Map 55

ARCHAEOLOGICAL SITES IN SOUTHEASTERN WISCONSIN LISTED ON THE NATIONAL REGISTER OF HISTORIC PLACES



Over 2,000 historic and prehistoric archaeological sites have been identified in the Region by the State Historical Society of Wisconsin. Of that total, the 14 sites indicated on this map have been listed on the National Register of Historic Places.

Source: State Historical Society of Wisconsin.

heelsplitter, are of special concern. An area adjacent to the confluence of the Mukwonago River and Fox River in Waukesha County was particularly species-rich, with a total of 14 mussel species being recorded as present there in 1990, including five critical mussel species. Other species-rich stream reaches include Nippersink Creek, Cedar Creek, various reaches of the Milwaukee River, Turtle Creek, the Oconomowoc River, and the Ashippun River.

Using the Commission's aquatic-area evaluation scheme, it was determined that the highest-quality streams in the Region in 1990 included the Mukwonago River, reaches of the Milwaukee River, the Bark River, Bluff Creek, Riveredge Creek, and the upper reaches of Cedar Creek. Of a total of about 1,209 perennial–stream-miles in the Region, about 103 stream-miles, or about 9 percent, were assigned an Aquatic Area rank of AQ-1, the highest; about 188 stream-miles, or about 16 percent, were assigned a rank of AQ-2; and about 446 stream-miles, or about 37 percent, were assigned a rank of AQ-3.

The highest-quality lakes within the Region in 1990 included Beulah Lake, Lulu Lake, the Phantom Lakes, Pickerel Lake, Big Cedar Lake, Gilbert Lake, Nagawicka Lake, and Loew's Lake, and Long Lake and Mud Lake within the Cedarburg Bog State Natural Area. Within the Region in 1990 there was a total of 198 lakes generally 10 acres or more in water-surface area, having a combined water-surface area of about 38,495 acres. Of these lakes, lakes with a total water-surface area of about 3,723 acres, or about 10 percent of the total water-surface area involved, were assigned an Aquatic Area rank of AQ-1, the highest; lakes with a total water-surface area of about 20,965 acres, or about 54 percent of the total water-surface area involved, were assigned an Aquatic Area rank of AQ-2; and lakes with a total water-surface area of about 9,879 acres, or about 26 percent of the total water-surface area involved, were assigned an Aquatic Area rank of AQ-3.

A total of 85 significant geological areas, including 57 bedrock geological sites and 29 sites containing glacial features, were identified as existing within the Region in 1993. These 86 sites included 23 sites classified as being of statewide or greater significance (GA-1); 28 sites of countywide or regional significance (GA-2); and 35 sites of local significance (GA-3).

A total of 2,043 historic and prehistoric archaeological sites was also identified within the Region. Fourteen of these sites were listed on the National Register of Historic Places.

Chapter VII

NATURAL AREA-, CRITICAL SPECIES-, AND CRITICAL SPECIES HABITAT-RELATED LAWS AND POLICIES

INTRODUCTION

This chapter is directed at the existing legal mechanisms which may be used to promote the sound protection and management of the remaining natural areas, critical species, and critical species habitats in Southeastern Wisconsin. The chapter has been organized into three major parts dealing with the Federal, State, and local rules and regulations related to the management of species and their habitats. It should be recognized that many of these rules and regulations are interrelated. The first section deals with the Federal policies and regulations related to endangered and threatened species and their habitats, nongame species, wetlands, and coastal areas. The second section deals with the State policies and regulations related to endangered and threatened species, State-designated natural areas, shoreland and wetland conservancy zoning, water quality certification for wetlands, protection of game and nongame species, and nuisance weed problems. The third and final major section deals with local upland and lowland conservancy zoning, other zoning provisions which may be useful in protecting natural areas and critical species habitats, and subdivision control ordinances.

FEDERAL POLICIES AND REGULATIONS

The Federal policies and regulations related to natural areas, critical species, and critical species habitat include Federal permit programs; establishment of wildlife refuges; promulgation of regulations requiring states and local governments to undertake certain actions; and the provision of grants for studies, refuges, and the implementation of state regulatory programs. This section describes those Federal policies and regulations.

Federal Endangered Species Regulations

The Endangered Species Act of 1973[1] requires that all Federal departments and agencies seek to conserve endangered and threatened species, and that they utilize their authorities in furtherance of the purpose of the Act. That purpose is to provide a means to conserve endangered and threatened species and the ecosystems upon which they depend. The Act requires the Secretary of the Interior to determine by regulation if a particular species is endangered or threatened because of: 1) the present or threatened destruction, modification, or curtailment of its habitat or range; 2) overutilization for commercial, sporting, scientific, or educational purposes; 3) disease or predation; 4) inadequacy of existing regulatory mechanisms; and 5) other natural or human-induced factors affecting its continued existence. The Secretary is to coordinate this listing with the Secretary of Commerce. The Act prohibits any person subject to the jurisdiction of the United States from: 1) importing or exporting Federally designated endangered or threatened species; 2) taking any such species; 3) possessing, selling, offering for sale, delivering, receiving, carrying, transporting, or shipping by any means any such species for personal or commercial uses; and 4) exporting from or importing into the United States any such species. The Secretary of the Interior may, however, permit, under specified conditions, such activities for scientific purposes or to enhance the propagation or survival of such species through, for example, captive breeding programs. The Act further provides for enforcement and civil penalties with respect to its violations. The provisions of the Act are carried out by the U. S. Fish and Wildlife Service.

The Act further directs the Secretary of the Interior to establish and implement a program to conserve fish, other wildlife, and plants listed as endangered or threatened. This program includes the use of land acquisition under the Fish and Wildlife Act of 1956, the Fish and Wildlife Coordination Act, and the Migratory Bird Conservation Act, as appropriate. The Endangered Species Act also authorizes the acquisition of lands, waters, or interests essential to the support of endangered or threatened species.

Finally, the Act provides for cooperation with states in carrying out its purpose through management agreements, cooperative agreements, and allocation of funds.

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[1] *Environmental Reporter 71:8201 (1976); 50 CFR 17; and 16 USC 1531-1543.*

Fish and Wildlife Policies and Regulations

Federal fish and wildlife regulations have been established through several treaties and acts of Congress. The most significant and relevant of such treaties and acts with regard to the protection and management of Southeastern Wisconsin's natural areas and critical species habitat are described below.

The Migratory Bird Treaty Act of 1918: The Migratory Bird Treaty Act of 1918 between the United States and Great Britain (Canada) has as its purpose the protection of migratory birds. Except as permitted by regulation, "it is unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, capture, or kill, possess, offer for sale, sell, offer to barter, barter, offer to purchase, purchase, deliver for transportation, transport or cause to be transported, carry or cause to be carried, or receive for shipment, transportation, carriage, or export, any migratory bird [or] any part, nest, or eggs of any such bird. . . ."[2] Exception is made with regard to such nonnative birds as house sparrows, starlings, and feral pigeons, as well as resident game birds such as pheasant, grouse, quail, and wild turkey. In addition, certain migratory birds, such as red-wing blackbirds, cowbirds, grackles, and crows may be controlled without permit if "found committing or about to commit depredations upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance."[3]

The Fish and Wildlife Coordination Act of 1934: The Fish and Wildlife Coordination Act of 1934 authorized the Secretaries of Agriculture and Commerce to: 1) provide assistance to and cooperate with Federal and state efforts "to protect, rear, stock and increase the supply of game and fur-bearing animals";[4] 2) study "the effects of domestic sewage, trade wastes, and other polluting substances on wildlife";[5] 3) use impounded waters for fish culture and as resting and nesting areas for migratory birds, and consult with pertinent agencies prior to the construction of new dams to ensure provisions for fish migration; 4) prepare plans designed to protect wildlife resources; 5) conduct wildlife surveys on public lands; and 6) allow Federal agencies to accept funds and lands related to the protection of wildlife resources, provided that any land donations were consented to by the state in which they are located.[6] Several subsequent amendments directed that: 1) the Fish and Wildlife Service be consulted when the "waters of any stream or other body of water" were to be impounded, diverted, modified, or controlled to prevent the "loss of and damage to" wildlife resources; 2) wildlife habitat management plans could include the transfer of such habitats to states for management; 3) surplus Federal lands could be used for wildlife conservation purposes; and 4) wildlife conservation would receive equal consideration and coordination with other resource development programs.[7]

The Fish and Wildlife Act of 1956: The Fish and Wildlife Act of 1956 established a comprehensive national policy with respect to fish, shellfish, and other wildlife. Emphasis of the Act was on the commercial fishing industry. However, the U. S. Fish and Wildlife Service was also directed to ensure "the inherent right of every citizen and resident to fish for pleasure, enjoyment, and betterment and to maintain and increase public opportunities for recreational use of fish and wildlife resources."[8] The Act also directed that a continuing research, extension, and information program that addressed domestic and international fish and wildlife issues be established.[9] The Act was amended in 1992 to allow the Fish and Wildlife Service "to accept donations of both real and personal property" and further to allow the use of volunteers to help implement projects.[10]

The Fish and Wildlife Conservation Act of 1980: The Fish and Wildlife Conservation Act of 1980, also

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[2] *16 USC 703.*

[3] *50 CFR 21.43.*

[4] *U. S. Department of the Interior, U. S. Fish and Wildlife Service, Office of Legislative Services, Digest of Federal Resource Laws of Interest to the U. S. Fish and Wildlife Service, 1992, p. 36.*

[5] *Ibid.*

[6] *Ibid.*

[7] *Ibid.*

[8] *Ibid., p. 35.*

[9] *Ibid.*

[10] *Ibid., p. 36; and 92 Stat. 3110.*

known as the Nongame Act,[11] was established to provide grants for the development and implementation of comprehensive nongame fish and wildlife plans. The Act was amended in 1988 to require the U. S. Fish and Wildlife Service to monitor and assess migratory nongame birds to: 1) determine the effects of environmental changes and human activities on such birds; 2) identify appropriate actions to reduce or eliminate the adverse effects of such changes and activities; and 3) report back to Congress at five-year intervals on the actions taken. The Act was further amended in 1989 to require the U. S. Fish and Wildlife Service "to identify lands and waters in the United States and other nations in the Western Hemisphere whose protection, management, or acquisition will foster the conservation of migratory nongame birds."[12]

The Bald Eagle Protection Act of 1940 (1972 and 1978 Amendments): The Bald Eagle Protection Act[13] protects the bald and golden eagles by prohibiting, except by permit or other specified provision, their taking, possessing, and commerce. The law specifies enforcement measures and provides penalties for violations.

The 1972 amendments to the Act increased penalties for violations. The 1978 amendments authorize the removal of golden eagle nests that are determined by the Secretary of the Interior to interfere with resource development or recovery activities.

Bald eagles are migratory through Southeastern Wisconsin and may, on a seasonal basis, utilize natural areas and associated wildlife habitats within the Region.

The Lacey Act Amendments of 1981: The Lacey Act Amendments of 1981[14] repealed the Black Bass Act and Sections 43 and 44 of the Lacey Act of 1900, replacing that legislation with a single, more comprehensive statute. The Lacey Act Amendments state that it is unlawful to export, sell, acquire, or purchase fish, wildlife, or plants that would be taken, possessed, transported, or sold in violation of U. S. laws. Also declared unlawful is the involvement in interstate or foreign commerce of any fish, wildlife, or plants that would be taken, possessed, or sold in violation of any state or foreign laws. The Lacey Act Amendments cover all fish, wildlife, and plants, as well as their parts and products, that are protected under the Convention on International Trade in Endangered Species (CITES) as well as those protected by state statutes. For example, to transport any species designated as an endangered species by the State of Wisconsin across State lines without the appropriate permits would be regarded as a violation of the Lacey Act Amendments.

The legislation provides for felony criminal sanctions, penalties for misdemeanor violations, and civil penalties. It further provides enforcement authorizations for those implementing its provisions.

Other Federal Policies and Regulations

Federal policies and regulations administered by other Federal agencies have also been established. These policies and regulations may directly or indirectly affect the protection and management of natural areas and critical species habitats in Southeastern Wisconsin.

The National Environmental Policy Act of 1969: The National Environmental Policy Act of 1969 (NEPA) contains a Congressional declaration of a national policy that encourages a "productive and enjoyable harmony between man and his environment" as well as a statement that its purpose is "to promote efforts which will prevent or eliminate damage to the environment and biosphere and

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[11]*U. S. Department of the Interior, U. S. Fish and Wildlife Service, Office of Legislative Services, Digest of Federal Resource Laws of Interest to the U. S. Fish and Wildlife Service, 1992, pp. 34-35; 16 USC 2901-2911; and 94 Stat. 1322.*

[12]*U. S. Department of the Interior, U. S. Fish and Wildlife Service, Office of Legislative Services, Digest of Federal Resource Laws of Interest to the U. S. Fish and Wildlife Service, 1992, p. 35; and 103 Stat. 1977.*

[13]*U. S. Department of the Interior, U. S. Fish and Wildlife Service, Office of Legislative Services, Digest of Federal Resource Laws of Interest to the U. S. Fish and Wildlife Service, 1992, p. 10; 16 USC 668-668d; and 54 Stat. 250.*

[14]*U. S. Department of the Interior, U. S. Fish and Wildlife Service, Office of Legislative Services, Digest of Federal Resource Laws of Interest to the U. S. Fish and Wildlife Service, 1992, pp. 42-43.*

stimulate the health and welfare of man."[15] The Act is also intended to enrich humankind's understanding of the ecological systems and natural resources important to the Nation. In addition, the Council on Environmental Quality was established under this Act.

Specifically, NEPA requires all Federal agencies to prepare environmental impact statements for all major Federal actions, including recommendations and proposals for legislation, which would significantly affect the quality of the human environment. The Act requires that environmental values be given appropriate consideration along with economic and technical considerations. The NEPA process is required to be integrated into the early planning stages of projects; significant environmental issues, such as those involving natural areas, critical species habitats, and endangered and threatened species of plants and animals, must be identified early in the planning process.

While not creating specific regulatory or statutory requirements for the protection of natural areas or rare, threatened, and endangered species and their critical habitats, NEPA does create a context within which the effect of Federal actions on those areas, species, and habitats will be considered. It is just such considerations which, for example, have served to protect natural areas such as the Cudahy Woods Natural Area in the City of Milwaukee from adverse potential impacts arising from Federal actions related to the approval of specific alignments for runways at General Mitchell International Airport.

The National Natural Landmarks Program: The National Natural Landmarks Program was established to identify and encourage the preservation of ecological and geological features which represent important examples of the Nation's natural history. Specifically, the objectives of the Natural Landmarks Program are: 1) to encourage the preservation of sites which illustrate the ecological and geological character of the United States; 2) to enhance the educational and scientific value of such sites; 3) to strengthen the public's appreciation of natural history; and 4) to encourage a concern for the conservation of the Nation's natural history.

The National Natural Landmarks Program is administered by the U. S. Department of the Interior, National Park Service. Sites eligible for designation as National Natural Landmarks are selected based upon the condition and regional abundance of the ecological or geological features present; how well they represent the natural region within which the sites occur; the long-term viability of the sites; and the importance of the sites to education and to scientific research. Designation may be given to publicly or privately owned lands. However, the designation does not carry any regulations or restrictions on the owner concerning the use or future development of any site so designated. Owners of National Natural Landmark sites may enter into a voluntary, nonbinding agreement with the National Park Service concerning the protection and management of their respective sites. The National Environmental Policy Act of 1969 requires Federal agencies to consider the existence and location of National Natural Landmark sites during any assessment of the environmental effects of agency actions.

The Federal Water Pollution Control Act of 1972 (1977 Amendments): The Federal Water Pollution Control Act of 1972, as amended in 1977, is commonly known as the Clean Water Act. The object of this Act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Further, the Act declares that it is the policy of the Congress to recognize, preserve, and protect the primary responsibilities and rights of the states to prevent, reduce, and eliminate pollution, to plan the development and use (including restoration, preservation, and enhancement) of land and water resources, and to consult with the Administrator of the U. S. Environmental Protection Agency (EPA).

Under Section 404 of the Act, the Secretary of the Army, acting through the Chief of Engineers, may issue permits, after notice and opportunity for public hearings, for the discharge of dredged or fill material into navigable waters at specified disposal sites. The Administrator of the EPA is authorized to prohibit the specification of any defined area as a disposal site if it is determined after notice and opportunity for public hearings that the discharge of such materials will have unacceptable adverse effects on municipal water supplies, shellfish beds and fishery areas which include spawning and breeding areas, wildlife habitat, or recreation areas.

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[15]*Ibid., p. 51; Council on Environmental Quality, Executive Office of the President, Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act, 1978; Kenneth M. MacKenthun and Jacob I. Bregman, Environmental Regulations Handbook, Lewis Publishers, New York, 1991; and 42 USC 4341, as amended by PL 94-52 and PL 94-83.*

Moreover, under Section 401, any applicant for a Federal license or permit to conduct any activity including, but not limited to, any discharge into navigable waters is required to provide the licensing or permitting agency with certification from the state in which the discharge will take place. If the state determines that such discharge will affect the quality of its waters so as to violate any water quality requirement of the state and if permit conditions cannot ensure compliance, the licensing or permitting agency shall not issue such license or permit.

The Coastal Zone Management Act of 1972: The Coastal Zone Management Act of 1972[16] declares that it is the national policy to: 1) preserve, protect, develop, and restore or enhance the resources of the Nation's coastal zone for this and future generations; 2) encourage and assist states in developing and implementing management programs to achieve the wise use of coastal land and water resources, giving full consideration to ecological, cultural, historical, and aesthetic values, as well as to need for economic development; 3) require cooperation of Federal agencies with state, local, and regional agencies regarding programs affecting the coastal zone; and 4) encourage the participation of the public and of Federal, state, local, and regional agencies in the development of coastal management programs.

To achieve the foregoing, the Secretary of Commerce is authorized to make annual management program development grants to states for the purpose of assisting in the development of a coastal zone management program which includes identification of coastal zone management boundaries and an inventory and designation of areas of particular concern to the coastal zone, such as natural areas and critical species habitats, along with other provisions. In addition, the Secretary is authorized to make annual administrative grants to states for the purpose of sharing the costs of administering the management program, provided that the management program makes provisions for procedures whereby specific areas may be designated for the purpose of preserving or restoring them for conservational, recreational, ecological, and aesthetic values, as well as for fulfilling the other requirements set forth in the Act. Furthermore, the Secretary is authorized to make available coastal grants for the acquisition, development, and operation of estuarine sanctuaries for the purpose of creating natural field laboratories to gather data and make studies of the natural and human processes occurring within the estuaries of the coastal zone. The Act also sets forth Federal guidelines for consistency among state programs and for interagency coordination and cooperation on implementation of the programs between Federal, state, local, and regional agencies as well as other interested public and private parties.

Under the Act, counties in Southeastern Wisconsin which abut the coast of Lake Michigan are eligible for grants from the Wisconsin Coastal Management Program. These counties are Kenosha County, Racine County, Milwaukee County, and Ozaukee County. All municipalities which are located either wholly or partly within at least one of these counties are also eligible for such grants.

Finally, the Act establishes an estuarine sanctuaries program (Section 312),[17] which authorizes the Secretary of Commerce to make grants available to coastal states, including Wisconsin, to cover the costs of acquisition, development, and operation of estuarine sanctuaries. The purpose of such sanctuaries, now referred to as National Estuarine Research Reserves,[18] is to create "natural field laboratories to gather data and make studies of the natural and human processes occurring within the estuaries of the coastal zone." Several coastal freshwater estuaries[19] along the Wisconsin Lake Michigan and Lake Superior shorelines are eligible for designation as estuarine research reserves. However, none of the coastal natural areas located in Southeastern Wisconsin meets the designation criteria set forth under the National Estuary Research Reserve System.[20]

The Federal Noxious Weed Act of 1975: The Federal Noxious Weed Act of 1975[21] authorized the estab-

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[16] *86 Stat. 1280 et seq.*

[17] *86 Stat. 1288; PL 92-583; later amended under s. 315, 16 USC 1451.*

[18] *Federal Register, Vol. 58, No. 134, 1993; and 15 CFR 921.*

[19] *See 16 USC 1453(7) for discussion of estuary-type areas of the Great Lakes and their tributary waters.*

[20] *See 15 CFR 921.11 for National Estuary Research Reserve System site selection criteria.*

[21] *7 USC 2801 et seq.; 88 Stat. 2148; and 104 Stat. 3611.*

lishment of a Federal program through the Secretary of Agriculture to control, eradicate, prevent, or retard the spread of noxious weeds. Under the Act, the Secretary of Agriculture is authorized to: 1) designate by regulation certain plants as noxious weeds; 2) prohibit the movement, except by permit, of noxious weeds in interstate and foreign commerce; 3) inspect, seize, and destroy products, and quarantine areas to prevent the spread of noxious weeds; 4) cooperate with other Federal, state, and local agencies, farmers' associations, and private individuals in developing and implementing measures to control, eradicate, prevent, or retard the spread of noxious weeds; and 5) establish integrated management systems to control or contain noxious weeds targeted through cooperative agreement. The law further requires that environmental assessments or impact statements necessary to implement noxious-weed-control programs be completed within a one-year time period.

The Recreation Coordination and Development Act of 1963: The Recreation Coordination and Development Act of 1963[22] was a Congressional declaration of policy stating that present and future generations would be assured that "adequate outdoor recreation resources" will be made available. The Act called upon government and the private sector to "take prompt and coordinated action . . . to conserve, develop, and utilize [their] resources for the benefit and enjoyment of the American people." In the following year, as a result of this declaration of policy, the Congress acted to create the Land and Water Conservation Fund (LAWCON).[23] Under LAWCON, matching grants were authorized to be made to states for outdoor recreation projects. Funds were also provided to Federal agencies for land acquisitions consistent with the Act. Later legislation[24] authorized funds to be used for: 1) the National Wildlife Refuge System; 2) acquisition of habitat of endangered and threatened species of fish, wildlife, and plants identified in Section 5(a) of the Endangered Species Act; 3) areas authorized for acquisition under the Refuge Recreation Act; 4) areas authorized for acquisition under the Fish and Wildlife Act, except for migratory waterfowl areas designated by the Migratory Bird Conservation Act; and 5) other areas authorized for acquisition by the Congress.

Concluding Remarks—Federal Policies and Regulations

Certain sections and subsections of other Federal laws may affect the protection and management of natural areas and critical species habitats located within Southeastern Wisconsin. However, these sections and subsections are related to making grants available for studies and land acquisitions, extend or increase such grants under the Federal laws specifically discussed above, or require coordination between agencies.

In summary, the protection provided natural areas and critical species habitats under Federal policies and regulations is limited. The major remedies available under Federal law generally relate to the taking, possession, transport, and sale of Federally designated endangered and threatened animal and plant species and migratory game and nongame birds. No Federal regulations have been promulgated per se to protect natural areas and critical species habitats identified by Federal agencies or by states. However, regulations have been promulgated which require consideration of endangered and threatened animal and plant species in the issuance of Federal permits and other approvals. Further, programs which grant funds, usually to state agencies, have been enacted. These funds may be used to acquire natural areas and critical species habitats in Southeastern Wisconsin.

STATE POLICIES AND REGULATIONS

The State of Wisconsin's policies and regulations related to natural areas, critical species, and critical species habitats generally involve State permit and approval programs, acquisition and management

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[22] *U. S. Department of the Interior, U. S. Fish and Wildlife Service, Office of Legislative Services, Digest of Federal Resource Laws of Interest to the U. S. Fish and Wildlife Service, 1992, p. 43; 16 USC 4601; and 77 Stat. 49.*

[23] *U. S. Department of the Interior, U. S. Fish and Wildlife Service, Office of Legislative Services, Digest of Federal Resource Laws of Interest to the U. S. Fish and Wildlife Service, 1992, p. 43; and 78 Stat. 897.*

[24] *U. S. Department of the Interior, U. S. Fish and Wildlife Service, Office of Legislative Services, Digest of Federal Resource Laws of Interest to the U. S. Fish and Wildlife Service, 1992, p. 43; 90 Stat. 1313; and 91 Stat. 210.*

of natural areas and wildlife refuges, and State-mandated local zoning for floodland, shoreland, and wetland areas. This section describes those State policies and regulations.

State Endangered Species Regulations

The State of Wisconsin's endangered and threatened species are protected under the provisions of Section 29.415 of the Wisconsin Statutes. Chapter NR 27 of the Wisconsin Administrative Code sets forth the rules necessary to implement the State's endangered and threatened species program and identifies those native animals and plants that are listed as endangered or threatened in the State of Wisconsin (see Tables 42, 43, 45, 46, and 47 in Chapter V of this report, on pages 156, 157, 159, and 160-162).

The purpose of the endangered and threatened species law is to conserve and restore wild animals and wild plants of the State of Wisconsin that are endangered or threatened. In addition, the statute protects those species protected under the Federal Endangered Species Act of 1973. The State statute addresses the taking, possession, transportation, processing, and sale of endangered and threatened animal and plant species. Specifically, the statute prohibits the taking, transporting, possession, processing, and sale of any wild animal listed by the Wisconsin Department of Natural Resources as endangered or threatened. In addition, the statute prohibits the processing or sale of any wild plant listed by the Wisconsin Department of Natural Resources as endangered or threatened. Further, persons are prohibited from removing, transporting, cutting, rooting up, severing, injuring, or destroying listed wild plant species on public property or on property that they do not own or lease. Exceptions to this latter provision are made with respect to forestry and agricultural practices and to the construction, operation, or maintenance of a utility facility.

In Wisconsin, the endangered and threatened species statutes also provide for the enforcement of promulgated rules; a permit program for the taking, possession, transportation, and exportation of listed species; exemptions for zoological societies and municipal zoos and their officers and employees; and conservation activities.

What is significant about Wisconsin's basic endangered and threatened species statute is that while it provides maximum protection for individual endangered and threatened animal species, such protection does not extend to plants of like status. Moreover, the statute provides no protection mechanism for the critical habitat of listed species. It is in this latter respect, however, that coordination with other State rules and regulations may provide protection for the critical habitat for listed endangered and threatened species. This point was emphasized during temporary-injunction proceedings in State of Wisconsin v. Richard J. Kaerek (Case No. 90-CV-2186; unpublished), where the State sought to enjoin the defendants from constructing a pier and boardwalk through a bog located at the north end of Nagawicka Lake. The bog had been identified as providing critical habitat for Blanding's turtle (Emydoidea blandingii), a State-designated threatened species. In his conclusions, the presiding judge stated that ". . . the testimony [in the case] shows that the existence of these piers may cause, through the use of a boardwalk or even a path, disruption of the natural environment, and the words 'endangered species' come down hard upon the court with a heavy burden to see that that instance is protected."

The Wisconsin Conservation Act

The Wisconsin Conservation Act is intended to provide an adequate and flexible system for the protection, development, and use of the State's forests, lakes, streams, fish and game, plant life, flowers, and other outdoor resources. The Act is codified in Chapter 23 of the Wisconsin Statutes, which chapter is entitled "Conservation." The Act provides for the establishment of fish and game refuges under which the Wisconsin Department of Natural Resources may designate lands and surface waters "necessary to secure perpetuation of any species [of game, bird, or fish]"; and maintain an adequate supply of such species by "providing safe retreats in which [game, bird, or fish species may rest, breed, and replenish adjacent lands and waters]." The Act also provides for the acquisition of lands and waters suitable for State forests, State parks, and other natural resource-related uses. These lands and waters may be acquired by purchase, lease or agreement, gift, or, after obtaining the approval of the appropriate State Senate and Assembly Committees, condemnation. The Act also provides for the maintenance of such lands and waters.

The Wisconsin Environmental Policy Act of 1972

The Wisconsin Environmental Policy Act of 1972 (WEPA) is patterned after the National Environ-

mental Policy Act.[25] WEPA declares a State policy that encourages a "productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; and to enrich the understanding of the important ecological systems and natural resources."

Specifically, WEPA requires all State agencies to prepare environmental impact statements for all "legislation and other major actions significantly affecting the quality of the human environment." Preparation of such statements must substantially follow guidelines issued by the U. S. Council on Environmental Quality. In applicable cases, WEPA requires that a detailed statement be prepared on: 1) the environmental impact of a proposed action; 2) any adverse environmental effects which cannot be avoided should a proposal be implemented; 3) alternatives to a proposed action; 4) the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity; 5) any irreversible and irretrievable commitments of resources which would be involved in a proposed action should it be implemented; and 6) the details of the beneficial aspects of a proposed project, both short-term and long-term, and the economic advantages of the proposal. As such, WEPA has been designed to encourage more environmentally sensitive decisions by State agencies and to encourage broader citizen participation in the decision-making process.[26]

Like the National Environmental Policy Act, WEPA does not create specific regulatory or statutory requirements for the protection of natural areas or rare, threatened, and endangered species and their critical habitats. WEPA does, however, create a context within which the effect of State actions on these areas, species, and habitats will be considered.

Protection of Natural Resources

Section 23.095 of the Wisconsin Statutes declares it unlawful for any person to "damage or attempt to damage any natural resource within the state." Penalties for violation of this statute range from a forfeiture of up to $100 for violation of the statute's general prohibition against damaging or attempting to damage natural resources within the state to a fine of up to $10,000 or imprisonment of up to nine months, or both, for violation of the statute's specific prohibition against intentionally damaging or intentionally attempting to damage an archaeological feature located on State-owned lands under the supervision, management, and control of the Wisconsin Department of Natural Resources.

The Public Trust Doctrine and Public Waters

Wisconsin's public trust doctrine is based upon an original concept of English common law under which the Crown held tidal waters in trust for the public. This concept was advanced to the Northwest Ordinance of 1787. Article IV of the Ordinance provided that "[t]he navigable waters leading into the Mississippi and the St. Lawrence [Rivers], and the carrying places between the same, shall be common highways and forever free. . . ." The Wisconsin Enabling Act of 1836 admitted Wisconsin as a U. S. territory. Section 3 of that Act incorporated the Northwest Ordinance language concerning navigable waters. Later, in 1848, Wisconsin adopted a State constitution and attained statehood. The public trust with respect to navigable waters was carried forward under Article IX of the Wisconsin Constitution, which article is entitled "Eminent Domain and Property of the State." Section 1 of Article IX declares that "[t]he state shall have concurrent jurisdiction on all rivers and lakes bordering on this state . . . and the navigable waters leading into the Mississippi [River] and St. Lawrence [Seaway], and the carrying places between the same, shall be common highways and forever free. . . ."

The Wisconsin courts have construed the public trust doctrine liberally and noted in Diana Shooting Club v. Husting (1914)[27] that the "wisdom of the policy which steadfastly and carefully preserved to the people the full and free use of public waters cannot be questioned. Nor should it be limited by narrow constructions." This ruling further affirmed the State as "a trustee of the people charged with the faithful execution of the trust created for their

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[25]*Chapter 274, Laws of 1971; and Dorothy Lagerroos, Your Role in the Act: A Citizen[']s Guide to WEPA (The Wisconsin Environmental Policy Act), 1977. The latter is available from the Wisconsin Department of Administration.*

[26]*Wisconsin Department of Natural Resources, Bureau of Environmental Analysis and Review, A Citizen Guide to the Role of the Wisconsin Environmental Policy Act in DNR Decision-Making, Wisconsin Department of Natural Resources, Madison, Wisconsin, 1995.*

[27]*Diana Shooting Club v. Husting, 156 Wis. 261 (1914).*

benefit." The Wisconsin courts have also expanded the public trust doctrine in recognition of changes in public needs and uses. For example, the Wisconsin Supreme Court held in Muench v. Public Service Commission (1952)[28] that the enjoyment of scenic beauty is a public right. Later, in Claflin v. Department of Natural Resources (1973),[29] the State Supreme Court upheld an order for the removal of a boathouse based upon its adverse aesthetic impacts. The Court stated that ". . . the natural beauty of our northern lakes is one of the most precious heritages Wisconsin citizens enjoy."

Of particular concern to any natural areas and critical species habitat management plan is the application of the public trust doctrine to that plan. Such application applies to the ownership of navigable waters and their beds and the rights of riparian owners. The ownership of lake and stream beds has been established under case law. Diedrich v. Northwestern Union Railroad Co. (1877)[30] established that the beds of navigable lakes are owned by the State, while Munninghoff v. Wisconsin Conservation Commission (1949)[31] established that the beds of navigable streams are owned by the riparian owner. Noted, however, was the concept that the water over the stream bed was held in the public trust. These two rulings are important in that the bed of lakes contained partly or wholly within the natural areas and critical species habitats are held in the public trust. However, the stream beds of such sites are not—only the waters which flow over those beds. The navigable waters of Wisconsin include the entire area of the lakes and ponds that are located below the ordinary high-water mark of such water bodies.[32] In addition, such waters must have a well-defined bed and banks. Several court cases have addressed what, in effect, amounts to a definition of a lake and pond. In Ne-pee-nauk Club v. Wilson (1897),[33] the Wisconsin Supreme Court distinguished between a lake and stream, stating that a stream has natural motion—a current—while a lake, in its natural state, is substantially at rest. The Court went on to state that the difference between lakes and streams is independent of the size of the water body. The Court further recognized that a navigable lake could be properly called a marsh or swamp as a result of low-water conditions in which large expanses of mud or vegetation are exposed. This latter condition was further supported in Illinois Steel Co. v. Bilot (1901),[34] where the Court declared:

> The mere fact that the water was very shallow, so that marsh grass appeared above the surface, that it was called a marsh, and that the water was not deep enough to admit navigation, or that the surface was not at all times wholly submerged, does not preclude its being, in fact, a lake.

This fact was further supported in State v. Trudeau (1987),[35] where the Court held that a lake bed need not be navigable in fact; "if land is part of a navigable lake, then the fact that the specific area cannot be navigated is irrelevant."[36]

Navigable waters in Wisconsin also include streams and flowages. Specifically, navigable streams have clearly been defined in case law. DeGayner and Co., Inc. v. Department of Natural Resources (1975)[37] expanded the definition of navigability from the old "saw-log test" (see Olson v. Merrill [1877])[38] to one under which

> any stream is "navigable in fact" which is capable of floating any boat, skiff, or canoe, of

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[28] *Muench v. Public Service Commission, 261 Wis. 492 (1952).*

[29] *Claflin v. Department of Natural Resources, 58 Wis. 2d 182 (1973).*

[30] *Diedrich v. Northwestern Union Railroad Co., 42 Wis. 248 (1877).*

[31] *Munninghoff v. Wisconsin Conservation Commission, 255 Wis. 252 (1949).*

[32] *Navigable waters of the State are defined in s. 281.31(2)(d) of the Wisconsin Statutes. Also, the ordinary high-water mark was defined in Diana Shooting Club v. Husting, 156 Wis. 261 (1914).*

[33] *Ne-pee-nauk Club v. Wilson, 96 Wis. 290 (1897).*

[34] *Illinois Steel Co. v. Bilot, 109 Wis. 418 (1901).*

[35] *State v. Trudeau, 139 Wis. 2d 91 (1987).*

[36] *Michael Cain and Roberta Borchardt, Topical List of Water Law Cases (1992), Wisconsin Department of Natural Resources, Madison, Wisconsin, 1992, p. 17.*

[37] *DeGayner and Co., Inc. v. Department of Natural Resources, 70 Wis. 2d 936, 236 N.W. 2d 217 (1975).*

[38] *Olson v. Merrill, 42 Wis. 203 (1877).*

the shallowest draft used for recreational purposes. . . .

. . . [Further,] the test [for navigability] is whether the stream has periods of navigable capacity which ordinarily recur from year to year, e.g., spring freshets, or has continued navigability long enough to make it useful as a highway for recreation or commerce.

In addition, a stream must have a bed and banks, as well as a direction of flow.

The issue of navigability and the public trust becomes significant to natural areas and critical species habitats in two areas: ownership and regulatory jurisdiction. Natural areas that are located completely, or in part, below the ordinary high-water mark of a navigable lake or pond are held in the public trust. For those natural areas and critical species habitats located within or along navigable streams, the volume of water is held in the public trust. However, the bed as well as the riparian lands may be held in private ownership.

Floodplains and certain wetlands adjacent to navigable waters are regulated under Wisconsin law. The specific regulatory issues with respect to natural areas and critical species habitats are discussed below.

Floodplain Zoning

Wisconsin's floodplain management program is set forth in Chapter 87 of the Wisconsin Statutes and Chapter NR 116 of the Wisconsin Administrative Code. The Statutes and Administrative Code require municipalities, which include all counties, cities, and villages, to

> adopt reasonable and effective floodplain zoning ordinances within their respective jurisdictions to regulate all floodplains where serious flood damage may occur within one year after hydraulic and engineering data adequate to formulate the ordinance becomes available.[39]

While this statute is directed at local government, the State, through the Wisconsin Department of Natural Resources, retains oversight authority. As noted in Section 87.30(1) of the Wisconsin Statutes, if a unit of government fails to enact an adequate floodplain zoning ordinance within one year of the receipt of the required hydraulic and engineering data, the State shall "determine and fix by order the limits of any or all floodplains."

While many of the natural areas and critical species habitats of the Region do occur, wholly or partly, within floodplains, neither the Wisconsin Statutes nor the Wisconsin Administrative Code provides criteria to protect such environmentally sensitive lands in the establishment of floodplain boundaries or criteria for permitted uses, variances, or amendments.

Shoreland Wetlands

Shoreland wetlands include those wetlands that are five acres or more in size and which occur within the shoreland zone. The shoreland zone includes those lands within the following distances from the ordinary high-water mark of navigable waters: 1) 1,000 feet from a lake, pond, or flowage; and 2) 300 feet from a river or stream or to the landward side of the floodplain, whichever distance is greater.[40] Chapters NR 115 and NR 117 of the Wisconsin Administrative Code require counties, for unincorporated areas, and cities and villages, for incorporated areas, within six months of receiving a copy of the final Wisconsin Wetland Inventory map for their respective areas, to adopt a shoreland-wetland zoning ordinance protecting such wetlands. Again, as in the floodplain regulations, the State, through the Wisconsin Department of Natural Resources, retains oversight responsibility for the implementation and enforcement of Chapters NR 115 and NR 117. The Department's duties with respect to shoreland-wetland zoning are set forth in Section NR 115.06 for unincorporated areas and Section NR 117.06 for incorporated areas. Both chapters direct the Department to assist the local units of government with their "development, adoption, administration and enforcement [of shoreland-wetland zoning] . . . seeking the highest practicable degree of uniformity consistent with the shoreland protection objectives found in s. 144.26 [now Section 281.31], Stats." In addition, the Department must review and approve all shoreland-wetland zoning ordinances, determine noncompliance, and monitor administration of the rule.

The shoreland-wetland regulations do have a significant role in protecting the Region's natural areas and critical species habitat in that the State has applied a set of shoreland-wetland protection

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[39]*See s. NR 116.01(1), Wis. Admin. Code; see also s. 87.30(1), Wis. Stats.*

[40]*See ss. NR 115.03(8) and NR 117.03(9), Wis. Admin. Code; see also s. 59.692(1), Wis. Stats.*

standards related to the functional values of such wetlands. Specifically, those wetlands that provide significant special recreational, scenic, or scientific interest, including scarce wetland types and habitat for endangered species, are to be protected.

The status and requirements of the shoreland-wetland zoning ordinances in effect within the Region will be discussed in the section of this chapter concerning local policies and regulations.

Water Quality Standards for Wetlands

Related to the shoreland-wetland standards, Section 404 of the Federal Clean Water Act, and other permitting and approval requirements under such sections of Wisconsin law and administrative rules as Chapters 23, 281, and 283 of the Wisconsin Statutes and Chapters NR 500 to NR 520 of the Wisconsin Administrative Code, the State of Wisconsin has established water quality standards for wetlands. Such standards were developed pursuant to Section 281.15(1)(b) of the Wisconsin Statutes and are set forth in Chapter NR 103 of the Wisconsin Administrative Code, which chapter is entitled "Water Quality Standards for Wetlands." The water quality standards for wetlands are intended, among other concerns, to "protect public rights and interest, public health and welfare and the present and prospective uses of all waters of the state," including the "propagation of fish and other aquatic life and wild . . . animals [and the] preservation of natural flora and fauna." Under the water quality standards for wetlands, the Department of Natural Resources must consider: 1) the wetland dependency of any proposed action that would affect a wetland; 2) practicable alternatives to that proposal; 3) potential impacts that may result from implementation of that proposal; 4) cumulative impacts on wetlands; 5) potential secondary impacts on wetland functions and values resulting from implementation of that proposal; and 6) any potential adverse impacts on wetlands in designated areas of special natural resource interest. It is these "special natural resource interest" wetlands that are of particular concern to the natural areas and critical species habitats planning and management efforts. Wetlands in areas of special natural resource interest are defined in Section NR 103.04 of the Wisconsin Administrative Code and are listed in Table 106. As may be noted from Table 106, those natural areas and critical species habitats identified as being located within or associated with the primary environmental corridors as delineated by the Commission in 1985;[41] calcareous fens; habitat areas utilized by State-designated or Federally designated threatened or endangered species; designated fish and wildlife refuges and management areas; designated State natural areas; and outstanding or exceptional resource waters, such as Bluff Creek and Lulu Lake in Walworth County; Spring Lake and the Mukwonago River between Eagle Spring Lake and Upper Phantom Lake in Waukesha County; and Lake Michigan, are to receive special consideration in the evaluation of those proposals requiring water quality certification.

In addition, the Department must consider the potential impacts of a particular proposal upon the functional values and uses of wetlands. The functional values and uses of wetlands are identified in Section NR 103.03(1) of the Administrative Code and are listed in Table 107. A review of those functional values and uses shows a considerable relationship to the functions and values of natural areas and critical species habitats. Any such areas designated under the natural areas and critical species habitat planning and management program would represent a significant functional value and use to be protected under the State's water quality standards for wetlands. In view of Chapter NR 103, as well as those wetlands protected under Chapters NR 115 and NR 117 of the Administrative Code, natural areas and critical species habitats that are wetlands should be protected from most dredging and filling activities. They would continue to be at risk, however, to certain drainage projects, maintenance dredging, utility installations, and agricultural activities, particularly in dry years.

Areawide Water Quality Management Plans

The content of areawide water quality management plans prepared pursuant to Section 208 of the Federal Clean Water Act is prescribed in Chapter NR 121 of the Wisconsin Administrative Code. The purpose of Chapter NR 121 is to establish the necessary regulations that specify policies, procedures, and requirements for the areawide water quality planning process. The intent of the chapter is to guide the preparation of areawide plans for managing groundwater and surface-water quality throughout the State. The authority established under the Wisconsin Statutes regarding the policy, purpose, powers, and duties of the Department of Natural Resources with respect to the State's water resources and the Department's duty to establish a

[41] *See Chapter III of this report for a discussion of the primary environmental corridors.*

Table 106

SPECIAL NATURAL RESOURCE INTEREST WETLANDS

(1) Cold water communities as defined in s. NR 102.04 (3) (b), including all trout streams and their tributaries and trout lakes;

(2) Lakes Michigan and Superior and the Mississippi river;

(3) State and federal designated wild and scenic rivers, designated state riverways and state designated scenic urban waterways (s. 30.26, Stats., ch. NR 302, 16 USC 1271 to 1287, ss. 30.40 to 30.49, Stats., and s. 30.275, Stats.);

(4) Environmentally sensitive areas and environmental corridors identified in area-wide water quality management plans, special area management plans (SAMP), special wetland inventory studies (SWIS), advanced delineation and identification studies (ADID) and areas designated by the United States environmental protection agency under s. 404 (c), 33 USC 1344 (c);

(5) Calcareous fens;

(6) Habitat used by state or federally designated threatened or endangered species (s. 29.415, Stats., ch. NR 27 and 16 USC 1531 to 1543);

(7) State parks, forests, trails and recreation areas;

(8) State and federal fish and wildlife refuges and fish and wildlife management areas;

(9) State and federal designated wilderness areas (16 USC 1131 to 1135 and s. NR 1.415);

(10) Designated or dedicated state natural areas established under ss. 23.27 to 23.29, Stats.;

(11) Wild rice waters as listed in s. NR 19.09; and

(12) Any other surface waters identified as outstanding or exceptional resource waters in ch. NR 102.

NOTE: All of the wetlands located within the Commission-delineated 1985 primary environmental corridors have been designated by the U. S. Environmental Protection Agency and the U. S. Department of the Army, Corps of Engineers, as ADID wetlands.

Source: Section NR 103.04, Wisconsin Administrative Code.

continuing water pollution control planning process is cited as the basis for Chapter NR 121.

Of particular pertinence to a natural areas and critical species habitat protection and management program is Section NR 121.05(1)(g) of the Wisconsin Administrative Code, which deals with the content of areawide water quality management plans. This section addresses the exclusion of areas that are unsuitable for the installation of wastewater treatment systems. Specifically, this section states:

> Areas to be considered for exclusion from the sewer service area because of the potential for adverse impacts on the quality of the waters of the state from both point and nonpoint sources of pollution include but are not limited to wetlands, shorelands, floodways and floodplains, steep slopes, highly erodible soils and other limiting soil types, groundwater recharge areas, and other such physical constraints.

In Southeastern Wisconsin, the majority of such areas are located within the Commission-delineated primary environmental corridors. Similarly, since most of the natural areas and critical species habitats of the Region are located within the primary environmental corridors, Chapter NR 121 offers an additional level of protection for natural areas in the urbanizing portions of the Region located within

Table 107

FUNCTIONAL VALUES AND USES OF WETLANDS

1. Storm and flood water storage and retention and the moderation of water level fluctuation extremes;

2. Hydrologic functions including the maintenance of dry season streamflow, the discharge of groundwater to a wetland, the recharge of groundwater from a wetland to another area and the flow of groundwater through a wetland;

3. Filtration or storage of sediments, nutrients or toxic substances that would otherwise adversely impact the quality of other waters of the state;

4. Shoreline protection against erosion through the dissipation of wave energy and water velocity and anchoring of sediments;

5. Habitat for aquatic organisms in the food web including, but not limited to fish, crustaceans, mollusks, insects, annelids, planktonic organisms and the plants and animals upon which these aquatic organisms feed and depend upon for their needs in all life stages;

6. Habitat for resident and transient wildlife species, including mammals, birds, reptiles and amphibians for breeding, resting, nesting, escape cover, travel corridors and food; and

7. Recreational, cultural, educational, scientific and natural aesthetic values and uses.

Source: Section NR 103.03(1), Wisconsin Administrative Code.

proposed public sanitary sewer service areas. Adoption of the natural areas and critical species habitat protection and management plan by the Commission would serve to strengthen the rationale for protecting the primary environmental corridors under the areawide water quality management plan.

Purple Loosestrife

Section 23.23 of the Wisconsin Statutes addresses purple loosestrife control. Under the statute, purple loosestrife is defined as any nonnative member of the genus Lythrum. The statute calls for the Wisconsin Department of Natural Resources to make "a reasonable effort" to control purple loosestrife in the State's wetlands. The control effort is to employ "the least environmentally harmful methods available that are effective." The statute further calls for the development of a statewide education program and grants the Department the authority to institute purple loosestrife control pilot projects and provide grants to other public agencies for purple loosestrife control. Proper implementation of this statute will help to maintain the integrity of the remaining natural areas and critical species habitats within the Region.

Natural Areas Preservation Council

Provision for a Natural Areas Preservation Council (NAPC) is set forth in Sections 15.347(4) and 23.26 of the Wisconsin Statutes. The NAPC is charged with making recommendations to the Wisconsin Department of Natural Resources and other agencies concerning "the suitability of proposed natural area sites for designation and acquisition" as well as the "development, utilization, maintenance and withdrawal of state natural areas." The NAPC is also charged with the preparation of a list of State natural areas available for research and the teaching of conservation and natural history and the preparation of recommendations concerning sites appropriate for designation as natural areas or scientific areas of national significance.

It is the Natural Areas Preservation Council that will, upon the completion of the natural areas and critical species habitat protection and management plan, be asked to review, adopt, and certify the plan to the Wisconsin Department of Natural Resources and the Wisconsin Natural Resources Board.

State Natural Areas

Natural areas are defined, their importance is identified, and provisions are made for their inventory and evaluation, acquisition, and designations under Sections 23.27, 23.28, and 23.29 of the Wisconsin Statutes. The definitions germane to the natural areas and critical species habitats have been set forth in previous chapters of this report and will

not be reiterated here. However, a brief discussion of the natural areas land inventory and acquisition program, State natural areas designation process, and natural areas heritage program is in order.

The Department of Natural Resources has been directed by the Wisconsin Legislature to establish and conduct a natural heritage inventory program with the advice of the NAPC. Specifically, the Statutes state:

> [The] program shall establish a system for determining the existence and location of natural areas, the degree of endangerment of natural areas, an evaluation of the importance of natural areas, information related to the associated natural values of natural areas and other information and data related to natural areas. This program shall establish a system for determining the existence and location of native plant and animal communities and endangered, threatened and critical species, the degree of endangerment of these communities and species, the existence and location of habitat areas associated with these communities and species and other information and data related to these communities and species. This program shall establish and coordinate standards for the collection, storage, recall and display of data related to the natural heritage inventory.[42]

Section 23.27 of the Statutes provides for the acquisition of natural areas. Section 23.28 provides for the designation of natural areas as State natural areas if such natural areas are located either on State-owned lands or on other lands under the Department's management or control. Section 23.28 also authorizes the Department to designate a State natural area on lands managed or controlled by another unit or agency of government or nonprofit organization if a voluntary, written management agreement is in place between the Department and the owner or manager of the subject natural area. In addition, the statute authorizes the Department to manage the designated State natural areas for their natural values.

Under the Wisconsin natural areas heritage program, as set forth in Section 23.29 of the Wisconsin Statutes, the Legislature has authorized a matching grant program and sets forth the criteria under which lands can be accepted into that program.

Concluding Remarks—State Policies and Regulations

In summary, the protection of natural areas and critical species habitats, under State policies and regulations, is also limited. The major remedies available under State law, as with Federal law, generally relate to the taking, possession, transport, and sale of Federally designated and State-designated endangered and threatened plant species, and game and nongame animal species. However, even endangered or threatened plant species do not receive the same level of protective consideration that extends to native animal species, the latter being considered property of the State. Further, no State regulations have been promulgated to directly protect natural areas and critical species habitats, unless they are located within designated State natural areas owned or managed, or both, by the State. Designated State natural areas on privately held lands are managed only under a mutual-agreement policy.

The State of Wisconsin has created some programs, however, which both directly and indirectly affect the protection of natural areas and critical species habitats if they are located in wetlands or are located in sanitary sewer service areas designated under the Clean Water Act. The presence of State-designated or Federally designated rare, threatened, or endangered species and their critical habitats, as well as the presence of high-quality natural areas within the State's wetlands and primary environmental corridors, does have an effect on the issuance of necessary permits and approvals for activities not consistent with the protection of these species and areas. In addition, the State of Wisconsin has enacted programs under which funds may be made available to the Department of Natural Resources and to private, nonprofit conservation organizations to locate, evaluate, acquire, protect, and manage important natural areas and critical species habitats in Southeastern Wisconsin.

LOCAL POLICIES AND REGULATIONS

Local policies and regulations related to natural areas, critical species, and critical species habitats generally involve State-mandated local zoning for shoreland and wetland areas, subdivision control ordinances, local zoning for conservation and other

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[42] *S. 23.27(3), Wis. Stats.*

environmentally significant areas, and the acquisition and management of parks, parkways, and other similar open space lands. This section describes those local zoning and acquisition policies and programs.

State-Mandated Local Zoning

As noted above, State-mandated local zoning applies to floodplains and shoreland wetlands. With respect to floodplains, however, no criteria for the protection of environmentally sensitive lands are contained in the Wisconsin Statutes or the Wisconsin Administrative Code. Accordingly, counties, cities, and villages are under no obligation to consider the protection of natural areas or critical species habitats when enacting floodplain ordinances.

Shoreland Zoning

The shoreland zone of the unincorporated portions of counties is defined under Section 59.692 of the Wisconsin Statutes. As noted above, the shoreland zone for lakes, ponds, and flowages extends landward 1,000 feet from the ordinary high-water mark. The shoreland zone for a river or stream extends landward 300 feet from the ordinary high-water mark or to the landward side of the floodplain, whichever distance is greater. Within this shoreland zone, counties are required to zone by ordinance the unincorporated areas in a manner that "effect[s] the purposes of s. 281.31 and to promote the public health, safety and general welfare."[43] Section 281.31 of the Statutes requires that county shoreland subdivision and zoning regulations

> further the maintenance of safe and healthful conditions; prevent and control water pollution; protect spawning grounds, fish and aquatic life; control building sites, placement of structure and land uses and reserve shore cover and natural beauty.[44]

Shoreland wetlands shown on the final Wisconsin Wetland Inventory maps for a county are required to be appropriately zoned and placed within a shoreland-wetland zoning district. Permitted uses within the shoreland-wetland zoning district include hiking, fishing, trapping, hunting, harvesting of wild crops, silviculture, pasturing of livestock, cultivation of crops provided that such cultivation "can be accomplished without filling, flooding or artificial drainage of the wetland," repair of existing drainage systems, construction of certain utility lines, and construction and maintenance of duck blinds, piers, docks, and walkways "provided that no filling, flooding, dredging, draining, ditching, tiling or excavating is done."[45]

Chapter NR 115 of the Wisconsin Administrative Code requires a county shoreland-wetland zoning ordinance to prohibit uses harmful to wetlands. In addition, that chapter provides for a process which includes a procedure and performance standards related to wetland functional values and uses for official ordinance amendments to the shoreland-wetland zoning districts. The functional values and uses set forth in that chapter are similar to those identified in Chapter NR 103 of the Wisconsin Administrative Code (see Table 107). Chapter NR 115 also provides for State oversight of proposed changes to shoreland-wetland zoning districts.

As noted in the above discussion of State authority and policies concerning natural areas, the functional values and uses of wetlands that support natural area or critical species habitat conditions, or both, may not be allocated to other zoning uses. Rather, they must be maintained in an essentially protected open space use. One shortcoming of Chapter NR 115, however, concerns pasturing of livestock, silviculture, and cultivation of agricultural crops in dry years. These permitted uses of the State's shoreland wetlands would not be compatible with the maintenance of natural area and critical species habitat conditions.

Shoreland-wetland zoning is also required for cities and villages. The policies and regulations concerning the city and village shoreland-wetland zoning districts are essentially identical to those applicable in unincorporated areas. The two sections of the Wisconsin Statutes applying to shoreland wetlands in incorporated territory are Section 62.231 for cities and Section 61.351 for villages. These sections respectively require cities and villages to protectively zone those wetlands shown on the Wisconsin Wetland Inventory maps which are five or more acres in size and which are located within the shoreland zone. The criteria concerning permitted

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[43]*S. 59.692(1m), Wis. Stats.*

[44]*See also s. NR 115.01(2), Wis. Admin. Code.*

[45]*See s. NR 115.05(2)(c), Wis. Admin. Code.*

uses, functional values and uses, and State review and oversight are, for the most part, the same as those used for county shoreland-wetland zoning.

Subdivision Control Ordinances

Subdivision control ordinances are intended primarily to regulate and order the development of land for urban use and to ensure the provision of clear and accurate property-boundary-line records. The subdivision of land has a vital and lasting effect upon the community as a whole. Much of the form and character of a community is determined by the quality of its land subdivisions and standards which are built into them. Once land has been divided into blocks and lots, streets established, and utilities installed, the development pattern is permanently established and unlikely to be changed. Because land subdivision affects the welfare of the community in so many respects, its regulation and control have become widely accepted as a function of municipal, county, and state government. Subdivision regulation and control are necessary to ensure that proposed land subdivisions will fit harmoniously into the existing land use pattern and general plan for the physical development of the community; to ensure that adequate provision is made for community and neighborhood facilities such as parks and open space areas, schools, places of worship, and shopping centers; and to provide uniform standards for utilities, drainage, street widths and layouts, and lot sizes and improvements.

Natural areas and critical species habitat areas may be protected through thoughtful and carefully designed land subdivisions. Land subdivision control ordinances may provide for the conservation and proper use of the soil, water, wetland, woodland, and wildlife resources of an area, in that such ordinances may provide for the proper adjustment of the subdivision design and attendant land uses to the natural resource base. The ordinances may explicitly seek to prevent flood damage, prevent and control erosion, protect water quality, and preserve natural vegetation and cover in order to promote the natural beauty of the landscape. Further, the ordinances may be used to restrict the location of building sites on steep slopes, in areas covered by poor soils, or in areas otherwise poorly suited for development. Properly employed, the subdivision control ordinance is one of the most effective tools available to local governments for the protection of the remaining natural areas and critical species habitats in Southeastern Wisconsin. A model land subdivision control ordinance including provisions for the protection and preservation of environmentally sensitive areas is contained in SEWRPC Planning Guide No. 1, Land Development Guide, November 1963. This model ordinance has been widely adapted and adopted throughout the seven-county Southeastern Wisconsin Region.

Local Zoning

Natural areas and critical species habitats may be protected directly or indirectly through local zoning efforts. Local zoning districts and their supporting ordinances which may be useful in the protection of natural areas and critical species habitats include park and park-recreational (P and PR) districts, natural features conservancy (NFC) districts, lowland conservancy (C-1) districts, upland conservancy (C-2) districts, and natural and scientific area resource conservancy (C-3) districts, and their respective supporting ordinances.

Park and Park-Recreational (P and PR) Districts: Park- and recreation-related zoning districts are intended to provide for both public and private recreational needs. Principal and accessory uses of these districts are usually designed to meet the public's recreational needs without causing undue harm to the natural resource base. Principal uses generally include such features as bicycling, hiking, and cross-country-skiing trails; botanical and zoological gardens; fairgrounds; neighborhood "tot lots"; athletic fields and playfields; skiing and sledding hills; tennis courts; picnic grounds; nature trails; and historical monuments or sites. Accessory uses may include pavilions, rest-room facilities, boathouses, locker rooms, and equipment storage facilities.

Many park district zones will also include conditional uses for amusement parks, exposition grounds, arenas and stadiums, public swimming pools, golf courses, recreational vehicles (RVs), campgrounds, shooting ranges, snowmobile trails, sports clubs, and large assemblies, e.g., assemblies of more than 5,000 persons.

Buildings are usually allowed in the park and recreation districts and the ordinance will contain specifications for lot areas, building height and width, and authorized utility services. Park and park-recreational district zoning is effective on public sites for protecting natural areas that are part of nature centers or nature trail systems, or both. However, support facilities such as rest rooms and parking lots may be established within the natural areas in order to provide suitable public access. Such accessory or conditional uses may

or may not be compatible with the protection and proper management of a particular natural area or critical species habitat.

Natural Features Conservancy (NFC) Districts: The natural features conservancy district is intended to be used to preserve, protect, enhance, or restore natural features within the district. Such natural features are defined by ordinance and range from topography to scientific and natural areas. As with the park and recreational district described above, permitted, accessory, and conditional uses within NFC districts are defined in the ordinance. Often, no principal buildings are permitted in the district, and when outbuildings and other structures are permitted, only a small percentage—1 percent, for example—is allocated to such a use. This zoning district can be very useful in protecting natural areas and critical species habitats.

A particularly good example of the natural features conservancy district protecting areas of rough topography and kettle-moraine-type physiography is contained in the Village of East Troy's zoning ordinance. Figure 14 sets forth the portion of this ordinance describing the Village's natural features conservancy district.

Lowland Conservancy (C-1) Districts: Lowland conservancy districts are intended to be used to prevent the destruction of lowland natural resources, including watercourses, lakes, ponds, wetlands, and shoreland areas. The lowland conservancy district may include floodplains, shoreland wetlands, nonshoreland wetlands, and areas of poorly drained soils. The intent of this zoning district is to prevent damages and destruction to valuable natural resources and prevent development from occurring where it would cause a hazard to the public health or safety, or would otherwise be incompatible with the public welfare in a manner that would cause a nuisance.

Principal uses within the lowland conservancy zone tend to be similar to those in the shoreland-wetland zoning districts. In fact, many units of government will use the lowland conservancy zoning district as their shoreland-wetland zoning district. In some cases, the shoreland-wetland zone will appear as an overlay zoning district to the lowland conservancy zone.

Conditional uses in the lowland conservancy zone tend to be restricted to wildlife ponds, utility lines, nonresidential buildings used for wildlife management or fish culture, roads necessary for the conduct of silviculture, bridges, and bridge approaches.

Typically, no permanent structures are permitted in this district, nor are onsite sanitary waste disposal systems, or private wells used to obtain water for domestic uses, including human consumption.

Upland Conservancy (C-2) Districts: Upland conservancy districts are usually intended to be used to preserve, protect, enhance, and restore certain upland natural resource features such as woodlands, prairies, wildlife habitats, steep slopes, and scenic areas. Typically, the zone is further intended to reduce problems associated with erosion and sedimentation and to promote and maintain the scenic beauty of an area.

Principal uses often include hunting; forest and game management; park- and recreation-related activities; preservation of scenic, historical, and natural areas; and provision for large-acreage, estate-type residential development. Accessory uses may include storage sheds and bins, stables, and private residences.

Parcel sizes tend to be large; the Commission recommends five-acre or larger lot sizes in this use category. The Commission further recommends that vegetation removal be restricted to the immediate building sites; dead or partially fallen trees contributing to a safety problem; and exotic, nonnative plant species invading the site.

Use of the upland conservancy district to protect natural areas and critical species habitats varies depending on the specific ordinance and the type of habitat to be protected. Habitat areas located in such districts zoned under language designed to protect a specific natural area or critical species habitat feature or element, such as language prohibiting cutting of living, open grown trees with a diameter at breast height of six or more inches and which further requires the maintenance of an associated grassland habitat, may be adequately preserved and protected under such language.

Natural and Scientific Area Resource Conservancy (C-3) Districts: A natural and scientific area resource conservancy district can and should be used to protect natural areas and critical species habitats. Clearly, the intent of such a district is to preserve and protect valuable natural, scientific, and scenic resources, including prairies, woodlands, wildlife habitats, wetlands, significant geological

Figure 14

VILLAGE OF EAST TROY NATURAL FEATURES CONSERVANCY DISTRICT PROVISIONS

3.16 NFC NATURAL FEATURES CONSERVANCY DISTRICT

The NFC Natural Features Conservancy District is intended to be used to preserve, protect, enhance and restore areas of rough topography and areas where depressions in the terrain alternate with small hills, forming Kettle and Kame topography. Regulation of these areas will serve to protect unique topographic features from encroachment by urban development, control erosion and sedimentation and promote and maintain the natural beauty of the Village.

a. Permitted Uses
- — Agricultural uses when conducted in accordance with County Soil and Water Conservation District Standards.
- — Fishing and hunting
- — Forest and game management
- — Park and recreational use
- — Preservation of scenic, historic and scientific areas
- — Sustained yield forestry
- — Harvesting of wild crops
- — Water retention and wildlife preserves
- — Hiking and nature trails

b. Permitted Accessory Uses
- — Nonhabitable structures associated with a permitted use.

c. Conditional Uses
- — None

d. Lot Area and Width
- — No minimum lot area or lot width is required.

e. Building Height and Area
- — No principal building or parts of a principal building shall exceed thirty-five (35) feet in height.
- — The sum total of the ground level area of all buildings or structures shall not exceed one (1) percent of the total area of a parcel zoned Natural Features Conservancy District.

f. Setback and Yards
- — There shall be a minimum building setback of forty-five (45) feet from the right-of-way of all streets.
- — There shall be two (2) side yards. Each side yard shall be not less than thirty (30) feet in width.
- — There shall be a rear yard of not less than thirty-five (35) feet.

g. Special Regulations
- — To encourage uses that are compatible with the residential character of the Village, Zoning Permits for permitted uses in the Natural Features Conservancy District shall not be issued without prior review by and approval of the Village Plan Commission. Said review and approval shall be concerned with general layout, building plans, ingress, egress, parking, loading and unloading, and landscape plans.

Source: Zoning Ordinance, Village of East Troy, Walworth County, Wisconsin, September 1981.

and archaeological features, and lakes, rivers, and streams. The intent of the zoning regulations attached to this district is to preclude incompatible development which may result in public health and safety hazards, deplete or destroy significant natural resources, or be a detriment to the public welfare. This zoning district would involve principal or permitted uses similar to those found in the shoreland-wetland zoning district. Managed uses would be consistent with the preservation of the natural or scientific area involved, and would serve to enhance and perpetuate the condition being protected. Typically, existing structures or facilities on land included in this district are allowed to be maintained, but new building is prohibited. Conditional uses may center on structures and

facilities associated with either access to or interpretive facilities attendant to the natural and scientific areas.

Typical natural and scientific area resource conservancy district ordinance language is set forth in Figure 15. The subject ordinance was prepared for Kenosha County to protect the Chiwaukee Prairie National Natural Landmark and designated State natural area. The Chiwaukee Prairie now lies within the Village of Pleasant Prairie and the subject ordinance has since been adopted and is administered by the Village.

Concluding Remarks—Local Policies and Regulations

Local units of government may also acquire natural areas. Matching funds are available from the State for those local units and agencies of government inclined to acquire natural areas and critical species habitats. Such habitats, once acquired, can then be properly protected and managed.

In summary, local zoning for natural areas and critical species habitats located in wetlands, particularly shoreland wetlands, can be effective. The oversight of the Wisconsin Department of Natural Resources concerning shoreland wetlands under Chapters NR 115 and NR 117 of the Wisconsin Administrative Code, combined with the implementation of Chapter NR 103 of the Code, can be used to avoid the loss of significant wetland natural areas and critical species habitats. However, upland natural area and critical species habitat protection is largely lacking. While several zoning districts and subdivision control ordinances are available to help protect such areas, the local units of government involved—county, town, city, and village—must be inclined to enact and apply such regulations. Zoning is only as good as the local unit of government's commitment to maintaining and enforcing it. In Southeastern Wisconsin, some communities are strongly committed to the preservation of their resources; other communities lack any level of concern. The most effective way to protect natural areas and critical species habitats is to purchase them in fee simple. Once a natural area is under protective ownership, it can then be properly managed to protect and enhance the resource features for which the area became designated.

CONCLUSIONS

Federal and State authorities needed to protect natural areas and critical species habitats are limited. Major remedies available under Federal and State law generally relate to the taking, possession, transport, and sale of designated endangered and threatened plant and game and nongame animal species. No Federal or State regulations have been promulgated to directly protect natural areas and critical species habitats unless they are located within designated State natural areas owned and managed by the State of Wisconsin.

The Federal and State governments have created some programs which both directly and indirectly affect the protection of natural areas and critical species habitats if they are located in wetlands. The State of Wisconsin, through the sanitary sewer service area management process developed under the Federal Clean Water Act, may, both directly and indirectly, protect natural areas and critical species habitats located within primary environmental corridors. Some Federal and State programs have been enacted in which funds may be made available to public and to private, nonprofit conservation organizations to locate, evaluate, acquire, protect, and manage natural areas and critical species habitats.

Local zoning, designed to include the protection of natural areas and critical species habitats located in wetlands, particularly shoreland wetlands, can be a very effective tool to protect environmentally sensitive areas, particularly floodlands and wetlands. Several zoning districts are available to help protect such areas, but local units of government must be inclined to enact and properly administer such regulations. Similarly, subdivision control ordinances may be used to protect park, parkway, and other open space lands which include natural areas and critical species habitats. Again, however, local units of government must be inclined to enact and properly administer such ordinances.

No programs have been established to protect and manage, either directly or indirectly, significant geological sites. However, the Federal National Natural Landmarks program may designate certain significant geological sites. As such, Federal agencies must consider the existence and location of such sites during any assessment of the effect of their actions on the environment.

Figure 15

KENOSHA COUNTY NATURAL AND SCIENTIFIC AREA RESOURCE CONSERVANCY DISTRICT ORDINANCE PROVISIONS[a]

12.25-3 C-3 NATURAL AND SCIENTIFIC AREA RESOURCE CONSERVANCY DISTRICT

A. Primary Purpose and Characteristics

The C-3 Natural and Scientific Area Resource Conservancy District is intended to be used to prevent the destruction of valuable natural, scenic, and scientific resources including wetlands, shorelands of navigable waters, prairies, meadows, sand dunes, woodlands, wildlife habitat, and areas of high erosion hazard. Incompatible development in these areas may result in hazards to the public health and safety, may deplete or destroy invaluable or irreplaceable natural resources, or may otherwise be detrimental to the public welfare.

B. Designation of Natural and Scientific Resource Areas

For determining which areas are to be located in the C-3 Natural and Scientific Area Resource Conservancy District, the Kenosha County Office of Planning and Zoning Administration shall develop district maps reflecting the best data available. The district delineation process shall make use of the Wisconsin Wetland Inventory Maps for Kenosha County, dated June 20, 1985, and stamped "FINAL." The Wisconsin Wetland Inventory Maps shall be modified to reflect existing urban uses and land committed to urban uses in the following manner:

1. Platted lots which were built upon before the adoption of these district regulations shall not be placed in the district.
2. Platted lots for which zoning permits were issued prior to the adoption of these district regulations shall not be placed in the district.
3. Larger lots (greater than 80 feet wide and at least 20,000 square feet in area) traversed by a C-3 boundary shall be considered buildable only to the limits of the C-3 District.
4. Smaller individual undeveloped platted lots will be excluded from the district if the building envelope remaining after removing the setback, side yards, potential well site, and potential on-site sewage system site results in a minimum area of 1,000 square feet.

C. Mapping Disputes in the C-3 District

Whenever it is alleged that a discrepancy exists between a Natural and Scientific Area delineation and actual field conditions, the staff of the Kenosha County Office of Planning and Zoning Administration shall resolve the discrepancy in the following manner:

1. The Kenosha County Office of Planning and Zoning Administration staff shall request that the staff of the Wisconsin Department of Natural Resources make a field inspection of the disputed lot and stake the limits of the Natural and Scientific Area.
2. The Kenosha County Office of Planning and Zoning Administration shall advise the property owner of the preliminary results of the field investigation. The property owner shall determine, within 30 days, whether he will pursue a final wetland determination on the property.
3. Should the property owner decide to pursue a final wetland determination, he shall have a plat of survey prepared by a Wisconsin Registered Land Surveyor. The plat of survey shall show all property lines, structures on the lot and the location of the wetland boundary as staked in the field. The plat of survey shall be filed with the Kenosha County Officer of Planning and Zoning Administration.
4. The Kenosha County Office of Planning and Zoning Administration shall institute the appropriate action to change the Zoning Map to conform to the plat of survey. No fee shall be required of the property owner for this action.

D. Principal Uses

1. The following uses provided they do not involve filling, flooding, draining, dredging, ditching, tiling or excavation:

   a. Hiking, fishing, trapping, hunting, swimming, and boating, unless otherwise prohibited by law.
   b. The harvesting of wild crops, such as marsh hay, ferns, moss, wild rice, berries, tree fruits, and tree seeds, in a manner that is not injurious to the natural reproduction of such crops;
   c. The pasturing of livestock;
   d. The cultivation of agricultural crops;
   e. The practice of silviculture, including the planting, thinning and harvesting of timber; and
   f. The construction or maintenance of duck blinds.

Figure 15 (continued)

2. The following uses which may involve filling, flooding, draining, dredging, ditching, tiling, and excavating, but only to the extent specifically provided below:

   a. Temporary water level stabilization measures necessary to alleviate abnormally wet or dry conditions that would have an adverse impact on silvicultural activities if not corrected;
   b. The cultivation of cranberries including flooding, dike and dam construction or ditching necessary for the growing and harvesting of cranberries;
   c. The maintenance and repair of existing agricultural drainage systems including ditching, tiling, dredging, excavating and filling necessary to maintain the level of drainage required to continue the existing agricultural use. This includes the minimum filling necessary for disposal of dredged spoil adjacent to the drainage system provided that dredged spoil is placed on existing spoil banks where possible;
   d. The construction or maintenance of fences for the pasturing of livestock, including limited excavating and filling necessary for such construction or maintenance;
   e. The construction or maintenance of piers, docks or walkways built on pilings, including limited excavating and filling necessary for such construction and maintenance; and
   f. The maintenance, repair, replacement or reconstruction of existing town and county highways and bridges, including limited excavating and filling necessary for such maintenance, repair, replacement or reconstruction.

E. Conditional Uses (See also section 12.29-8)

No conditional uses shall be permitted in the C-3 Natural and Scientific Area Resource Conservancy District except:

1. Roads necessary to conduct silvicultural and agricultural cultivation activities.
2. Roads and driveways necessary to provide access to planned urban development.
3. Nonresidential buildings for wildlife management.
4. Park and recreation areas.
5. Railroad lines.
6. Utilities.

F. Lot Area

Where a lot or parcel is located partially within a C-3 Natural and Scientific Area Resource Conservancy District and partially within an adjoining use district, that area of the lot or parcel in the C-3 District may be used to meet the lot area requirements of the adjoining district provided that at least 50 percent of the minimum lot area requirement is provided outside the C-3 District where public sanitary sewerage facilities are available, and at least 40,000 square feet is provided outside the C-3 District where public sanitary sewerage facilities are not available.

G. Structures

No structure shall be permitted, except those permitted by conditional use grant, in the C-3 Natural and Scientific Area Resource Conservancy District. Furthermore, no on-site soil absorption sanitary sewage system, holding tank or private well used to obtain water for ultimate human consumption shall be constructed in the C-3 Natural and Scientific Area Resource Conservancy District.

[a]*This zoning ordinance was adopted by Kenosha County in an effort to protect natural elements within the Chiwaukee Prairie. Since the former Town of Pleasant Prairie's incorporation as the Village of Pleasant Prairie, the Village has adopted and is administering this ordinance.*

Source: SEWRPC.

Based upon the foregoing, it is clear that the most effective way to protect natural areas and critical species habitats remains their purchase in fee simple.

It is also clear that the protection and preservation of any natural area or critical species habitat becomes difficult in the absence of properly prepared and adopted regional, county, and local comprehensive plans. While some existing Federal and State laws and regulations may protect selected natural areas and critical species habitats, e.g., wetlands and floodlands, and may help in managing some of the Federally acquired and State-acquired areas, no comprehensive policy is in place to account for the protection and management of such areas. Clearly, for nonwetland natural areas and critical species habitats, the best tools available for their protection and management are the traditional county and local zoning and land subdivision control ordinances and purchase in fee simple.

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Chapter VIII

RECOMMENDED PLAN AND IMPLEMENTATION MEASURES

INTRODUCTION

This chapter presents a recommended natural areas and critical species habitat protection and management plan for the Southeastern Wisconsin Region. More specifically, this chapter presents: 1) a set of natural areas and critical species habitat protection objectives and supporting principles and standards; 2) a recommended plan attendant to natural areas and critical species habitats, together with ancillary plan recommendations attendant to geological and archaeological areas; 3) estimates of plan implementation costs; 4) an appraisal of the potential performance of the plan with respect to the protection of endangered, threatened, and rare species; and 5) plan implementation measures.

OBJECTIVES, PRINCIPLES, AND STANDARDS

Planning is a rational process for formulating and meeting objectives. The formulation of objectives, therefore, is an essential task which must be undertaken before plans can be prepared. The formulation of the objectives needed to guide preparation of a natural areas and critical species habitat protection plan is a complex and difficult task because it involves technical as well as value-system considerations. This task involves the combined knowledge of many individuals who are informed about the Region and the objectives. However, the objectives should ultimately be approved by duly appointed and elected officials legally responsible for plan formulation, adoption, and implementation.

At the regional level, the use of advisory committees has proved to be a practical and effective procedure for providing the technical expertise required for the formulation of sound objectives and plans. Particularly with respect to natural areas and critical species habitat protection, the accumulated knowledge and experience about the Region which the members of the Commission's Technical Advisory Committee for the Protection and Management of Natural Areas in Southeastern Wisconsin possess facilitated the formulation of plan objectives as well as plan design. One of the major tasks of the Committee was to assist the Commission in formulating regional natural areas and critical species habitat protection and management objectives, along with the necessary supporting principles and standards, and in the design of a plan to meet those objectives.

Basic Concepts and Definitions

The term "objective" is subject to a wide range of interpretation and application and is closely linked to other terms often used in planning work which also are subject to a wide range of interpretation and application. The following definitions which have been consistently used by the Commission are employed herein:

1. Objective: a goal or end toward the attainment of which plans and policies are directed.

2. Principle: a fundamental, primary, or generally accepted tenet used to assert the validity of objectives and to prepare standards and plans.

3. Standard: a criterion used as a basis of comparison to determine the adequacy of alternative and recommended plan proposals to attain objectives.

4. Plan: a design which seeks to achieve the agreed-upon objectives.

5. Policy: a rule or course of action used to ensure plan implementation.

6. Program: a coordinated series of policies and actions to carry out a plan.

Although only the first four of these terms are considered herein in any depth, an understanding of the interrelationship of the foregoing definitions and of the basic concepts which they represent is essential to an understanding of the objectives, principles, and standards and the plan herein set forth.

Objectives and Standards

The objectives adopted for the regional natural areas and critical species habitat protection and management plan are largely self-descriptive. They are concerned primarily with preservation of the natural ecological systems of the Region. Each

objective is complemented with a set of planning standards which are, in turn, directly relatable to a planning principle which supports the chosen objective. The planning principles thus augment each objective by asserting the inherent validity of the objective.

The following two natural areas and critical species habitat protection and management objectives were recommended for adoption upon careful review by the Technical Advisory Committee for the Protection and Management of Natural Areas in Southeastern Wisconsin:

1. Maintenance of the integrity of the remaining biodiversity of the Region.

2. Preservation and protection of the remaining significant geological and archaeological sites of the Region.

Complementing each of these two objectives are planning principles and a set of planning standards (see Table 108). The principles and standards serve to facilitate the quantitative application of the objectives in plan design.

RECOMMENDED PLAN—NATURAL AREAS AND CRITICAL SPECIES HABITAT SITES

Given the objectives and standards noted above, the following presents a recommended plan for the protection and management of the Region's natural areas and critical species habitat. The plan includes three basic elements: land acquisition, land regulation, and land management.

While consideration was given in the planning process to the formulation of alternative plans, only a single recommended plan is set forth herein. Each of the 447 designated Natural Area sites and the 141 additional designated Critical Species Habitat sites identified in the inventory reported in Chapter VI of this report represents areas that are worthy of preservation and protection as urban and rural development activities in the Region proceed. In considering the potential alternative plans, the Advisory Committee concluded that the only meaningful variable upon which to structure alternatives was that which pertains to the degree to which the inventoried Natural Area and Critical Species Habitat sites are brought under protective ownership, whether that ownership is public or private in nature. Rather than artificially structuring alternative plans to reflect assumed degrees of protective land acquisition, the Advisory Committee instead chose to structure a single recommended plan that would seek to preserve and protect, to the maximum extent practicable, the identified sites. Encompassed within the structure of the plan is an inherent priority-ranking system that recognizes the complex institutional nature of the public and private agencies and organizations available to help implement the plan. Also recognized by the plan is the fact that within each concerned unit of government, agency, and organization, the financial resources to implement the plan will be constrained. In this regard, it is recognized that land acquisition and management partnerships among the public and private agencies concerned may need to be formed in order to more fully carry out the plan recommendations.

In making this determination, the Committee acknowledged that State, county, and local units of government and private conservancy organizations will all have their own particular perspectives concerning land acquisition priorities and financial constraints as they seek to implement the recommended plan over time through more detailed planning and programming activities. For example, as individual counties and municipalities prepare park and open space plans, the Advisory Committee envisioned that each would carefully review the regional natural areas plan land acquisition recommendations and, to the greatest extent financially feasible, reflect in their county and municipal plans those recommendations addressed to the level and unit of government concerned in the regional plan.

In addition, the Wisconsin Department of Natural Resources has among its responsibilities the identification, protection, and management of lands supporting important natural resources, including natural areas, in Wisconsin. To accomplish this task, the Department is required to follow an established approval process when acquiring land and easements. Establishment of new projects, as well as expansion of existing projects, entails preparation of feasibility studies and subsequent master plans. The studies and plans require approval by the Wisconsin Natural Resources Board before they can be implemented.

For sites to be considered for Department purchase as natural areas, they must first qualify by meeting a clearly defined set of criteria as determined by Department specialists in natural area protection. Qualified natural area sites are given a priority ranking in comparison to other potential natural area acquisition projects statewide. Before pursuing acquisition, projects must be approved by the

Table 108

NATURAL AREAS AND CRITICAL SPECIES HABITAT PROTECTION AND MANAGEMENT OBJECTIVES, PRINCIPLES, AND STANDARDS

OBJECTIVE NO. 1

Maintenance of the integrity of the remaining biodiversity of the Region.[a]

PRINCIPLES

Ecosystems with high biodiversity levels tend to be more viable; provide valuable benchmarks against which the human impacts on similar ecosystems elsewhere can be evaluated; and are better able to naturally respond to environmental changes. Loss of the more diverse animal and plant communities creates a smaller reservoir of species through the loss of the less common and more sensitive species. Ultimately, the number of diverse natural animal and plant communities may become so small that the continued existence of many native species over time would be compromised.

Rare, threatened, and endangered animal and plant species are important components of the biodiversity of the Region; therefore, their survival should be promoted. This requires preservation of the habitats concerned. Common, native species are also important elements of the biodiversity of the Region, and it is important to preserve the genetic differences within these species.

Preservation of genetically distinct populations within species is important for preserving biodiversity. Once a species is reduced to a remnant population, its total extinction becomes more likely. The existence of several populations of a given species spreads, and therefore reduces, the risks of environmental changes so that unfavorable conditions in one or a few habitats are less likely to threaten the entire species. Movement of rare, threatened, and endangered species across the landscape, which prevents their population and their gene pools from becoming isolated, occurs through habitat connections—environmental corridors—between natural areas and critical species habitats.

High levels of biodiversity contribute materially to the scenic and natural beauty of the Region. Maintaining such a biodiversity provides for economic, cultural, and recreational opportunities and has significant scientific and educational value. High levels of biodiversity also contribute to the support of a broad and sustainable food chain. Such a food chain, in turn, supports a myriad of game and nongame animal species which have economic, educational, cultural, recreational, and scientific value. Preservation of biodiversity provides an opportunity for future economic, educational, medical, and scientific uses of all species, including those that are rare, threatened, and endangered.

STANDARDS

1. All natural areas and critical species habitats within primary environmental corridors, or within blocks of habitat of sufficient size to support necessary ecological processes, including the genetic flow of animal and plant species among and between populations, should be preserved, protected, and managed to maintain their value.

2. All Natural Areas of statewide or greater significance (NA-1 areas) should be preserved, protected, and managed to maintain their natural value.

3. All Natural Areas of countywide or regional significance (NA-2 areas) and of local significance (NA-3 areas) which contain Federally designated or State-designated rare, threatened, or endangered animal or plant species habitat should be preserved, protected, and managed to maintain their natural value.

4. Areas of pre-settlement vegetation identified for preservation should include the associated wildlife, soil profiles, hydrologic regime, and ecological processes, as well as native plant species; that is, they should constitute complete ecosystems, not merely component communities.

5. Areas of pre-settlement vegetation identified for preservation should, given the environs, size, and configuration of the areas, be amenable to application of appropriate management techniques to maintain or restore natural conditions; the techniques may include prescribed burning, brush cutting, control of exotic species, provision of suitable buffer areas, and return to natural hydrologic conditions, particularly surface-water and groundwater levels.

6. Areas of pre-settlement vegetation identified for preservation should be subject to minimal disturbance, and directed or restricted public access should be possible.

7. All bird habitat areas providing large tracts of grasslands and forest interiors should be preserved, protected, restored, and managed to maintain their natural value.

OBJECTIVE NO. 2

Preservation and protection of the remaining significant geological and archaeological sites of the Region.[b]

PRINCIPLE

Preservation of sites having geological and archaeological significance provides opportunities for aesthetic enjoyment and for cultural, educational, historical, and scientific pursuits within the Region.

STANDARDS

1. All significant geological and archaeological sites located within the primary environmental corridors should be preserved, protected, and managed in a manner consistent with the long-term maintenance of their geological and archaeological features.

2. All bedrock geological sites of statewide or greater significance should be preserved and protected.

3. Collecting pressure at threatened geological sites should be reduced or eliminated by providing designated new exposures for amateur collectors and school groups.

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[a] *According to the Wisconsin Department of Natural Resources publication Wisconsin's Biodiversity as a Management Issue, biological diversity, or "biodiversity," is the entire spectrum of life-forms and the many ecological processes that support them. It occurs at four interacting levels: genetic, species, community, and ecosystem.*

[b] *Geological sites contain significant representations of mineral formations, stratigraphy, and prehistoric climate conditions and biological habitats. Archaeological sites contain significant remnants or representations of historical and prehistoric human habitation.*

Source: SEWRPC.

Department, the Natural Resources Board, the Governor, and, in some cases, the State Legislature.

The specific value of a site is determined by appraisals conducted by Department and contract appraisers, with land values based on fair market value. Land purchases by the Department are made only from willing sellers within established project boundaries. Of course, acquisition is always limited by available funding. In 1996, the Natural Resources Board approved a five-year land acquisition plan which guides establishment of all new Department projects to the year 2000.

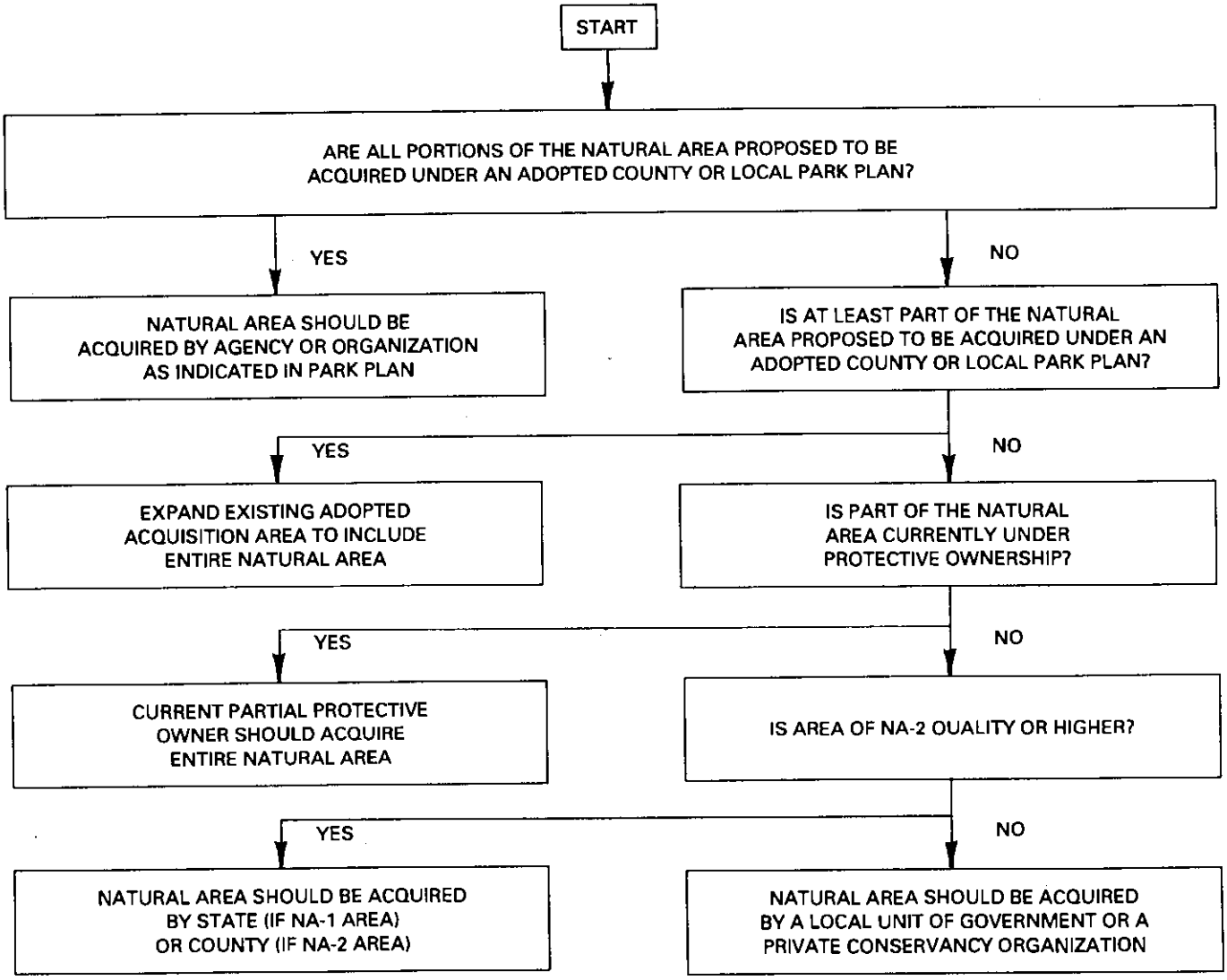
Land Acquisition Plan Element

The land acquisition plan element has four subelements involving the following: 1) identified Natural Area sites of statewide or greater significance; 2) other identified Natural Area sites; 3) identified Critical Species Habitat sites lying partly or wholly outside of identified Natural Areas; and 4) sites required to reestablish large tracts of grasslands and forest interiors. Each of these subelements is described below. A key to the determination of the recommended site acquisition agency or organization is given in Figure 16.

Natural Area Sites of Statewide or Greater (NA-1) Significance: The Advisory Committee recommended that the first acquisition priority be accorded those inventoried Natural Area sites of statewide or greater significance (NA-1 sites). There are 40 such sites in the Region. The plan recommends that all 40 sites be preserved and protected. The site-specific plan recommendations in this respect are set forth in Table 109 and on Map 56. The table and map

Figure 16

PROPOSED NATURAL AREA (NA-1, NA-2, AND NA-3) ACQUISITION SCHEME



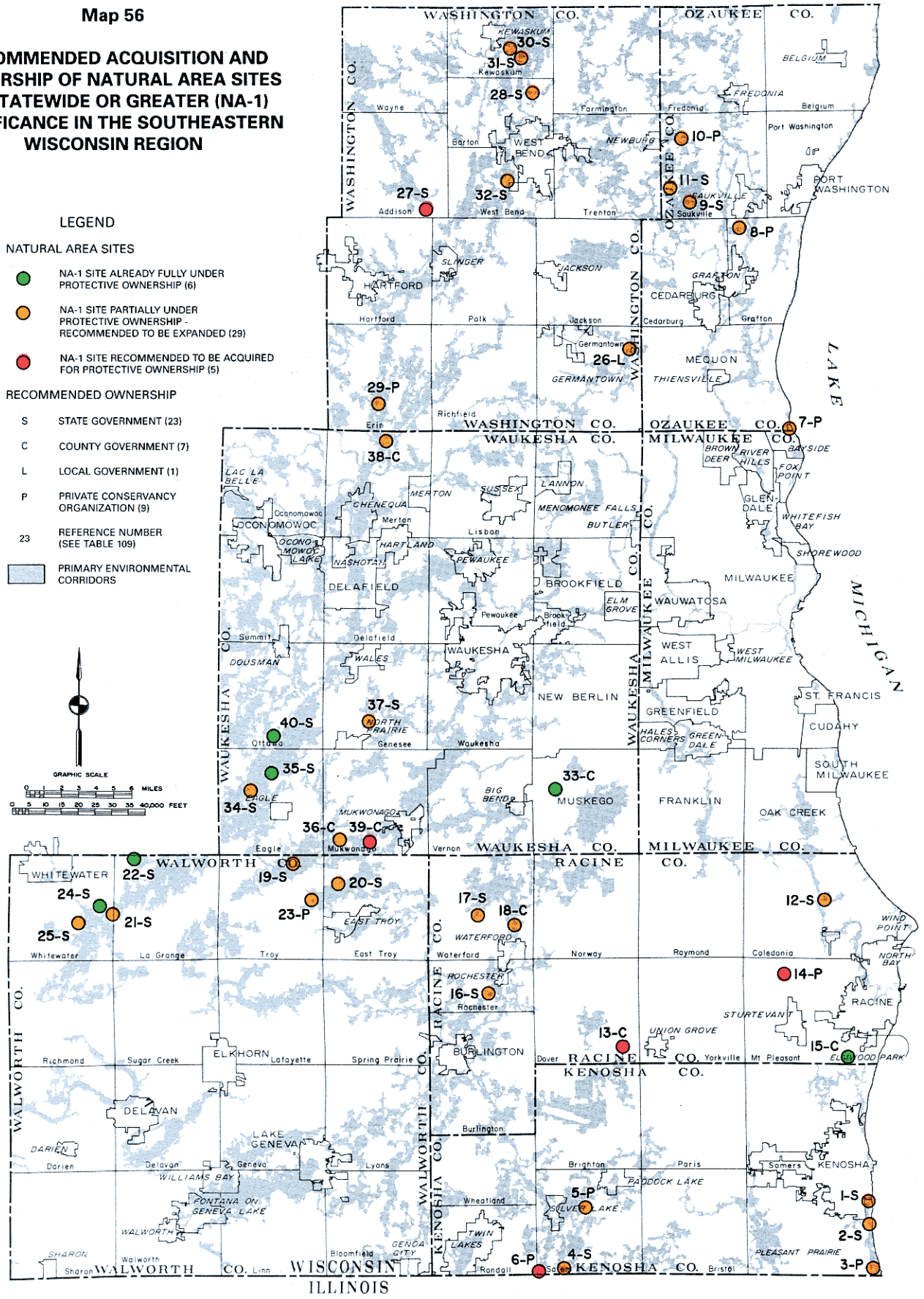
Source: SEWRPC.

include each NA-1 site area proposed to be acquired and the type of public or private agency proposed to be responsible for the acquisition. In according the highest priority to the NA-1 sites, the Advisory Committee noted that 36 of the 40 sites are located in primary environmental corridors as identified by the Regional Planning Commission in its prior regional planning efforts. Moreover, 37 of the 40 sites were found in the inventory to support rare, threatened, or endangered plant, bird, or mammal species, or a combination thereof.

In total, the 40 NA-1 sites encompass about 8,700 acres, or 13.6 square miles, or about 0.5 percent of the total area of the Region. Of that total, about 5,829 acres, or about 9.1 square miles, or 67 percent, have already been placed under protective public or private ownership. This includes six sites where protective acquisition has been completed. The plan recommends that approximately 2,862 acres, or 4.5 square miles, similarly be placed under protective ownership before such lands are lost to urban development. This includes expansion of such

Map 56

RECOMMENDED ACQUISITION AND OWNERSHIP OF NATURAL AREA SITES OF STATEWIDE OR GREATER (NA-1) SIGNIFICANCE IN THE SOUTHEASTERN WISCONSIN REGION



All 40 of the NA-1 quality Natural Area sites identified in the Region are recommended for protective ownership. The recommended agency for acquisition in each case relates to several factors, including prior partial ownership, protective ownership recommendations made in adopted park and open space plans, and established Wisconsin Department of Natural Resources project boundaries.

Source: SEWRPC.

Table 109

LAND ACQUISITION PRIORITY 1: PROTECTION OF NATURAL AREA SITES OF STATEWIDE OR GREATER (NA-1) SIGNIFICANCE IN THE SOUTHEASTERN WISCONSIN REGION

	NA-1 Site Identification			Site Characteristics		Site Area (acres)					
County	Reference Number on Map 56	Civil Division(s)	Name	Located in Primary Environmental Corridor	Supports Rare, Threatened, or Endangered Species	Already under Protective Ownership[a]	Proposed to Be Acquired	Total	Proposed Acquisition Agency	Acquisition of Site Recommended in a Prior Regional or County Plan	Formal Project Acquisition Area Established
Kenosha	1	City of Kenosha	Kenosha Sand Dunes and Low Prairie	Yes	Yes	86	13	99	Wisconsin Department of Natural Resources	Yes	Yes
	2	Village of Pleasant Prairie	Carol Beach Low Prairie and Panné State Natural Area	Yes	Yes	29	10	39	Wisconsin Department of Natural Resources	Yes	Yes
	3	Village of Pleasant Prairie	Chiwaukee Prairie State Natural Area	Yes	Yes	242	67	309	The Nature Conservancy	Yes	Yes
	4	Town of Salem	Peat Lake State Natural Area	Yes	No	136	4	140	Wisconsin Department of Natural Resources	Yes	No
	5	Town of Salem	Silver Lake Bog State Natural Area	Yes	Yes	14	4	18	Silver Lake Sportsmen's Club	No	No
	6	Town of Salem	Stopa Fen	Yes	Yes	--	9	9	The Nature Conservancy	No	No
	Subtotal	--	--	6 of 6 sites	5 of 6 sites	507	107	614	--	--	--
Milwaukee	None	--	--	--	--	--	--	--	--	--	--
Ozaukee	7	City of Mequon[b]	Fairy Chasm State Natural Area	Yes	Yes	21	59	80	The Nature Conservancy	Yes	No
	8	Town of Grafton	Kurtz Woods State Natural Area	Yes	Yes	31	39	70	The Nature Conservancy	No	No
	9	Town of Saukville	Cedarburg Bog State Natural Area	Yes	Yes	1,572	437	2,009	Wisconsin Department of Natural Resources	Yes	Yes
	10	Town of Saukville	Riveredge Creek and Ephemeral Pond State Natural Area	Yes	Yes	75	22	97	Riveredge Nature Center	No	Yes
	11	Town of Saukville	Sapa Spruce Bog State Natural Area	Yes	Yes	22	37	59	University of Wisconsin-Milwaukee	Yes	No
	Subtotal	--	--	5 of 5 sites	5 of 5 sites	1,721	594	2,315	--	--	--
Racine	12	Town of Caledonia	Renak-Polak Maple-Beech Woods State Natural Area	Yes	Yes	96	42	138	University of Wisconsin-Parkside	No	No
	13	Town of Dover Town of Yorkville	Kansasville Railroad Prairie	No	Yes	--	14	14	Racine County	Yes	No
	14	Town of Mt. Pleasant	Franksville Railroad Prairie	No	Yes	--	4	4	The Nature Conservancy	No	No
	15	Town of Mt. Pleasant	Sanders Park Hardwoods State Natural Area	No	Yes	56	--	56	Racine County	Yes	Yes
	16	Town of Rochester	Cherry Lake Sedge Meadow State Natural Area	Yes	Yes	163	27	190	Wisconsin Department of Natural Resources	Yes	Yes
	17	Town of Waterford	Tichigan Fen	Yes	Yes	95	23	118	Wisconsin Department of Natural Resources	Yes	Yes
	18	Town of Waterford	Elm Island Bog-Island Oak Woods	Yes	Yes	9	59	68	Racine County	Yes	No
	Subtotal	--	--	4 of 7 sites	7 of 7 sites	419	169	588	--	--	--
Walworth	19	Town of Eagle Town of Troy[c]	Lulu Lake and Eagle Spring Lake Wetland Complex and Adjacent Uplands	Yes	Yes	726	244	970	Wisconsin Department of Natural Resources	Yes	Yes
	20	Town of East Troy	Beulah Bog State Natural Area	Yes	Yes	58	14	72	Wisconsin Department of Natural Resources	Yes	No
	21	Town of LaGrange Town of Whitewater	Bluff Creek Woods	Yes	Yes	319	19	338	Wisconsin Department of Natural Resources	Yes	Yes
	22	Town of LaGrange	Young Prairie State Natural Area	Yes	Yes	53	--	53	Wisconsin Department of Natural Resources	Yes	Yes
	23	Town of Troy	Pickerel Lake Fen State Natural Area	Yes	Yes	86	187	273	The Nature Conservancy	Yes	Yes
	24	Town of Whitewater	Bluff Creek Fens	Yes	Yes	106	--	106	Wisconsin Department of Natural Resources	Yes	Yes
	25	Town of Whitewater	Clover Valley Fen State Natural Area	Yes	Yes	93	19	112	Wisconsin Department of Natural Resources	Yes	Yes
	Subtotal	--	--	7 of 7 sites	7 of 7 sites	1,441	483	1,924	--	--	--
Washington	26	Village of Germantown	Germantown Swamp	Yes	No	190	184	374	Village of Germantown	No	No
	27	Town of Addison	Aurora Road Fen	Yes	Yes	--	22	22	Wisconsin Department of Natural Resources	Yes	Yes
	28	Town of Barton	Smith Lake and Wetlands	Yes	Yes	85	45	130	Wisconsin Department of Natural Resources	No	No
	29	Town of Erin	Murphy Lake-McConville Lake Wetland Complex	Yes	Yes	279	611	890	The Nature Conservancy	No	No

Table 109 (continued)

County	NA-1 Site Identification			Site Characteristics		Site Area (acres)			Proposed Acquisition Agency	Acquisition of Site Recommended in a Prior Regional or County Plan	Formal Project Acquisition Area Established
	Reference Number on Map 56	Civil Division(s)	Name	Located in Primary Environmental Corridor	Supports Rare, Threatened, or Endangered Species	Already under Protective Ownership[a]	Proposed to Be Acquired	Total			
Washington (continued)	30	Town of Kewaskum	Kewaskum Maple-Oak Woods State Natural Area	Yes	Yes	46	40	86	Wisconsin Department of Natural Resources	Yes	Yes
	31	Town of Kewaskum	Milwaukee River Floodplain Forest State Natural Area	Yes	No	130	5	135	Wisconsin Department of Natural Resources	Yes	Yes
	32	Town of West Bend	Paradise Lake Fen	Yes	Yes	11	11	22	Wisconsin Department of Natural Resources	Yes	No
	Subtotal	--	--	7 of 7 sites	5 of 7 sites	741	918	1,659	--	--	--
Waukesha	33	City of Muskego	Muskego Park Hardwoods State Natural Area	No	Yes	73	--	73	Waukesha County	Yes	Yes
	34	Town of Eagle	Scuppernong Prairie State Natural Area	Yes	Yes	544	28	572	Wisconsin Department of Natural Resources	Yes	Yes
	35	Town of Eagle	Kettle Moraine Fen and Low Prairie State Natural Area	Yes	Yes	109	--	109	Wisconsin Department of Natural Resources	Yes	Yes
	36	Town of Eagle Town of Mukwonago	Upper Mukwonago River	Yes	Yes	7	159	166[d]	Waukesha County	Yes	No
	37	Town of Genesee	Genesee Oak Opening and Yatzeck's Fen State Natural Area	Yes	Yes	40	55	95	Wisconsin Department of Natural Resources	Yes	No
	38	Town of Merton	Monches Woods	Yes	Yes	202	120	322	Waukesha County	Yes	Yes
	39	Town of Mukwonago	Mukwonago Fen, Sedge Meadow, and Tamarack Relict	Yes	Yes	--	229	229[e]	Waukesha County	Yes	No
	40	Town of Ottawa	Ottawa Lake Fen State Natural Area	Yes	Yes	25	--	25	Wisconsin Department of Natural Resources	Yes	Yes
	Subtotal	--	--	7 of 8 sites	8 of 8 sites	1,000	591	1,591	--	--	--
Region	Total	--	--	38 of 40 sites	37 of 40 sites	5,829	2,862	8,691	--	--	--

[a] *Based on 1994 data.*

[b] *Site partly located in Milwaukee County.*

[c] *Site partly located in Waukesha County.*

[d] *An additional six acres of this site, located within the Rainbow Springs Golf Course, should remain in private ownership and be protected through public land use regulation.*

[e] *An additional three acres of this site, consisting of developed residential lots, should remain in private ownership and be protected through public land use regulation.*

Source: SEWRPC.

ownership for 29 sites already partly in protective ownership plus five sites where acquisition for protective ownership has not yet begun. The remaining nine acres, now in private ownership, are recommended to remain in such ownership and to be protected through public land use regulation.

A summary of the distribution by county of the NA-1 sites proposed to be acquired under this plan subelement is set forth in Table 110. About 68 percent of the area proposed to be acquired represents lands that were proposed to be acquired for open space protection purposes in prior regional and county plans. Consequently, this recommendation is really new only with respect to the remaining 32 percent of the land area concerned, representing a total of about 918 acres. Moreover, 45 percent of the land area proposed to be acquired to protect NA-1 sites has already been included in specific project acquisition areas as defined by implementing agencies.

A summary of the proposed responsibilities attendant to acquisition of the remaining NA-1 lands is set forth in Table 111. State government, through the Wisconsin Department of Natural Resources and

Table 110

RELATIONSHIP BETWEEN LAND ACQUISITION RECOMMENDATIONS ATTENDANT TO NATURAL AREA SITES OF STATEWIDE OR GREATER (NA-1) SIGNIFICANCE IN THE REGION AND PRIOR REGIONAL AND COUNTY PLANS AND ESTABLISHED PROJECT ACQUISITION AREAS

County	Total Land Area Proposed to Be Acquired (acres)	Prior Regional and County Plan Recommendations		Established Project Acquisition Areas	
		Land Area Proposed to Be Acquired (acres)	Percent of Total	Land Area Included in Project Area (acres)	Percent of Total
Kenosha	107	94	88	90	84
Milwaukee	--	--	--	--	--
Ozaukee	594	533	90	459	77
Racine	169	165	98	50	30
Walworth	483	483	100	469	97
Washington	918	78	9	67	7
Waukesha	591	591	100	148	25
Total	2,862	1,944	68	1,283	45

Source: SEWRPC.

The pitcher plant (Sarracenia purpurea), shown above, uses a modified leaf to trap insects. It is in this manner that such "carnivorous" plants are able to supplement their nutritional requirements in low-nutrient environments, such as acid bogs. The above photograph was taken at the Beulah Bog State Natural Area.

Source: Donald M. Reed.

the University of Wisconsin, is recommended to acquire about 38 percent of the land area concerned and own 23 of the 40 sites, county government about 20 percent and seven sites, local government about 7 percent and one site, and private conservancy organizations the remaining 35 percent and nine sites.

Natural Area Sites of Countywide or Regional (NA-2) or Local (NA-3) Significance: The second-highest acquisition priority was accorded the following Natural Area sites, all of which were found in the inventory to be of either countywide or regional (NA-2) or local (NA-3) significance:

1. Those sites which were found to lie within a primary environmental corridor as identified in prior regional plans.

2. Those sites which, while not lying in a primary environmental corridor, were nevertheless found in the inventory to support rare, threatened, or endangered species.

3. Those sites which, while lying beyond primary environmental corridors and while not found to support rare, threatened, or endangered species, were found in the inventory to have already been at least partly placed in public or private protective ownership.

The result of applying the above criteria was the inclusion within the second-highest acquisition priority category of all 122 Natural Area sites found in the inventory to be of countywide or regional significance, plus 265 of the 285 Natural Area sites found in the inventory to be of local significance. In total, then, 387 Natural Area sites would be preserved and protected under this acquisition

Table 111

SUMMARY OF PROPOSED ACQUISITION OF LANDS TO PROTECT NATURAL AREA SITES OF STATEWIDE OR GREATER (NA-1) SIGNIFICANCE IN THE SOUTHEASTERN WISCONSIN REGION BY COUNTY

County	Land Acquisition Responsibility	Land Area to Be Acquired		Estimated Cost	
		Acres	Percent of Total	Dollars[a]	Percent of Total
Kenosha	State Government	27	25	$ 31,900	25
	County Government	--	--	--	--
	Local Government	--	--	--	--
	Private Conservation Organization	80	75	93,500	75
	Subtotal	107	100	$ 125,400	100
Milwaukee	State Government	--	--	--	--
	County Government	--	--	--	--
	Local Government	--	--	--	--
	Private Conservation Organization	--	--	--	--
	Subtotal	--	--	--	--
Ozaukee	State Government	474	80	$ 568,800	77
	County Government	--	--	--	--
	Local Government	--	--	--	--
	Private Conservation Organization	120	20	165,800	23
	Subtotal	594	100	$ 734,600	100
Racine	State Government	92	55	$ 124,000	61
	County Government	73	43	72,750	36
	Local Government	--	--	--	--
	Private Conservation Organization	4	2	6,000	3
	Subtotal	169	100	$ 202,750	100
Walworth	State Government	296	61	$ 209,300	74
	County Government	--	--	--	--
	Local Government	--	--	--	--
	Private Conservation Organization	187	39	74,800	26
	Subtotal	483	100	$ 284,100	100
Washington	State Government	123	13	$ 157,700	11
	County Government	--	--	--	--
	Local Government	184	20	296,500	22
	Private Conservation Organization	611	67	921,600	67
	Subtotal	918	100	$1,375,800	100
Waukesha	State Government	83	14	$ 80,400	11
	County Government	508	86	680,500	89
	Local Government	--	--	--	--
	Private Conservation Organization	--	--	--	--
	Subtotal	591	100	$ 760,900	100
Region	State Government	1,095	38	$1,172,100	34
	County Government	581	20	753,250	22
	Local Government	184	7	296,500	8
	Private Conservation Organization	1,002	35	1,261,700	36
	Total	2,862	100	$3,483,550	100

[a] *All cost figures are expressed in constant 1994 dollars.*

Source: SEWRPC.

The jack-in-the-pulpit (Arisaema triphyllum), shown above in a photograph taken at the Perkins Property, a Natural Area of local (NA-3) significance located in the Towns of Ottawa and Summit, Waukesha County, is a common herbaceous plant of wet-mesic to dry-mesic hardwood forests.

Source: Donald M. Reed.

recommendation. The site-specific plan recommendations attendant to this acquisition category are set forth for the Region on a county-by-county basis in Tables 112 through 118 and on Maps 57 through 63. These tables and maps include each site area recommended to be acquired and the type of public or private agency proposed to be responsible for the acquisition. Those 20 Natural Area sites of local significance not proposed to be acquired and placed in protective ownership are identified in Table 119 and shown on Map 64.

In total, the acreage within the 387 NA-2 and NA-3 sites recommended to be acquired for protective ownership encompasses about 47,563 acres, or 74.3 square miles, or about 2.8 percent of the total area of the Region. Of that total, 19,944 acres, or 31.2 square miles, or almost 42 percent, have already been placed under protective public or private ownership. This includes 56 sites where protective acquisition has been completed. The plan recommends that the remaining 27,619 acres, or 43.1 square miles, similarly be placed under protective ownership before such lands are lost to or degraded by urban development. This includes expansion of protective ownership for 179 sites already partly in protective ownership, plus the acquisition of 152 sites for which protective acquisition has not yet begun. The remaining 92 acres within the 387 NA-2 and NA-3 sites recommended for protective acquisition are now in private ownership. It is recommended that these 92 acres remain in such ownership and be protected through public land use regulation.

A summary of the distribution by county of the lands proposed to be acquired in this plan category is set forth in Table 120. About 55 percent of the area proposed to be acquired represents lands that were proposed to be acquired for open space protection purposes in prior regional and county plans. Consequently, this recommendation is really new only with respect to the remaining 45 percent of the area concerned, representing a total of 12,426 acres, or 19.4 square miles. About 14 percent of the land area proposed to be acquired to protect NA-2 and NA-3 sites has already been included in specific project acquisition areas as defined by implementing agencies.

A summary of the proposed responsibilities attendant to acquisition of the NA-2 and NA-3 lands is set forth in Table 121. State government, through mainly the Wisconsin Department of Natural Resources and the University of Wisconsin, is recommended to acquire about 23 percent of the land area concerned and own 101 of the 387 sites, county government about 34 percent and 120 sites, local government about 14 percent and 59 sites, and private conservancy organizations the remaining 29 percent and 107 sites.

Critical Species Habitat Sites: The third-highest acquisition priority was accorded those Critical Species Habitat sites found in the inventory to lie wholly or partly outside of qualifying Natural Areas, but which either 1) are located within primary environmental corridors, or 2) are located outside primary environmental corridors, but are already at least partly under public or private protective ownership. In total, the inventory identified 141 Critical Species Habitat sites. Of these 141 sites, 110 sites were plant-species-based, 29 sites were bird-species-based, one site was both plant- and bird-species based, and one site was mammal-based.

Of these 141 Critical Species Habitat sites lying wholly or partly outside of Natural Areas, 110 were found to be located within primary environmental corridors, or to be at least partly under protective ownership, and thus were included in the third acquisition priority category. The site-specific plan recommendations with regard to this category are set forth in Table 122 and on Map 65. The table

Table 112

LAND ACQUISITION PRIORITY 2: PROTECTION OF SELECTED NATURAL AREA SITES IN KENOSHA COUNTY OF COUNTYWIDE OR REGIONAL (NA-2) OR LOCAL (NA-3) SIGNIFICANCE

Site Identification				Site Characteristics		Site Area (acres)					
Reference Number on Map 57	Civil Division(s)	Name	Natural Area Class	Located in Primary Environmental Corridor	Supports Rare, Threatened, or Endangered Species	Already under Protective Ownership[a]	Proposed to Be Acquired	Total	Proposed Acquisition Agency	Acquisition of Site Recommended in a Prior Regional or County Plan	Formal Project Acquisition Area Established
1	Village of Pleasant Prairie	104th Street Mesic Prairie	NA-2	Yes	Yes	8	3	11	Wisconsin Department of Natural Resources	No	Yes[b]
2	Village of Pleasant Prairie	Carol Beach Prairie	NA-2	Yes	Yes	50	21	71	Wisconsin Department of Natural Resources	Yes	Yes
3	Village of Pleasant Prairie	Barnes Creek Dunes and Panné	NA-2	Yes	Yes	6	2	8	Wisconsin Department of Natural Resources	Yes	Yes
4	Village of Pleasant Prairie	Tobin Road Prairie	NA-2	Yes	Yes	9	5	14	Wisconsin Department of Natural Resources	Yes	Yes
5	Village of Pleasant Prairie	Lake Russo Prairie Remnant	NA-3	Yes	Yes	--	8	8	Village of Pleasant Prairie	Yes	No
6	Village of Pleasant Prairie	Des Plaines River Lowlands	NA-3	Yes	Yes	268	143	411	Village of Pleasant Prairie	Yes	Yes
7	Village of Pleasant Prairie	Bain Station Railroad Prairie	NA-3	No	Yes	--	5	5	Village of Pleasant Prairie	Yes	No
8	Village of Pleasant Prairie	Pleasant Railroad Prairie	NA-3	Yes	Yes	--	5	5	Village of Pleasant Prairie	Yes	No
9	Village of Pleasant Prairie	Carol Beach Estates Prairie	NA-3	Yes	Yes	7	3	10	The Nature Conservancy	No	Yes[b]
10	Town of Brighton	Friendship Lake Marsh	NA-2	Yes	No	11	108	119	Kenosha County	Yes	No
11	Town of Brighton	CTH NN Sedge Meadow	NA-2	Yes	No	--	60	60	Kenosha County	No	No
12	Town of Brighton	Section 11 Wetlands and Oak Woods	NA-3	Yes	No	--	130	130	Private conservancy organization	No	No
13	Town of Brighton	Bong Low Prairie	NA-3	Yes	Yes	2	--	2	Wisconsin Department of Natural Resources	Yes	Yes
14	Town of Brighton Town of Paris Town of Salem	Harris Marsh and Oak Woods	NA-2	Yes	No	212	13	225	Kenosha County	Yes[c]	No
15	Town of Bristol	Merkt Woods	NA-2	No	Yes	--	91	91	Kenosha County	No	No
16	Town of Bristol	Benedict Prairie	NA-2	No	Yes	8	--	8	University of Wisconsin-Milwaukee	No	No
17	Town of Bristol	Bristol Woods	NA-2	No	Yes	154	28	182	Kenosha County	Yes	No
18	Town of Bristol	Mud Lake Sedge Meadow	NA-2	Yes	Yes	--	51	51	Kenosha County	No	No
19	Town of Bristol	Des Plaines River Wetlands	NA-3	Yes	No	--	66	66	Kenosha County	Yes[d]	No
20	Town of Bristol	Salem Road Marsh	NA-3	No	No	27	--	27	Conservation Club of Kenosha	No	No
21	Town of Paris	Paris (Ehlen) Prairie Remnant	NA-3	No	Yes	--	1	1	Private conservancy organization	No	No
22	Town of Randall Village of Twin Lakes	Elizabeth Lake Lowlands	NA-2	Yes	No	--	48	48	Wisconsin Department of Natural Resources	Yes	No
23	Town of Salem	Camp Lake Marsh	NA-2	Yes	No	116	177	293	Wisconsin Department of Natural Resources	Yes	No
24	Town of Salem	Hooker Lake Marsh	NA-3	Yes	No	45	3	48	Wisconsin Department of Natural Resources	Yes	No
25	Town of Salem	Montgomery Lake Marsh	NA-3	Yes	No	14	29	43	Private conservancy organization	No	No
26	Town of Salem	CTH B-CTH AH Sedge Meadow	NA-3	Yes	No	--	12	12	Village of Silver Lake	No	No
27	Town of Somers	Petrifying Springs Woods	NA-2	Yes	Yes	113	32	145	Kenosha County	Yes	No
28	Town of Somers	Pike River Low Woods	NA-3	Yes	Yes	15	53	68	Kenosha County[e]	Yes	No
29	Town of Wheatland	New Munster Shrub-Carr and Tamarack Relict	NA-2	Yes	Yes	289	95	384	Wisconsin Department of Natural Resources	Yes	Yes
30	Town of Wheatland	Powers Lake Tamarack Relict	NA-3	Yes	Yes	--	152	152	Powers Lake Management District	No	No
31	Town of Wheatland	Dyer Lake Sedge Meadow	NA-3	Yes	No	6	34	40	Private conservancy organization	No	No
32	Town of Wheatland Town of Brighton	Peterson Creek Sedge Meadow	NA-3	Yes	No	--	89	89	Private conservancy organization	No	No
Total	--	--	--	--	--	1,358	1,445	2,803	--	--	--

[a] *Based on 1994 data.*

[b] *Natural Area is within a project boundary approved by the Wisconsin Natural Resources Board, but is outside the area recommended to be acquired in the adopted Chiwaukee Prairie-Carol Beach land use plan.*

[c] *The 212 acres under existing protective ownership are owned by the University of Wisconsin. It is recommended that Kenosha County acquire the remainder of the Natural Area as part of the Des Plaines River Parkway.*

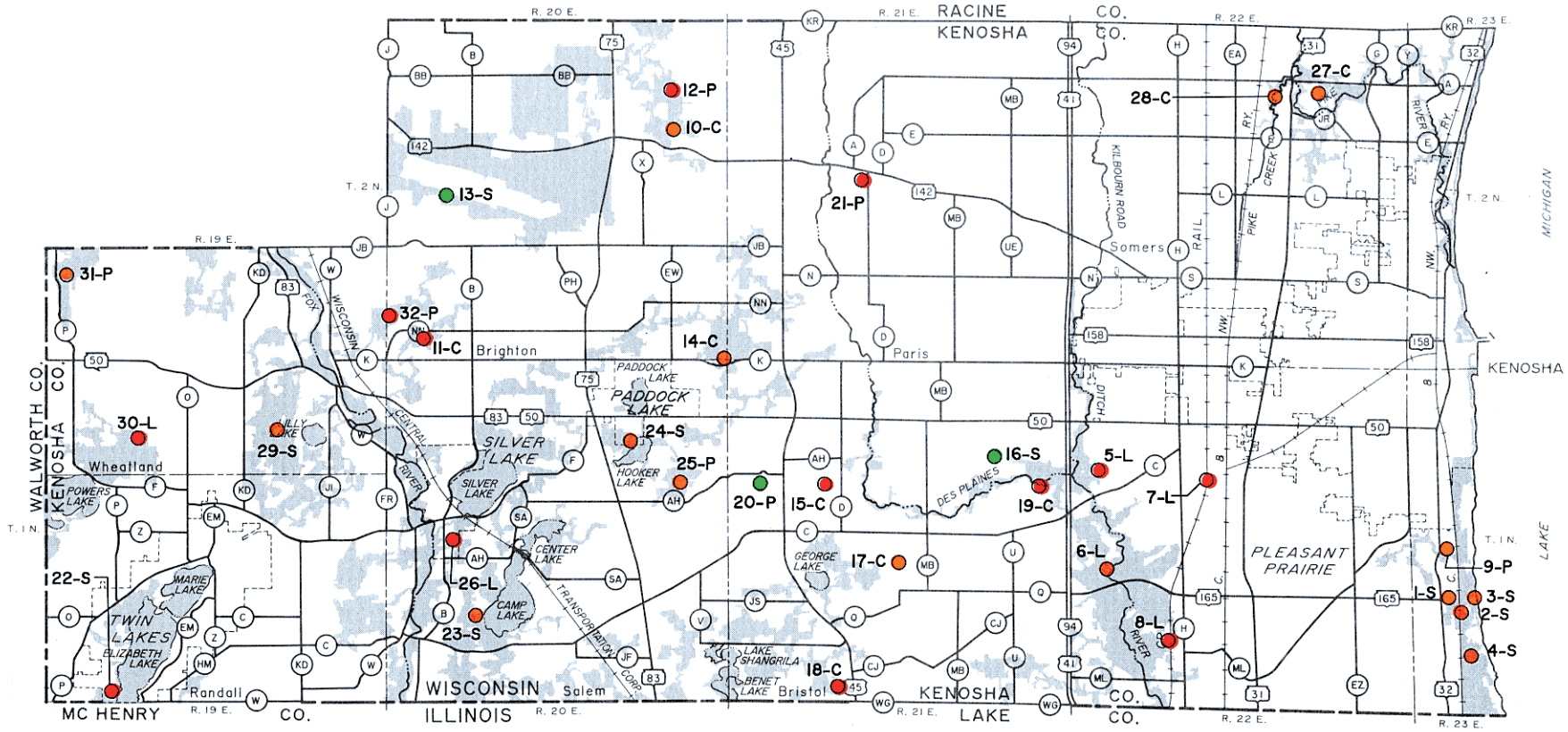
[d] *Acquisition of the Natural Area is recommended in the Des Plaines River watershed study which is currently under way.*

[e] *About 15 acres of the Pike River Low Woods Natural Area are located within the Hawthorne Hollow Nature Preserve. It is recommended that the remainder of the Natural Area—about 53 acres—be acquired by Kenosha County.*

Source: SEWRPC.

Map 57

RECOMMENDED ACQUISITION AND OWNERSHIP OF SELECTED NATURAL AREA SITES OF COUNTYWIDE OR REGIONAL (NA-2) OR LOCAL (NA-3) SIGNIFICANCE IN KENOSHA COUNTY



LEGEND

NATURAL AREA SITES

- NA-2 OR NA-3 SITE ALREADY FULLY UNDER PROTECTIVE OWNERSHIP (3)
- NA-2 OR NA-3 SITE PARTIALLY UNDER PROTECTIVE OWNERSHIP-RECOMMENDED TO BE EXPANDED (16)
- NA-2 OR NA-3 SITE RECOMMENDED TO BE ACQUIRED FOR PROTECTIVE OWNERSHIP (13)

RECOMMENDED OWNERSHIP

- S STATE GOVERNMENT (10)
- C COUNTY GOVERNMENT (9)
- L LOCAL GOVERNMENT (6)
- P PRIVATE CONSERVANCY ORGANIZATION (7)
- 23 REFERENCE NUMBER (SEE TABLE 112)
- PRIMARY ENVIRONMENTAL CORRIDORS

GRAPHIC SCALE
0 2 MILES
0 4000 8000 12000 16000 FEET

A total of 32 Natural Area sites of NA-2 or NA-3 quality identified in Kenosha County are recommended for protective ownership. The recommended agency for acquisition in each case relates to several factors, including prior partial ownership, recommendations made in adopted park and open space plans, and established Wisconsin Department of Natural Resources project boundaries.

Source: SEWRPC.

Table 113

LAND ACQUISITION PRIORITY 2: PROTECTION OF SELECTED NATURAL AREA SITES IN MILWAUKEE COUNTY OF COUNTYWIDE OR REGIONAL (NA-2) OR LOCAL (NA-3) SIGNIFICANCE

Site Identification				Site Characteristics		Site Area (acres)					
Reference Number on Map 58	Civil Division(s)	Name	Natural Area Class	Located in Primary Environmental Corridor	Supports Rare, Threatened, or Endangered Species	Already under Protective Ownership[a]	Proposed to Be Acquired	Total	Proposed Acquisition Agency(ies)	Acquisition of Site Recommended in a Prior Regional or County Plan	Formal Project Acquisition Area Established
1	City of Cudahy	Warnimont Park Fens	NA-2	Yes	Yes	2	--	2	Milwaukee County	Yes	No
2	City of Franklin	Grobschmidt Park Wetlands and Upland Woods	NA-3	No	Yes	76	4	80	Milwaukee County	Yes	No
3	City of Franklin	Root River Wet-Mesic Woods—West	NA-2	Yes	Yes	153	107	260	Milwaukee County	Yes	No
4	Village of Greendale	Root River Parkway Woods	NA-3	Yes	Yes	53	--	53	Milwaukee County	Yes	No
5	City of Franklin	Monastery Lake Wetlands	NA-3	Yes	Yes	31	14	45	Milwaukee County[b]	Yes	No
6	City of Franklin	Franklin (Puetz Road) Woods	NA-3	No	Yes	28	--	28	City of Franklin	Yes	No
7	City of Franklin	Fitzsimmons Road Woods	NA-3	No	Yes	14	28	42	City of Franklin	No	No
8	City of Franklin	Oakwood Park Oak Woods	NA-3	No	Yes	5	17	22	City of Franklin	No	No
9	City of Franklin	Root River Parkway Prairie	NA-3	No	No	27	--	27	Milwaukee County	Yes	No
10	City of Franklin	Franklin Oak Woods and Oak Savanna	NA-3	No	No	76	--	76	Milwaukee County	Yes	No
11	City of Franklin	Elm Road Woods	NA-3	No	Yes	--	20	20	City of Franklin	No	No
12	City of Franklin Village of Hales Corners	Whitnall Park Woods—South	NA-3	Yes	Yes	138	1	137	Milwaukee County	Yes	No
13	City of Franklin Town of Raymond	Root River Canal Woods	NA-2	Yes	Yes	111	168	278	Milwaukee and Racine Counties[c]	Yes	No
14	City of Glendale	Kletzsch Park Woods	NA-3	Yes	Yes	13	--	13	Milwaukee County	Yes	No
15	City of West Allis	Greenfield Park Woods	NA-2	Yes	Yes	52	--	52	Milwaukee County	Yes	No
16	Village of Brown Deer	Brown Deer Park Woods	NA-3	No	No	40	--	40	Milwaukee County	Yes	No
17	City of Milwaukee	Downer Woods	NA-3	No	No	13	--	13	University of Wisconsin-Milwaukee	Yes	No
18	City of Milwaukee	Bradley Woods	NA-3	No	Yes	18	19	35	City of Milwaukee	Yes	No
19	City of Milwaukee	Haskell Noyes Park Woods	NA-3	No	No	20	--	20	Milwaukee County	Yes	No
20	City of Milwaukee Village of Menomonee Falls	Harbinger Woods	NA-3	Yes	Yes	34	13	47	Milwaukee County and Village of Menomonee Falls[d]	Yes	No
21	City of Milwaukee Village of Menomonee Falls	Menomonee River Swamp—North	NA-3	Yes	No	59	19	78	Milwaukee and Waukesha Counties[e]	Yes	No
22	City of Oak Creek	Cudahy Woods	NA-2	No	Yes	41	6	47	Milwaukee County	Yes	No
23	City of Oak Creek	Falk Park Woods	NA-2	No	Yes	71	6	77	Milwaukee County	Yes	No
24	City of Oak Creek	Esch-Honadel Woods	NA-3	No	Yes	--	72	72	Milwaukee County	Yes	No
25	City of Oak Creek	Wood Creek Woods	NA-3	No	Yes	--	35	35	City of Oak Creek[f]	No	No
26	City of Oak Creek	Wedge Woods	NA-3	Yes	Yes	--	19	19	City of Oak Creek	No	No
27	City of Oak Creek	Oak Creek Low Woods	NA-3	Yes	Yes	31	37	68	Milwaukee County	Yes	No
28	City of Oak Creek Town of Caledonia	Root River Wet-Mesic Woods—East	NA-2	Yes	Yes	52	--	52	Milwaukee and Racine Counties[g]	Yes	No
29	City of Oak Creek Town of Caledonia	Root River Riverine Forest	NA-3	Yes	Yes	323	1	324	Milwaukee and Racine Counties[h]	Yes	No
30	City of St. Francis	St. Francis Seminary Woods	NA-2	Yes	Yes	--	37	37	Milwaukee County[i]	No	No
31	City of South Milwaukee	Rawson Park Woods	NA-2	No	Yes	23	--	23	Milwaukee County	No	No
32	City of South Milwaukee	Grant Park Woods—South	NA-3	Yes	No	45	--	45	Milwaukee County	Yes	No
33	City of South Milwaukee	Grant Park Woods—Old Growth	NA-3	Yes	Yes	38	--	38	Milwaukee County	Yes	No

Table 113 (continued)

Site Identification				Site Characteristics		Site Area (acres)					
Reference Number on Map 58	Civil Division(s)	Name	Natural Area Class	Located in Primary Environmental Corridor	Supports Rare, Threatened, or Endangered Species	Already under Protective Ownership[a]	Proposed to Be Acquired	Total	Proposed Acquisition Agency(ies)	Acquisition of Site Recommended in a Prior Regional or County Plan	Formal Project Acquisition Area Established
34	City of Wauwatosa	Menomonee River Swamp—South	NA-3	Yes	Yes	39	--	39	Milwaukee County	Yes	No
35	City of Wauwatosa	Currie Park Low Woods	NA-3	Yes	Yes	27	--	27	Milwaukee County	Yes	No
36	City of Wauwatosa	Wil-O-Way Woods	NA-3	Yes	No	41	--	41	Milwaukee County	Yes	No
37	City of Wauwatosa	Jacobus Park Woods	NA-3	Yes	Yes	11	--	11	Milwaukee County	Yes	No
38	City of Wauwatosa	Blue Mound Country Club Woods	NA-3	Yes	Yes	4	12	16	Milwaukee County	Yes	No
39	Village of Bayside	Schlitz Audubon Center Woods and Beach	NA-3	Yes	Yes	54	--	54	Schlitz Audubon Center	No	No
40	Village of Hales Corners	Whitnall Park Woods—North	NA-3	Yes	Yes	82	--	82	Milwaukee County	Yes	No
Total	--	--	--	--	--	1,841	635	2,476	--	--	--

[a] *Based on 1994 data.*

[b] *About 31 acres of the 45-acre Monastery Lake Wetlands are currently owned by the Nature Foundation. It is recommended that Milwaukee County acquire the remaining 14 acres.*

[c] *Includes 121 acres in Milwaukee County and 158 acres in Racine County. Milwaukee County currently owns 111 acres of that portion of the Natural Area within its boundaries. It is recommended that Milwaukee County acquire the remaining 10 acres within its boundaries and that Racine County acquire the 158 acres of the Natural Area located within its boundaries.*

[d] *Includes 34 acres in Milwaukee County—all of which are currently owned by the County—and 13 acres in the Village of Menomonee Falls in Waukesha County. It is recommended that the Village acquire the 13 acres of the Natural Area located within Village limits.*

[e] *Includes 74 acres in Milwaukee County and four acres in Waukesha County. Milwaukee County currently owns 59 acres of that portion of the Natural Area within its boundaries. It is recommended that Milwaukee County acquire the remaining 15 acres within its boundaries, and that Waukesha County acquire the four acres within its boundaries.*

[f] *Area planned for urban development and removed from planned environmental corridor by SEWRPC Community Assistance Planning Report No. 213, Sanitary Sewer Service Area for the City of Oak Creek, Milwaukee County, Wisconsin, July 1994.*

[g] *Includes 50 acres in Milwaukee County and two acres in Racine County. The entire Natural Area is protected through existing ownership by the two Counties.*

[h] *Includes 140 acres in Milwaukee County—all of which are currently owned by that County—and 184 acres in Racine County—183 acres of which are owned by that County. It is recommended that the remaining one acre be acquired by Racine County.*

[i] *It is recommended that Milwaukee County acquire a conservation easement over this Natural Area.*

Source: SEWRPC.

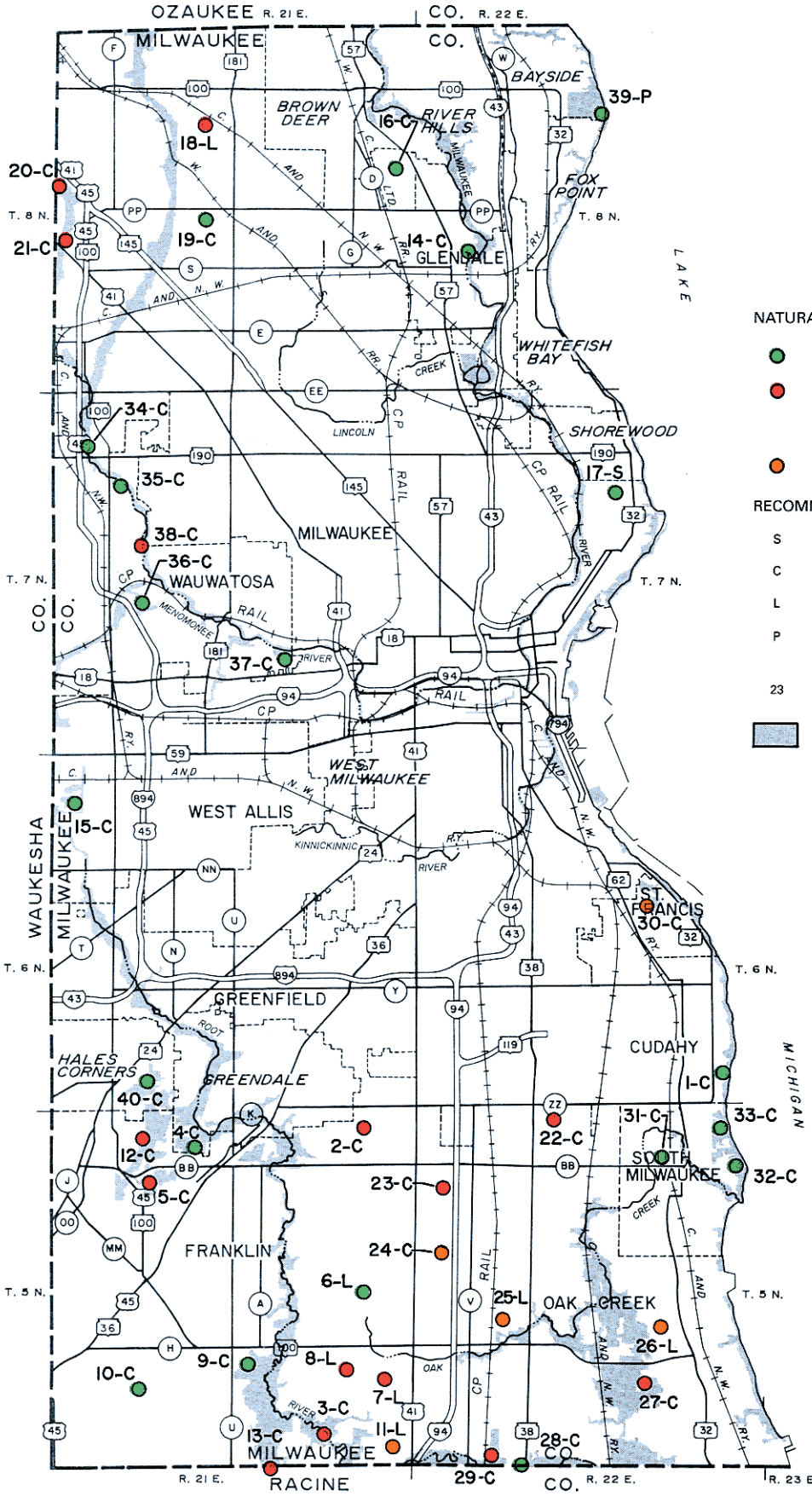
and map both include each site area proposed to be acquired and the type of public or private agency proposed to be responsible for the acquisition. Those 31 Critical Species Habitat sites which did not meet the acquisition criteria are identified on Table 123 and shown on Map 66.

In total, the 110 Critical Species Habitat sites proposed to be acquired encompass about 13,470 acres, or 21.0 square miles, or about 0.8 percent of the total area of the Region. Of that total, 9,699 acres, or 15.1 square miles, or 72 percent, have already been placed under protective public or private ownership. This includes 33 sites for which protective acquisition has been completed. The plan recommends that the remaining 3,771 acres, or 5.9 square miles, similarly be placed under protective ownership before such lands are lost to or degraded by urban development. This includes expansion of protective ownership for 16 sites already partly under protective ownership, plus the protective acquisition of 61 sites where protective acquisition has not yet begun.

A summary of the distribution by county of the lands proposed to be acquired in this acquisition category is set forth in Table 124. About 55 percent of the area proposed to be acquired represents lands that were proposed to be acquired for open space protection purposes in prior regional and county plans. Consequently, this recommendation is really new only with respect to the remaining 45 percent of the land area concerned, representing a total of 1,692 acres, or 2.6 square miles. About 29 percent of the land area proposed to be acquired to protect Critical Species Habitat sites has already been included in specific project acquisition areas as defined by implementing agencies.

Map 58

RECOMMENDED ACQUISITION AND OWNERSHIP OF SELECTED NATURAL AREA SITES OF COUNTYWIDE OR REGIONAL (NA-2) OR LOCAL (NA-3) SIGNIFICANCE IN MILWAUKEE COUNTY



LEGEND

NATURAL AREA SITES

- NA-2 OR NA-3 SITE ALREADY FULLY UNDER PROTECTIVE OWNERSHIP (20)
- NA-2 OR NA-3 SITE PARTIALLY UNDER PROTECTIVE OWNERSHIP - RECOMMENDED TO BE EXPANDED (15)
- NA-2 OR NA-3 SITE RECOMMENDED TO BE ACQUIRED FOR PROTECTIVE OWNERSHIP (5)

RECOMMENDED OWNERSHIP

S	STATE GOVERNMENT (1)
C	COUNTY GOVERNMENT (31)
L	LOCAL GOVERNMENT (7)
P	PRIVATE CONSERVANCY ORGANIZATION (1)
23	REFERENCE NUMBER (SEE TABLE 113)

PRIMARY ENVIRONMENTAL CORRIDORS

GRAPHIC SCALE
0 1 2 MILES
0 4000 8000 12000 16000 FEET

A total of 40 Natural Area sites of NA-2 or NA-3 quality identified in Milwaukee County are recommended for protective ownership. The recommended agency for acquisition in each case relates to several factors, including prior partial ownership, recommendations made in adopted park and open space plans, and established Wisconsin Department of Natural Resources project boundaries.

Source: SEWRPC.

Table 114

LAND ACQUISITION PRIORITY 2: PROTECTION OF SELECTED NATURAL AREA SITES IN OZAUKEE COUNTY OF COUNTYWIDE OR REGIONAL (NA-2) OR LOCAL (NA-3) SIGNIFICANCE

Site Identification				Site Characteristics		Site Area (acres)					
Reference Number on Map 59	Civil Division(s)	Name	Natural Area Class	Located in Primary Environmental Corridor	Supports Rare, Threatened, or Endangered Species	Already under Protective Ownership[a]	Proposed to Be Acquired	Total	Proposed Acquisition Agency	Acquisition of Site Recommended in a Prior Regional or County Plan	Formal Project Acquisition Area Established
1	City of Mequon	Pigeon Creek Low and Mesic Woods	NA-2	Yes	Yes	--	81	81	Ozaukee County	Yes	No
2	City of Mequon	Donges Bay Gorge	NA-2	Yes	Yes	--	22	22	Ozaukee County	No	No
3	City of Mequon	Pigeon Creek Maple Woods	NA-3	Yes	Yes	--	13	13	Ozaukee County	Yes	No
4	City of Mequon	Ville du Parc Riverine Forest	NA-3	Yes	No	49	62	111	City of Mequon	No	No
5	Village of Fredonia Town of Saukville Town of Fredonia	Milwaukee River Mesic Woods	NA-2	Yes	Yes	67	315	382	Ozaukee County	Yes	No
6	Town of Belgium	Harrington Beach Lacustrine Forest	NA-2	Yes	Yes	178	--	178	Wisconsin Department of Natural Resources	Yes	Yes
7	Town of Belgium	Cedar Grove Swamp	NA-3	Yes	No	--	177	177	Private conservancy organization	No	No
8	Town of Cedarburg	Mole Creek Swamp	NA-3	Yes	Yes	22	67	89	Town of Cedarburg	No	No
9	Town of Cedarburg	Sherman Road Woods	NA-3	Yes	No	--	72	72	Private conservancy organization	No	No
10	Town of Cedarburg	Five Corners Swamp	NA-3	Yes	No	19	154	173	Wisconsin Department of Natural Resources	No	No
11	Town of Cedarburg	Cedar Creek Forest	NA-3	Yes	Yes	--	23	23	City of Cedarburg	Yes	No
12	Town of Cedarburg Town of Saukville Town of Trenton	Cedar-Sauk Low Woods	NA-3	Yes	No	--	218	218[b]	Private conservancy organization	No	No
13	Town of Fredonia	Huiras Lake Woods and Bog	NA-2	Yes	No	22	413	435	Ozaukee County	No	No
14	Town of Fredonia	Janik's Woods	NA-2	Yes	Yes	--	183	183	Ozaukee County	Yes	No
15	Town of Fredonia	Spring Lake Marsh	NA-3	Yes	No	3	16	19	Private conservancy organization	No	No
16	Town of Fredonia	Spring Lake Beech Forest	NA-3	Yes	No	--	65	65	Private conservancy organization	No	No
17	Town of Fredonia	County Line Low Woods	NA-3	Yes	No	--	214	214	Private conservancy organization	No	No
18	Town of Fredonia	Beekeeper Bog	NA-3	Yes	No	9	6	15	Ozaukee County	No	No
19	Town of Fredonia	Department of Natural Resources Lowlands	NA-3	Yes	No	45	141	186	Wisconsin Department of Natural Resources	No	No
20	Town of Fredonia	Pioneer Road Lowlands	NA-3	Yes	No	--	94	94	Private conservancy organization	No	No
21	Town of Fredonia	Cedar Valley Swamp	NA-3	Yes	No	--	141	141	Private conservancy organization	No	No
22	Town of Fredonia	Evergreen Road Bog	NA-3	Yes	Yes	5	39	44	Private conservancy organization	No	No
23	Town of Fredonia	Kohler Road Woods	NA-3	Yes	No	--	124	124	Private conservancy organization	No	No
24	Town of Fredonia	Waubeka Low Woods	NA-3	Yes	No	21	140	161	Ozaukee County	No	No
25	Town of Grafton	Grafton Woods	NA-3	Yes	Yes	--	18	18	Ozaukee County	Yes	No
26	Town of Grafton	Cedar Heights Gorge	NA-3	Yes	No	--	9	9	Private conservancy organization	No	No
27	Town of Grafton	Lions Den Gorge	NA-3	Yes	No	--	20	20	Private conservancy organization	No	No
28	Town of Grafton	Ulao Lowland Forest	NA-3	Yes	No	--	347	347	Private conservancy organization	No	No
29	Town of Saukville	Cedarburg Beech Woods State Natural Area	NA-2	Yes	Yes	87	43	130	University of Wisconsin-Milwaukee	Yes	No
30	Town of Saukville	Ducks Limited Bog	NA-2	No	No	13	8	21	Ducks Limited	No	No
31	Town of Saukville	Riveredge Mesic Woods	NA-2	Yes	Yes	158	54	212	Riveredge Nature Center	No	No

Table 114 (continued)

Site Identification				Site Characteristics		Site Area (acres)					
Reference Number on Map 59	Civil Division(s)	Name	Natural Area Class	Located in Primary Environmental Corridor	Supports Rare, Threatened, or Endangered Species	Already under Protective Ownership[a]	Proposed to Be Acquired	Total	Proposed Acquisition Agency	Acquisition of Site Recommended in a Prior Regional or County Plan	Formal Project Acquisition Area Established
32	Town of Saukville	Kinnamon Conifer Swamp	NA-2	Yes	Yes	--	382	382	Ozaukee County	No	No
33	Town of Saukville	South Conifer Swamp	NA-2	Yes	No	3	49	52	Wisconsin Department of Natural Resources	Yes	No
34	Town of Saukville	Hansen's Lake Wetland	NA-3	No	No	5	8	13	Private conservancy organization	No	No
35	Town of Saukville	Max's Bog	NA-2	Yes	Yes	6	24	30	Wisconsin Department of Natural Resources	Yes	No
36	Town of Saukville	Knollwood Road Bog	NA-3	Yes	No	4	5	9	Private conservancy organization	No	No
37	City of Mequon	Highland Road Woods	NA-3	Yes	No	--	53	53	City of Mequon	No	No
Total	--	--	--	--	--	716	3,780	4,496	--	--	--

[a]*Based on 1994 data.*

[b]*Includes 204 acres in Ozaukee County and 14 acres in Washington County. It is recommended that the entire Natural Area be acquired by a private conservancy organization.*

Source: SEWRPC.

A summary of the proposed responsibilities attendant to acquisition of the recommended critical species habitat lands is set forth in Table 125. State government, through mainly the Wisconsin Department of Natural Resources and the University of Wisconsin, is recommended to acquire about 32 percent of the land area concerned and own 21 of the 110 sites, county government about 17 percent and 30 sites, local government about 10 percent and 27 sites, and private conservancy organizations the remaining 41 percent and 32 sites.

Considering the large number of sites within each acquisition priority category, a second level of planning could be used to establish subpriorities for acquisition. Such further categorizations should be the responsibility of the counties and municipalities involved as county and local park and open space plans are prepared.

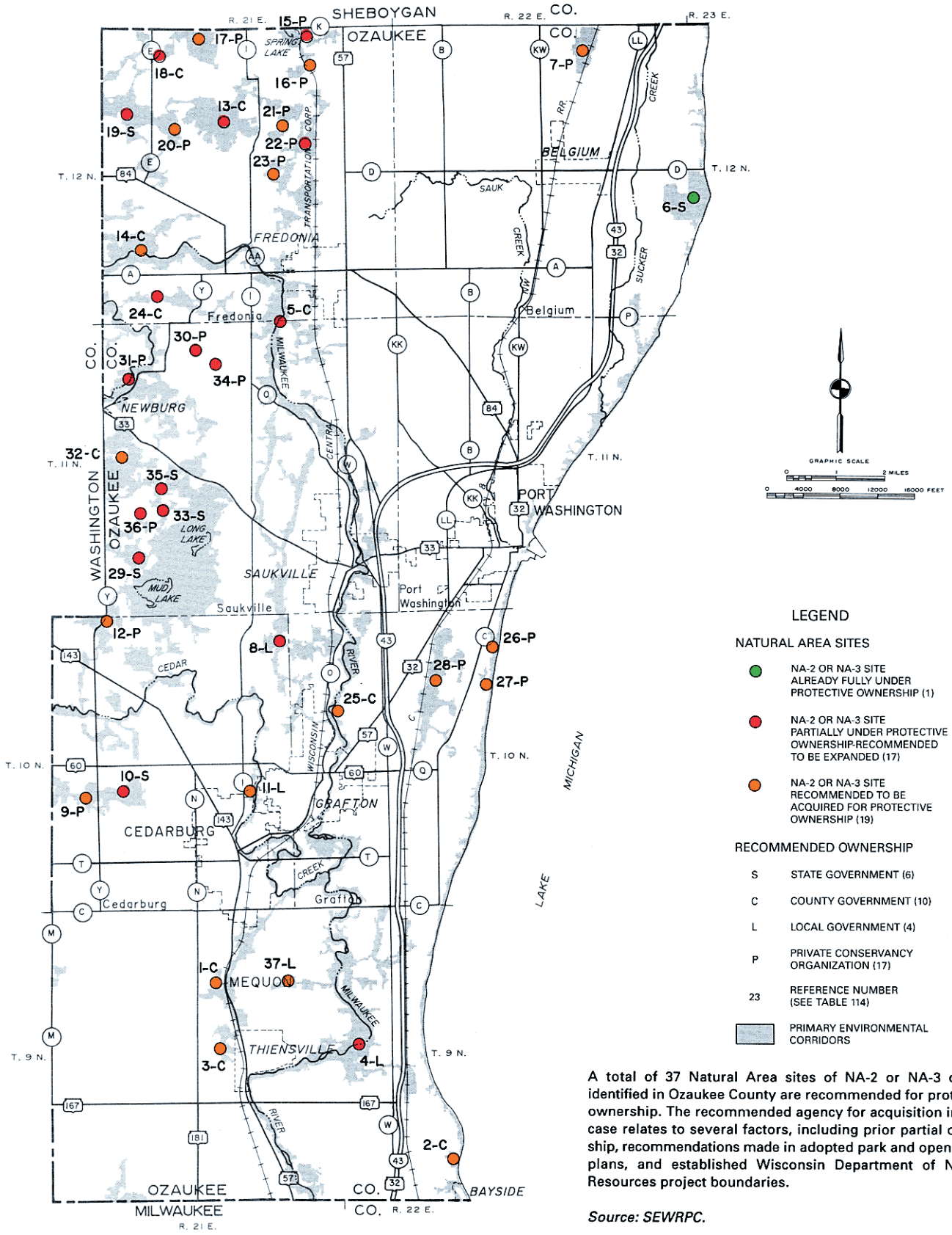
Reestablishment of Grassland and Forest Interior Sites: The fourth-highest acquisition priority was accorded activities designed to reestablish relatively large tracts of grasslands and forest interiors in the Region. As documented in Chapter V of this report, the loss to both urban and rural development of such relatively large tracts of grasslands and forest interiors has had a detrimental impact on certain bird populations in the Southeastern Wisconsin Region. Accordingly, the Advisory Committee determined to make a set of land acquisition and management recommendations that would, if implemented, result in the reestablishment of such areas at eight locations in the Region.

More particularly, the Advisory Committee recommended that the Wisconsin Department of Natural Resources assume responsibility for efforts to reestablish three relatively large tracts of grasslands—grassland reserves—and five relatively large tracts of forest interiors, all with a view toward securing permanent habitat sites for the enhancement of the bird population in the Region. These eight sites are identified in Table 126 and on Map 67.

The first proposed grassland reserve site lies in the Town of Eagle, Waukesha County, and would ultimately constitute an area approximating 2,115 acres, or 3.3 square miles. In its entirety, the site includes the Scuppernong Prairie State Natural Area, a site of statewide significance, as well as the Paradise Springs Brook and Headquarters Grasslands Critical Species Habitat sites recommended for preservation and protection. The entire Scuppernong grassland reserve site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest. Indeed, the Wisconsin Department of Natural Resources already owns 1,532 acres, about 2.4 square miles, or about 72 percent, of the proposed site. Much of the land yet to be acquired consists of croplands which, over time, would be converted to grassland habitat.

Map 59

RECOMMENDED ACQUISITION AND OWNERSHIP OF SELECTED NATURAL AREA SITES OF COUNTYWIDE OR REGIONAL (NA-2) OR LOCAL (NA-3) SIGNIFICANCE IN OZAUKEE COUNTY



LEGEND

NATURAL AREA SITES

- NA-2 OR NA-3 SITE ALREADY FULLY UNDER PROTECTIVE OWNERSHIP (1)
- NA-2 OR NA-3 SITE PARTIALLY UNDER PROTECTIVE OWNERSHIP-RECOMMENDED TO BE EXPANDED (17)
- NA-2 OR NA-3 SITE RECOMMENDED TO BE ACQUIRED FOR PROTECTIVE OWNERSHIP (19)

RECOMMENDED OWNERSHIP

- S STATE GOVERNMENT (6)
- C COUNTY GOVERNMENT (10)
- L LOCAL GOVERNMENT (4)
- P PRIVATE CONSERVANCY ORGANIZATION (17)
- 23 REFERENCE NUMBER (SEE TABLE 114)
- PRIMARY ENVIRONMENTAL CORRIDORS

A total of 37 Natural Area sites of NA-2 or NA-3 quality identified in Ozaukee County are recommended for protective ownership. The recommended agency for acquisition in each case relates to several factors, including prior partial ownership, recommendations made in adopted park and open space plans, and established Wisconsin Department of Natural Resources project boundaries.

Source: SEWRPC.

Table 115

LAND ACQUISITION PRIORITY 2: PROTECTION OF SELECTED NATURAL AREA SITES IN RACINE COUNTY OF COUNTYWIDE OR REGIONAL (NA-2) OR LOCAL (NA-3) SIGNIFICANCE

Site Identification				Site Characteristics		Site Area (acres)					
Reference Number on Map 60	Civil Division(s)	Name	Natural Area Class	Located in Primary Environmental Corridor	Supports Rare, Threatened, or Endangered Species	Already under Protective Ownership[a]	Proposed to Be Acquired	Total	Proposed Acquisition Agency(ies)	Acquisition of Site Recommended in a Prior Regional or County Plan	Formal Project Acquisition Area Established
1	Town of Burlington	Karcher Springs State Natural Area	NA-2	Yes	Yes	23	--	23	Wisconsin Department of Natural Resources	Yes	Yes
2	Town of Burlington	Lede Lake Fen-Meadow	NA-2	Yes	Yes	124	97	221	Wisconsin Department of Natural Resources	Yes	Yes
3	Town of Burlington	Bohner Lake Lowlands	NA-3	Yes	No	--	33	33	Bohner's Lake Sanitary District No. 1	No	No
4	Town of Burlington	Honey Lake Leatherleaf Bog	NA-3	Yes	No	--	69	69	Racine County	Yes	No
5	Town of Burlington	Wehmhoff Park Upland Woods and Wetlands	NA-3	Yes	No	67	6	73	Town of Burlington	No	No
6	Town of Burlington	Fox River Riverine Forest	NA-3	Yes	No	19	112	131	Racine County	Yes	No
7	Town of Burlington Town of Lyons	Burlington Railroad Prairie	NA-3	Yes	Yes	--	5	5	Racine and Walworth Counties[b]	Yes[c]	No
8	Town of Caledonia	Hunts Woods	NA-2	Yes	Yes	3	31	34	Racine County	Yes	Yes
9	Town of Caledonia	Caledonia Wildlife Area	NA-2	No	Yes	133	33	166	Town of Caledonia	Yes	No
10	Town of Caledonia	Cliffside Park Woods and Clay Banks	NA-2	Yes	Yes	53	2	55	Racine County	Yes	No
11	Town of Caledonia	Seven Mile Road Woods	NA-3	No	Yes	--	20	20	Private conservancy organization	No	No
12	Town of Caledonia	Zirbes Woods	NA-3	No	Yes	--	13	13	Private conservancy organization	No	No
13	Town of Caledonia	Caledonia Low Woods	NA-3	Yes	Yes	61	46	107	Racine County	Yes	Yes
14	Town of Caledonia	Foley Road Woods—West	NA-3	No	Yes	--	19	19	Private conservancy organization	No	No
15	Town of Caledonia	Foley Road Woods—East	NA-3	No	Yes	--	24	24	Private conservancy organization	No	No
16	Town of Caledonia	Tabor Woods	NA-3	Yes	Yes	--	107	107	Town of Caledonia	Yes	No
17	Town of Caledonia	Power Plant Ravine Woods	NA-3	Yes	Yes	--	32	32	Racine County	Yes	No
18	Town of Dover	Rosewood Railroad Prairie	NA-2	No	Yes	--	18	18	Racine County	Yes[c]	No
19	Town of Dover	Dover Wildlife Area Wetlands	NA-3	No	Yes	38	1	39	Wisconsin Department of Natural Resources	Yes	No
20	Town of Dover	Church Road Lowlands	NA-3	Yes	No	22	3	25	Wisconsin Department of Natural Resources	Yes	No
21	Town of Dover	Eagle Lake Wetlands	NA-3	Yes	No	16	30	46	Wisconsin Department of Natural Resources	Yes	No
22	Town of Dover	Vandenboom Road Marsh	NA-3	Yes	No	7	20	27	Private conservancy organization	No	No
23	Town of Dover Town of Brighton	Schroeder Road Marsh	NA-2	Yes	No	--	188	188	Kenosha and Racine Counties[d]	No	No
24	Town of Burlington Town of Lyons	Burlington Hills Woods	NA-3	Yes	Yes	--	637	637	Private conservancy organization[e]	No	No
25	Town of Mt. Pleasant	Sylvania Railroad Prairie	NA-3	No	Yes	--	7	7	Racine County	Yes[c]	No
26	Town of Mt. Pleasant	Campbell Woods	NA-3	No	Yes	--	72	72	Town of Mt. Pleasant	No	No
27	Town of Norway	Waubeesee Oak Woods and Tamarack Relict	NA-2	Yes	No	39	130	169	Racine County	Yes	No
28	Town of Norway	Wind Lake Tamarack Swamp	NA-2	Yes	No	122	212	334	Wisconsin Department of Natural Resources	Yes	No
29	Town of Norway	Wind Lake Shrub-Fen	NA-2	Yes	Yes	--	21	21	Racine County	Yes[f]	No
30	Town of Norway	Wind Lake Wet Meadow	NA-3	Yes	Yes	--	12	12	Wind Lake Management District	Yes[f]	No
31	Town of Raymond	County Line Riverine Woods	NA-2	Yes	Yes	41	100	141	Racine County	Yes	No
32	Town of Raymond	Kimmel Woods	NA-3	Yes	Yes	--	40	40	Private conservancy organization	No	No

Table 115 (continued)

Site Identification				Site Characteristics		Site Area (acres)					
Reference Number on Map 60	Civil Division(s)	Name	Natural Area Class	Located in Primary Environmental Corridor	Supports Rare, Threatened, or Endangered Species	Already under Protective Ownership[a]	Proposed to Be Acquired	Total	Proposed Acquisition Agency(ies)	Acquisition of Site Recommended in a Prior Regional or County Plan	Formal Project Acquisition Area Established
33	Town of Rochester	Brock Lake Fen	NA-2	Yes	Yes	68	163	231	Wisconsin Department of Natural Resources	Yes	Yes
34	Town of Rochester	Wadewitz Woods	NA-3	Yes	Yes	79	125	204	Racine County	Yes	No
35	Town of Rochester	Rowntree Road Woods	NA-3	Yes	No	--	74	74	Private conservancy organization	No	No
36	Town of Rochester	English Settlement Prairie	NA-3	Yes	No	--	16	16	Private conservancy organization	No	No
37	Town of Rochester	Eagle Creek Woods	NA-3	Yes	No	--	84	84	Private conservancy organization	No	No
38	Town of Rochester	Fox River Prairie	NA-3	Yes	No	--	2	2	Racine County	Yes	No
39	Town of Waterford	Tichigan Marsh	NA-2	Yes	No	252	195	447	Wisconsin Department of Natural Resources	Yes	Yes
40	Town of Waterford	Tichigan Wetlands and Low Woods	NA-2	Yes	No	154	16	170	Wisconsin Department of Natural Resources	Yes	Yes
41	Town of Waterford	Van Valin Woods	NA-3	Yes	No	--	30	30	Racine County	Yes	No
42	Town of Waterford	Tichigan Wet Prairie	NA-3	Yes	Yes	15	--	15	Wisconsin Department of Natural Resources	Yes	Yes
43	Town of Waterford Town of Vernon	Norris Marsh and Slough	NA-2	Yes	No	--	212	212[d]	Racine and Waukesha Counties	Yes	No
44	Town of Yorkville	Ives Grove Woods	NA-3	No	No	54	110	164	Racine County	Yes	No
45	Town of Yorkville	Union Grove Railroad Prairie	NA-2	No	Yes	--	32	32	Racine County	Yes[c]	No
Total	--	--	--	--	--	1,390	3,199	4,589	--	--	--

[a] *Based on 1994 data.*

[b] *Includes four acres in Racine County and one acre in Walworth County. It is recommended that each County involved acquire that portion of this Natural Area located within its boundaries.*

[c] *Acquisition of the railway right-of-way associated with this Natural Area is recommended for development of a trail under the adopted Racine County park and open space plan in the event that the right-of-way is abandoned by CP Rail System.*

[d] *Includes 77 acres in Racine County and 111 acres in Kenosha County. It is recommended that each County involved acquire that portion of this Natural Area located within its boundaries.*

[e] *Includes 557 acres in Racine County and 80 acres in Walworth County. It is recommended that the entire Natural Area be acquired by a private conservancy organization.*

[f] *Acquisition of this Natural Area is recommended in SEWRPC Community Assistance Planning Report No. 215, An Environmentally Sensitive Lands Preservation Plan for the Town of Norway Sanitary District No. 1, Racine County, Wisconsin, June 1996, which was approved in early 1996 by the SEWRPC Technical Coordinating and Advisory Committee overseeing preparation of the plan documented therein.*

[g] *Includes 180 acres in Racine County and 32 acres in Waukesha County. It is recommended that each County involved acquire that portion of this Natural Area located within its boundaries.*

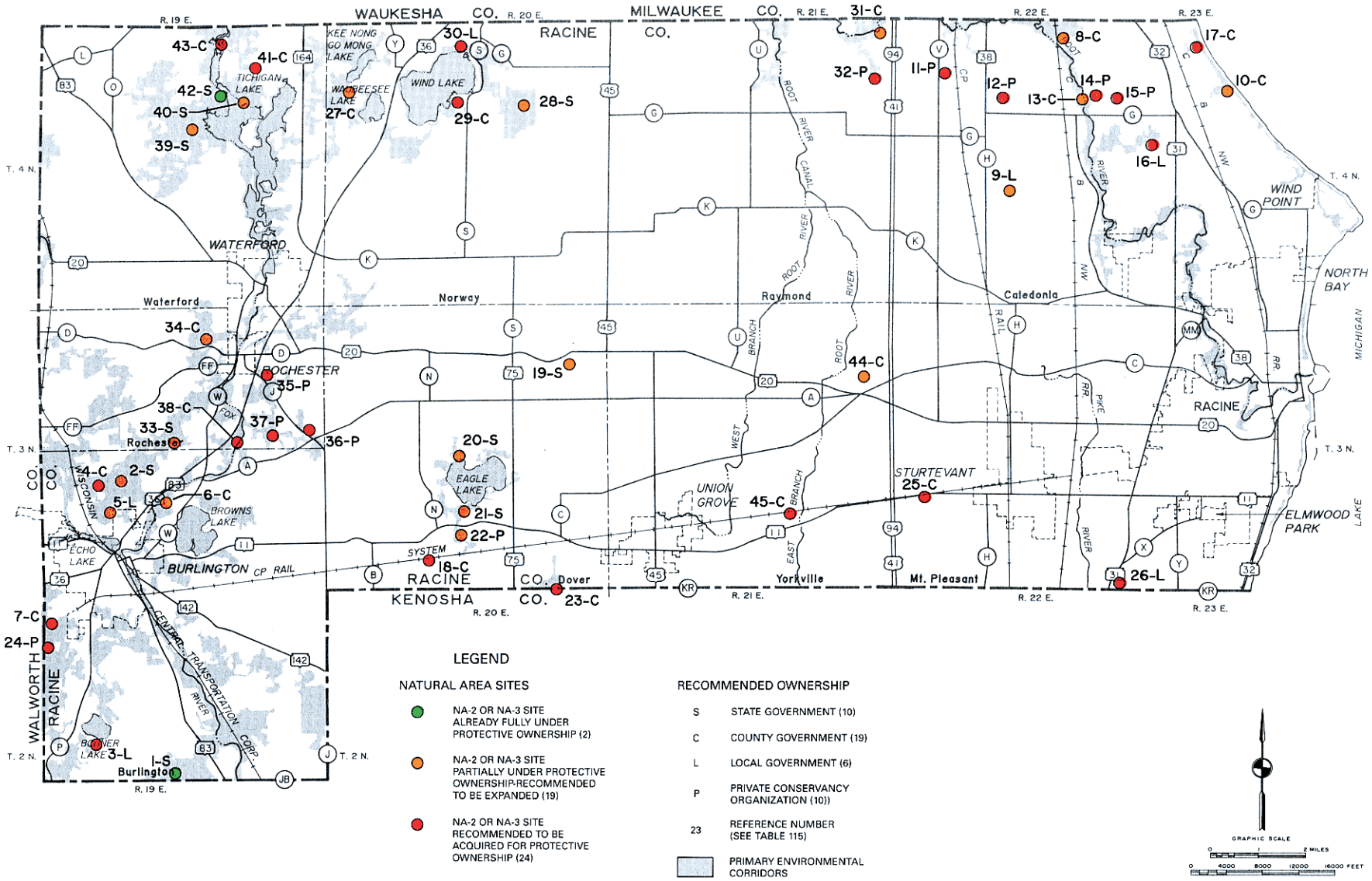
Source: SEWRPC.

The second proposed grassland reserve site lies in the Lulu Lake–Pickerel Lake area of the Town of Troy, Walworth County. This site would approximate 1,530 acres, or 2.4 square miles. This proposal would seek to effectively expand the project boundary of the Lulu Lake State Natural Area by about 1,075 acres, or 1.7 square miles. The Wisconsin Department of Natural Resources and The Nature Conservancy together already own about 265 acres, or 17 percent, of the site. Again, much of the land proposed to be acquired is presently being used for agricultural purposes. Over time, as this land is acquired for the grasslands reserve, crop production would cease and grassland habitat would be reintroduced. In lieu of land acquisition, it may be possible for the Department to enter into management agreements with landowners in the Lulu Lake area, similar to those proposed below for a grassland reserve site centered on the Bong State Recreation Area, to manage lands outside the project boundary for grassland habitat purposes.

The third proposed grassland reserve site would center on the Bong State Recreation Area and the adjoining Kenosha and Salem School Forest properties in the Town of Brighton, Kenosha County. It is envisioned that this site could serve as one of several relatively large grassland reserve sites proposed to be established in Wisconsin by the

Map 60

RECOMMENDED ACQUISITION AND OWNERSHIP OF SELECTED NATURAL AREA SITES OF COUNTYWIDE OR REGIONAL (NA-2) OR LOCAL (NA-3) SIGNIFICANCE IN RACINE COUNTY



A total of 45 Natural Area sites of NA-2 or NA-3 quality identified in Racine County are recommended for protective ownership. The recommended agency for acquisition in each case relates to several factors, including prior partial ownership, recommendations made in adopted park and open space plans, and established Wisconsin Department of Natural Resources project boundaries.

Source: SEWRPC.

Table 116

LAND ACQUISITION PRIORITY 2: PROTECTION OF SELECTED NATURAL AREA SITES IN WALWORTH COUNTY OF COUNTYWIDE OR REGIONAL (NA-2) OR LOCAL (NA-3) SIGNIFICANCE

Site Identification				Site Characteristics		Site Area (acres)					
Reference Number on Map 61	Civil Division(s)	Name	Natural Area Class	Located in Primary Environmental Corridor	Supports Rare, Threatened, or Endangered Species	Already under Protective Ownership[a]	Proposed to Be Acquired	Total	Proposed Acquisition Agency	Acquisition of Site Recommended in a Prior Regional or County Plan	Formal Project Acquisition Area Established
1	Village of Fontana-on-Geneva Lake	Fontana Prairie and Fen	NA-3	Yes	Yes	10	--	10	Village of Fontana-on-Geneva Lake	No	No
2	Village of Williams Bay	Williams Bay Lowlands	NA-3	Yes	Yes	8	--	8	Village of Williams Bay	Yes	No
3	Town of Bloomfield	Hafs Road Marsh	NA-3	No	No	93	13	106	Private conservancy organization	No	No
4	Town of Bloomfield	Lake Ivanhoe Sedge Meadow	NA-3	Yes	No	63	8	71	Wisconsin Department of Natural Resources	Yes	No
6	Town of Bloomfield	Bloomfield Sedge Meadow and Tamarack Relict	NA-3	Yes	No	129	42	171	Wisconsin Department of Natural Resources	Yes	No
6	Town of Bloomfield	Pell Lake Railroad Prairie	NA-3	Yes	Yes	--	4	4	Wisconsin Department of Natural Resources	Yes	No
7	Town of Bloomfield	Bloomfield Prairie	NA-3	Yes	Yes	--	4	4	Private conservancy organization	No	No
8	Town of Darien	Darien Oak Woods	NA-3	Yes	No	--	348	348	Walworth County	Yes	No
9	Town of Darien	Turtle Creek Sedge Meadow and Fen	NA-3	Yes	Yes	124	35	159	Wisconsin Department of Natural Resources	Yes[b]	Yes
10	Town of Darien	Creek Road Fen	NA-3	Yes	Yes	9	--	9	Wisconsin Department of Natural Resources	Yes[b]	Yes
11	Town of Delavan	Comus Lake Wetland Complex	NA-2	Yes	Yes	9	282	291	Wisconsin Department of Natural Resources	Yes	No
12	Town of Delavan	Delavan Prairie-Fen	NA-2	Yes	Yes	--	107	107	Walworth County	No	No
13	Town of Delavan	Lake Lawn Wetland Complex	NA-3	Yes	No	35	241	276	Wisconsin Department of Natural Resources	No	No
14	Town of Delavan Town of Sugar Creek	CTH P Sedge Meadow	NA-3	Yes	No	--	18	18	Wisconsin Department of Natural Resources	No	No
15	Town of East Troy	Thiede Road Tamarack Swamp	NA-2	Yes	No	8	40	48	Walworth County	No	No
16	Town of East Troy	Army Lake Lowlands	NA-3	Yes	No	9	83	92	Private conservancy organization	No	No
17	Town of East Troy	East Troy Tamaracks	NA-3	Yes	No	26	--	26	Wisconsin Department of Natural Resources	Yes	No
18	Town of East Troy	Potter Lake Tamaracks	NA-3	Yes	No	--	22	22	Potter Lake District	No	No
19	Town of East Troy	Hilburn Sedge Meadow	NA-3	Yes	No	--	66	66	Private conservancy organization	No	No
20	Town of Geneva	Warbler Trail Wetlands	NA-3	Yes	No	33	7	40	Wisconsin Department of Natural Resources	Yes	No
21	Town of Geneva	Lake Como Wetlands	NA-3	Yes	No	32	18	50	Lake Como Association	No	No
22	Town of LaFayette	Granzeau Woods	NA-3	Yes	No	--	78	78	Private conservancy organization	No	No
23	Town of LaFayette	Pallottine Maple Woods	NA-3	Yes	No	--	153	153	Private conservancy organization	Yes	No
24	Town of LaFayette	Sugar Creek Fens, Springs, and Sedge Meadow	NA-3	Yes	Yes	--	36	36	Walworth County	Yes	Yes
25	Town of LaFayette	Sugar Creek Wetlands	NA-3	Yes	No	--	74	74	Walworth County	No	No
26	Town of LaFayette	Abells Corners Sedge Meadow and Tamarack Relict	NA-3	Yes	Yes	--	42	42	Private conservancy organization	No	No
27	Town of LaGrange	Duffin Road Prairie	NA-3	Yes	No	8	--	8	Wisconsin Department of Natural Resources	Yes	Yes
28	Town of LaGrange	Kestol Dry Prairie	NA-2	Yes	Yes	1	--	1	Wisconsin Department of Natural Resources	Yes	Yes
29	Town of LaGrange	LaGrange Oak Woods	NA-2	Yes	Yes	685	13	698	Wisconsin Department of Natural Resources	Yes	Yes
30	Town of LaGrange	Muir Oak Woods and Duffin Road Fen	NA-2	Yes	Yes	622	42	664	Wisconsin Department of Natural Resources	Yes	Yes
31	Town of LaGrange	Connelly Fen	NA-3	Yes	Yes	--	2	2	Wisconsin Department of Natural Resources	Yes	Yes

Table 116 (continued)

Site Identification				Site Characteristics		Site Area (acres)					
Reference Number on Map 61	Civil Division(s)	Name	Natural Area Class	Located in Primary Environmental Corridor	Supports Rare, Threatened, or Endangered Species	Already under Protective Ownership[a]	Proposed to Be Acquired	Total	Proposed Acquisition Agency	Acquisition of Site Recommended in a Prior Regional or County Plan	Formal Project Acquisition Area Established
32	Town of LaGrange	Nordic Trail Oak Woods	NA-3	Yes	Yes	277	206	483	Wisconsin Department of Natural Resources	Yes	Yes
33	Town of LaGrange	Island Woods	NA-3	Yes	No	--	46	46	Lauderdale Lakes Lake Management District	No	No
34	Town of LaGrange Town of Sugar Creek	Baywood Road Sedge Meadow	NA-3	Yes	No	3	26	29	Private conservancy organization	No	No
35	Town of Linn	Peninsula Woods	NA-3	Yes	Yes	--	39	39	Private conservancy organization	No	No
36	Town of Geneva Town of Linn	Wychwood	NA-3	Yes	No	--	226	226	Private conservancy organization	Yes	No
37	Town of Lyons	Lake Ivanhoe Fen and Sedge Meadow	NA-2	Yes	Yes	58	35	93	Wisconsin Department of Natural Resources	Yes	No
38	Town of Lyons	Peterson Fen	NA-3	Yes	Yes	--	2	2	Private conservancy organization	No	No
39	Town of Lyons	Lake Geneva Tamarack Relict	NA-3	Yes	No	--	160	160	Wisconsin Department of Natural Resources	Yes	No
40	Town of Lyons	Ivanhoe Creek Fen	NA-3	Yes	Yes	--	32	32	Private conservancy organization	No	No
41	Town of Lyons	Cranberry Road Bog	NA-3	Yes	No	--	46	46	Private conservancy organization	No	No
42	Town of Lyons Town of Burlington	Tri-County Tamarack Swamp	NA-3	Yes	No	--	40	40	Private conservancy organization[c]	No	No
43	Town of Richmond	Lake Loraine Woods—East	NA-3	Yes	No	--	75	75	Private conservancy organization	No	No
44	Town of Richmond	Lake Loraine Marsh	NA-3	Yes	No	32	3	35	Private conservancy organization	Yes	No
45	Town of Richmond	Lake No. 10	NA-3	Yes	No	40	--	40	Private conservancy organization[b]	No	No
46	Town of Sharon	Salt Box Road Railroad Prairie	NA-3	No	Yes	--	12	12	Private conservancy organization	No	No
47	Town of Spring Prairie	Spring Prairie Fen	NA-2	No	Yes	--	34	34	Walworth County	No	No
48	Town of Spring Prairie	Spring Prairie Lowlands	NA-3	Yes	No	--	297	297	Private conservancy organization	No	No
49	Town of Spring Prairie Town of Burlington	Honey Lake Marsh and Sedge Meadow	NA-2	Yes	Yes	132	259	391	Wisconsin Department of Natural Resources[d]	Yes	Yes
50	Town of Sugar Creek	Lake Wandawega Marsh	NA-3	Yes	No	60	32	92	Private conservancy organization	No	No
51	Town of Sugar Creek	North Lake Marsh	NA-3	Yes	No	61	8	67	North Lake District	No	No
52	Town of Sugar Creek	Silver Lake	NA-3	No	No	78	10	88	Private conservancy organization	No	No
53	Town of Troy	Upper Mukwonago River Wetland Complex	NA-2	Yes	Yes	85	253	338	The Nature Conservancy	Yes	Yes
54	Town of Troy	Adams Lake Fen and Marsh	NA-2	Yes	Yes	--	65	65	Walworth County	No	No
55	Town of Troy	George Williams Sedge Meadow	NA-3	Yes	No	27	--	27	George Williams College	Yes[e]	Yes
56	Town of Troy	Doyles Lake Wetlands	NA-3	Yes	No	27	41	68	Private conservancy organization	No	No
57	Town of Troy	Lein's Road Fen	NA-3	Yes	Yes	--	22	22	Private conservancy organization	No	No
58	Town of Troy	Troy Fen	NA-3	Yes	No	11	2	13	Wisconsin Department of Natural Resources	Yes	No
59	Town of Troy	Honey Creek Fen	NA-3	Yes	Yes	--	7	7	Wisconsin Department of Natural Resources	Yes	No
60	Town of Troy Town of East Troy	Swan Lake Wetland Complex	NA-2	Yes	Yes	26	141	167	The Nature Conservancy	Yes	No
61	Town of Whitewater	Lone Tree Trail Oak Woods	NA-3	Yes	Yes	204	81	285	Wisconsin Department of Natural Resources	Yes	Yes
62	Town of Whitewater	Whitewater Oak Woods	NA-3	Yes	No	187	53	240	Wisconsin Department of Natural Resources	Yes	Yes

Table 116 (continued)

Site Identification				Site Characteristics		Site Area (acres)					
Reference Number on Map 61	Civil Division(s)	Name	Natural Area Class	Located in Primary Environmental Corridor	Supports Rare, Threatened, or Endangered Species	Already under Protective Ownership[a]	Proposed to Be Acquired	Total	Proposed Acquisition Agency	Acquisition of Site Recommended in a Prior Regional or County Plan	Formal Project Acquisition Area Established
63	Town of Whitewater	Rice Lake Dry Prairie	NA-3	Yes	Yes	1	--	1	Wisconsin Department of Natural Resources	Yes	Yes
64	Town of Delavan	Marsh Road Railroad Prairie	NA-3	No	No	4	--	4	Wisconsin Department of Transportation[f]	No	No
Total	--	--	--	--	--	3,205	4,009	7,214	--	--	--

[a]*Based on 1994 data.*

[b]*Area in existing protective ownership is surface water. It is recommended that a local conservation group assume responsibility for managing this Natural Area.*

[c]*Includes 25 acres in Walworth County and 15 acres in Racine County. It is recommended that this entire Natural Area be acquired by a private conservancy organization.*

[d]*Includes 250 acres in Racine County and 141 acres in Walworth County. A portion of this Natural Area site, although located within a project area approved by the Wisconsin Natural Resources Board, is owned by The Nature Conservancy. It is recommended that the Wisconsin Department of Natural Resources work with The Nature Conservancy to assure that the balance of the Natural Area is acquired.*

[e]*This Natural Area is located within the approved project boundary for the Lulu Lake State Natural Area, but is owned and is being managed by George Williams College. It is recommended that the College continue to manage the area in cooperation with the Wisconsin Department of Natural Resources.*

[f]*The railway right-of-way is currently owned by the Wisconsin Department of Transportation. It is proposed that a local conservation group enter into a cooperative agreement with the Department to manage this Natural Area.*

Source: SEWRPC.

Wisconsin Department of Natural Resources.[1] The Department envisions that large sites consist of at least 10,000 acres of land that are as treeless and open in character as possible, although not all such land would have to be in public ownership. The present Bong State Recreation Area and adjacent public landholdings, which approximate 4,780 acres, or about 7.5 square miles, could serve as the core area of one such large site. To supplement the present publicly owned lands, it is proposed that the Wisconsin Department of Natural Resources enter into appropriate land management agreements with landowners in the environs of the Bong site with a view toward meeting the goal of establishing a minimum area of 10,000 acres to serve as suitable habitat for grassland birds. Such management agreements would seek to ensure that some lands are converted to permanent grassland cover, with the remainder of the lands staying in crop production where farmers would be encouraged to plant small grain and hay crops. This goal could be achieved through voluntary negotiation of agreements with landowners over time, although in some cases landowners may desire to sell their lands to the Department.[2]

The first proposed forest interior reserve site lies in the Town of Addison, Washington County, and would use as its core the St. Anthony Maple Woods area recommended for preservation and protection as a Critical Species Habitat site. The entire project is envisioned as approximating 160 acres after forest restoration, of which about 94 acres, or 59 percent, would meet the definition of forest interior, that is, that portion of a forest lying at least 300 feet from the forest edge.

The second proposed forest interior reserve site lies in the Town of Trenton, Washington County. This site would use as its core the Shady Lane Woods, and would approximate 147 acres. After forest restoration, this area would include about 80 acres classified as forest interior, or about 54 percent of the site. No part of this site has been previously recommended to be acquired in this plan.

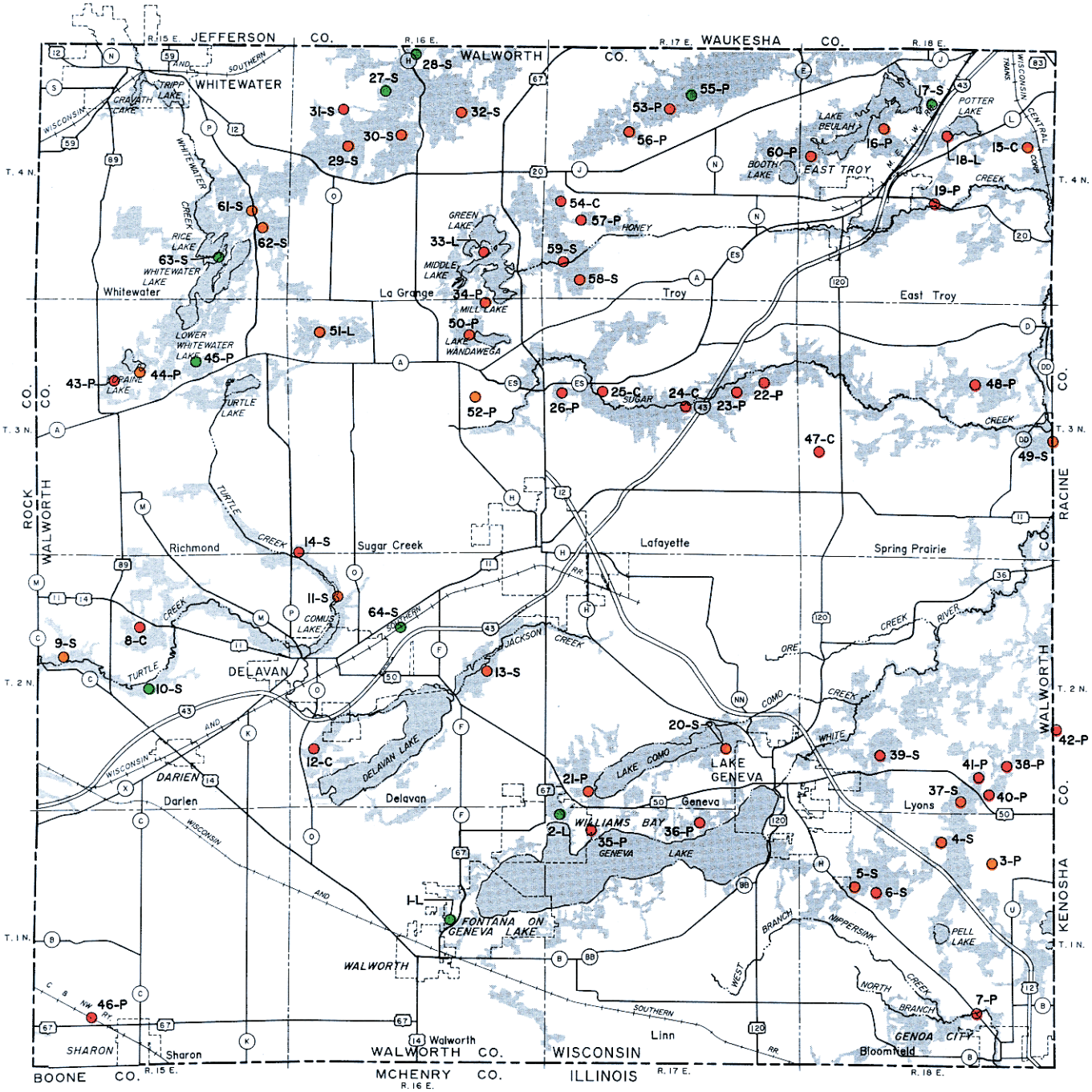
The third proposed forest interior reserve site lies in the City of Muskego, Waukesha County. The core of this site is an existing 100-acre woodland known as the Parker Drive Woods. After restoration, the

[1]*See the Wisconsin Department of Natural Resources publication Wisconsin's Biodiversity as a Management Issue, Wisconsin Department of Natural Resources, Madison, Wisconsin, 1995.*

[2]*Management agreements would be similar to those established under the Federal Crop Reserve Program. Under such an agreement, the State would vary payments by the soil type involved. Such payments could be expected to approximate $90 to $100 per acre per year.*

Map 61

RECOMMENDED ACQUISITION AND OWNERSHIP OF SELECTED NATURAL AREA SITES OF COUNTYWIDE OR REGIONAL (NA-2) OR LOCAL (NA-3) SIGNIFICANCE IN WALWORTH COUNTY



LEGEND

NATURAL AREA SITES

- NA-2 OR NA-3 SITE ALREADY FULLY UNDER PROTECTIVE OWNERSHIP (10)
- NA-2 OR NA-3 SITE PARTIALLY UNDER PROTECTIVE OWNERSHIP-RECOMMENDED TO BE EXPANDED (26)
- NA-2 OR NA-3 SITE RECOMMENDED TO BE ACQUIRED FOR PROTECTIVE OWNERSHIP (28)

RECOMMENDED OWNERSHIP

S	STATE GOVERNMENT (25)
C	COUNTY GOVERNMENT (7)
L	LOCAL GOVERNMENT (5)
P	PRIVATE CONSERVANCY ORGANIZATION (27)
23	REFERENCE NUMBER (SEE TABLE 116)
	PRIMARY ENVIRONMENTAL CORRIDORS

GRAPHIC SCALE
0 2 MILES
0 4000 8000 12000 16000 FEET

A total of 64 Natural Area sites of NA-2 or NA-3 quality identified in Walworth County are recommended for protective ownership. The recommended agency for acquisition in each case relates to several factors, including prior partial ownership, recommendations made in adopted park and open space plans, and established Wisconsin Department of Natural Resources project boundaries.

Source: SEWRPC.

Table 117

LAND ACQUISITION PRIORITY 2: PROTECTION OF SELECTED NATURAL AREA SITES IN WASHINGTON COUNTY OF COUNTYWIDE OR REGIONAL (NA-2) OR LOCAL (NA-3) SIGNIFICANCE

Site Identification				Site Characteristics		Site Area (acres)					
Reference Number on Map 82	Civil Division(s)	Name	Natural Area Class	Located in Primary Environmental Corridor	Supports Rare, Threatened, or Endangered Species	Already under Protective Ownership[a]	Proposed to Be Acquired	Total	Proposed Acquisition Agency	Acquisition of Site Recommended in a Prior Regional or County Plan	Formal Project Acquisition Area Established
1	City of West Bend Town of Barton	Blue Hills Woods	NA-2	Yes	Yes	105	161	266	City of West Bend	Yes	No
2	City of West Bend	Muth Woods	NA-2	No	Yes	--	30	30	City of West Bend	Yes	No
3	City of West Bend	Sunset Park Wetlands	NA-3	Yes	No	--	85	85	City of West Bend	Yes	No
4	City of West Bend	Albecker Park Wetlands	NA-3	Yes	No	31	60	91	City of West Bend	Yes	No
5	City of West Bend	Silver Creek Marsh	NA-3	Yes	No	10	17	27	Washington County	Yes	No
6	City of West Bend	University Fen	NA-3	Yes	Yes	1	--	1	City of West Bend	Yes	No
7	City of West Bend	Lac Lawrann Conservancy Upland Woods and Wetlands	NA-2	Yes	Yes	78	23	101	City of West Bend	Yes	No
8	Village of Germantown	Hoelz Swamp	NA-3	Yes	No	--	109	109	Village of Germantown	No	No
9	Village of Germantown	Lake Park Swamp	NA-3	Yes	No	9	45	54	Village of Germantown	No	No
10	Village of Germantown	Schoessow Woods	NA-3	Yes	Yes	--	51	51	Village of Germantown	No	No
11	Village of Germantown	USH 41 Swamp	NA-3	Yes	No	--	228	228	Village of Germantown	No	No
12	Village of Germantown	Kleinman Swamp	NA-3	Yes	No	38	33	71	Wisconsin Department of Natural Resources	No	No
13	Town of Addison	St. Anthony Beech Woods	NA-2	Yes	No	--	68	68	Washington County	No	No
14	Town of Addison	Allenton Swamp	NA-3	Yes	No	844	247	1,091	Wisconsin Department of Natural Resources	Yes	Yes
15	Town of Barton	Smith Lake Swamp	NA-3	Yes	No	--	38	38	Wisconsin Department of Natural Resources	No	No
16	Town of Barton	Lange Hardwoods	NA-3	Yes	No	--	53	53	Wisconsin Department of Natural Resources	Yes	No
17	Town of Barton	Wildwood Hardwood Swamp	NA-3	Yes	No	--	98	98	Wisconsin Department of Natural Resources	Yes	No
18	Town of Erin	Holy Hill Woods	NA-2	Yes	No	--	256	256	Washington County	No	No
19	Town of Erin	Toland Swamp	NA-2	Yes	No	--	193	193	Washington County	No	No
20	Town of Erin	Loew's Lake Wetland Complex	NA-2	Yes	Yes	280	201	481	Wisconsin Department of Natural Resources	Yes	Yes
21	Town of Erin	Hults Bog and Marsh	NA-3	Yes	No	--	14	14	Private conservancy organization	No	No
22	Town of Erin	Erin Sedge Meadow	NA-3	Yes	No	--	17	17	Private conservancy organization	No	No
23	Town of Erin	Thompson Swamp	NA-3	Yes	No	--	182	182	Private conservancy organization	No	No
24	Town of Erin Town of Richfield	Donegal Road Woods	NA-3	Yes	No	26	111	137	Wisconsin Department of Natural Resources	Yes	Yes
25	Town of Erin	St. Augustine Road Sedge Meadow	NA-3	Yes	No	--	11	11	Wisconsin Department of Natural Resources	Yes	Yes
26	Town of Erin	Mason Creek Swamp	NA-3	Yes	No	131	301	432	University of Wisconsin-Milwaukee	No	No
27	Town of Erin Town of Hartford	CTH E Wetlands	NA-3	Yes	No	--	28	28	Private conservancy organization	No	No
28	Town of Erin Town of Richfield	Friess Lake Tamarack Swamp	NA-2	Yes	No	--	228	228	Wisconsin Department of Natural Resources	Yes	Yes
29	Town of Farmington	North Branch Woods	NA-2	Yes	No	--	96	96	Washington County	No	No
30	Town of Farmington	Milwaukee River Swamp	NA-3	Yes	No	72	474	546	Private conservancy organization	No	No
31	Town of Farmington	Lizard Mound Woods	NA-3	Yes	No	22	6	28	Washington County	No	No
32	Town of Farmington	Green Lake Bog	NA-3	Yes	No	--	19	19	Green Lake Association	No	No
33	City of Hartford Town of Hartford	Rubicon Lowlands	NA-3	Yes	No	4	26	30	Washington County	No	No
34	Town of Hartford	STH 60 Swamp	NA-3	Yes	No	--	32	32	Private conservancy organization	No	No
35	Town of Hartford	Pike Lake Sedge Meadow	NA-3	Yes	Yes	11	3	14	Town of Hartford	No	No

Table 117 (continued)

Site Identification				Site Characteristics		Site Area (acres)					
Reference Number on Map 62	Civil Division(s)	Name	Natural Area Class	Located in Primary Environmental Corridor	Supports Rare, Threatened, or Endangered Species	Already under Protective Ownership[a]	Proposed to Be Acquired	Total	Proposed Acquisition Agency	Acquisition of Site Recommended in a Prior Regional or County Plan	Formal Project Acquisition Area Established
36	Town of Hartford	Pike Lake Woods	NA-3	Yes	No	131	--	131	Wisconsin Department of Natural Resources	Yes	Yes
37	Town of Jackson	Jackson Swamp	NA-2	Yes	Yes	1,221	350	1,571	Wisconsin Department of Natural Resources	Yes	Yes
38	Town of Kewaskum	Kettle Moraine Drive Bog	NA-2	Yes	Yes	29	10	39	Wisconsin Department of Natural Resources	Yes	Yes
39	Town of Kewaskum	Glacial Trail Forest	NA-2	Yes	No	212	11	223	Wisconsin Department of Natural Resources	Yes	Yes
40	Town of Kewaskum	St. Michael's Woods	NA-2	Yes	No	81	3	84	Wisconsin Department of Natural Resources	Yes	Yes
41	Town of Kewaskum	Kettle Moraine Drive Woods	NA-3	Yes	Yes	287	--	287	Wisconsin Department of Natural Resources	Yes	Yes
42	Town of Kewaskum	STH 28 Woods	NA-3	Yes	No	--	145	145	Private conservancy organization	No	No
43	Town of Polk	Big Cedar Lake Bog	NA-2	Yes	No	--	89	89	Washington County	No	No
44	Town of Polk	Mud Lake Upland Woods	NA-2	Yes	No	--	54	54	Washington County	No	No
45	Town of Polk	Mud Lake Meadow	NA-2	Yes	Yes	23	36	59	Washington County	No	No
46	Town of Polk	Mueller Woods	NA-3	Yes	No	4	93	97	Private conservancy organization	No	No
47	Town of Polk	Slinger Upland Woods	NA-3	Yes	No	--	196	196	Wisconsin Department of Natural Resources	Yes	No
48	Town of Polk	Heritage Trails Bog	NA-3	Yes	No	41	53	94	Washington County	Yes	No
49	Town of Polk Town of West Bend	Mud Lake Swamp	NA-2	Yes	Yes	7[b]	179	186	Washington County	No	No
50	Town of Richfield	CTH J Swamp	NA-3	Yes	No	33	67	100	Kettle Moraine Audubon Society	No	No
51	Town of Richfield	Hubertus Road Sedge Meadow	NA-3	Yes	No	--	7	7	Private conservancy organization	No	No
52	Town of Richfield	Amy Bell Lake and Lowlands	NA-3	Yes	No	6	14	20	Private conservancy organization	No	No
53	Town of Richfield	Colgate Shrub-Carr	NA-3	Yes	No	--	38	38	Private conservancy organization	No	No
54	Town of Richfield	Colgate Fen-Meadow	NA-2	Yes	Yes	--	23	23	The Nature Conservancy	No	No
55	Town of Richfield	Glacial Hills Park Bogs and Upland Woods	NA-2	Yes	Yes	49	11	60	Washington County	No	No
56	Town of Richfield	Lake Five Woods	NA-3	Yes	Yes	--	152	152	Private conservancy organization	No	No
57	Town of Richfield	Daniel Boone Bogs	NA-2	Yes	Yes	13	8	21	Washington County	No	No
58	Town of Trenton	Schoenbeck Woods	NA-2	Yes	No	--	195	195	Washington County	No	No
59	Town of Trenton	Bellin Bog	NA-2	No	No	2	15	17	Washington County	No	No
60	Town of Trenton	Reinartz Cedar Swamp	NA-2	Yes	No	9	110	119	Washington County	No	No
61	Town of Trenton	Myra Wetlands	NA-2	Yes	No	--	69	69	Washington County	No	No
62	Town of Trenton	Poplar Road Lacustrine Forest	NA-3	Yes	No	--	177	177	Private conservancy organization	No	No
63	Town of Trenton	Fellenz Hardwood Swamp	NA-3	Yes	No	--	58	58	Washington County	Yes	No
64	Town of Trenton	Paradise Drive Tamarack Swamp	NA-3	Yes	Yes	--	81	81	Private conservancy organization	No	No
65	Town of Trenton	Camp Wowitan Wetlands	NA-3	Yes	Yes	10	99	109	Private conservancy organization	No	No
66	Town of Trenton	Sandy Knoll Wetlands	NA-3	Yes	No	17	30	47	Washington County	No	No
67	Town of Trenton Town of Farmington	Sandy Knoll Swamp	NA-3	Yes	No	70	269	339	Washington County	Yes	No
68	Town of Wayne	Theresa Swamp	NA-3	Yes	No	879	65	944	Wisconsin Department of Natural Resources	Yes	Yes
69	Town of Wayne	Wayne Creek Swamp	NA-3	Yes	No	--	178	178	Wisconsin Department of Natural Resources	No	No
70	Town of Wayne	Stockcar Swamp	NA-3	Yes	Yes	--	240	240	Private conservancy organization	No	No

Table 117 (continued)

Site Identification				Site Characteristics		Site Area (acres)					
Reference Number on Map 62	Civil Division(s)	Name	Natural Area Class	Located in Primary Environmental Corridor	Supports Rare, Threatened, or Endangered Species	Already under Protective Ownership[a]	Proposed to Be Acquired	Total	Proposed Acquisition Agency	Acquisition of Site Recommended in a Prior Regional or County Plan	Formal Project Acquisition Area Established
71	Town of Wayne	Rock River Marsh	NA-3	Yes	No	186	140	326	Wisconsin Department of Natural Resources	Yes	Yes
72	Town of Wayne Town of Kewaskum	Wayne Swamp	NA-2	Yes	No	--	1,126	1,126	Washington County	No	No
73	Town of West Bend	Silverbrook Lake Woods	NA-2	Yes	Yes	148	256	404	Wisconsin Department of Natural Resources	Yes	No
74	Town of West Bend	Gilbert Lake Tamarack Swamp	NA-2	Yes	No	54	76	130	Cedar Lakes Conservation Foundation	Yes	No
75	Town of West Bend	Hacker Road Bog	NA-2	Yes	No	25	--	25	Wisconsin Department of Natural Resources	No	No
76	Town of West Bend	Little Cedar Lake Wetlands	NA-2	Yes	No	126	11	137	Cedar Lakes Conservation Foundation	No	No
77	Town of West Bend	CTH Z Upland Woods and Wetlands	NA-3	Yes	Yes	41	240	281	Cedar Lakes Conservation Foundation	No	No
78	Town of West Bend	Ziegler Woods	NA-3	Yes	No	--	170	170	Wisconsin Department of Natural Resources	Yes	No
Total	--	--	--	--	--	5,366	8,688	14,054	--	--	--

[a]*Based on 1994 data.*

[b]*The seven acres of this Natural Area in existing protective ownership are within the right-of-way of USH 41 and owned by the Wisconsin Department of Transportation.*

Source: SEWRPC.

entire site would approximate 123 acres, of which about 66 acres, or 54 percent, would meet the criteria for forest interior.

The fourth proposed forest interior site lies in the Town of Rochester, Racine County. The core of this site is an existing woodland approximating 130 acres and known as Oak Knoll Woods. The Wisconsin Department of Natural Resources currently owns about 40 acres. After restoration, the entire site would approximate 162 acres, of which about 86 acres, or 53 percent, would meet the criteria for forest interior.

The fifth proposed forest interior site lies in the Town of Belgium, Ozaukee County, and is approximately 400 acres in size. The site is located entirely within the boundaries of Harrington Beach State Park, and thus is completely under public ownership. At present, the site consists of old fields and human-planted grasslands which would be stocked with native hardwood tree species. It is estimated that reasonable forest interior conditions would be produced in about 50 years. After reforestation, about 260 acres, or about 65 percent of the site, would meet the criteria for forest interior.

It is recognized that in some cases alternatives to fee simple land purchases may be desirable. Accordingly, the use of deed restrictions, conservation easements, or purchase of development rights, or a combination thereof, may be used as an alternative to fee simple purchase to protect some Natural Areas, Critical Species Habitat sites, and designated significant Geological Areas.

Land Regulation Plan Element

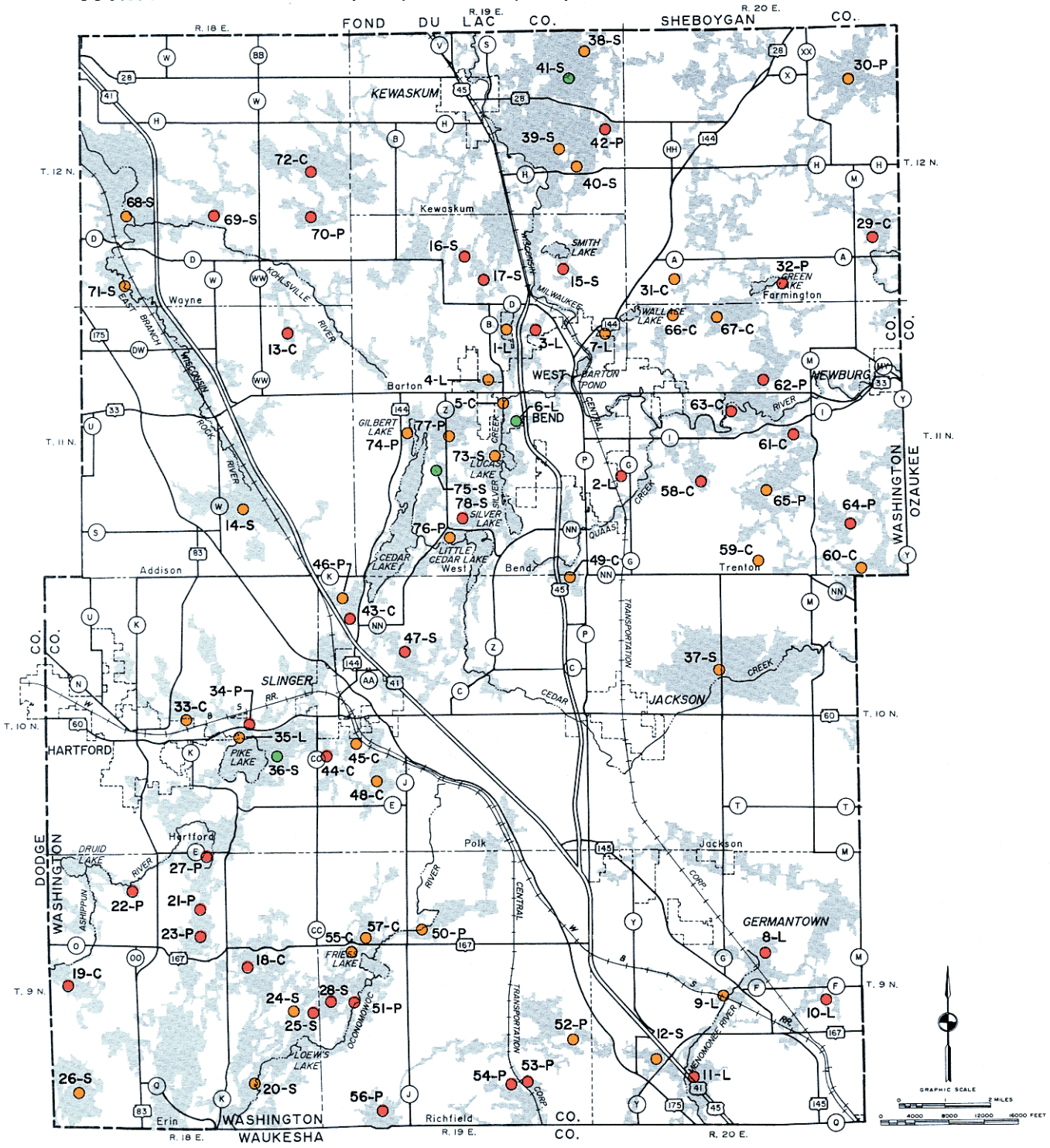
The land regulation element of the recommended plan includes the following specific recommendations:

1. Adjustment of Primary Environmental Corridor Boundaries

   The great majority of the Natural Areas and Critical Species Habitat sites recommended for preservation and protection lie within primary environmental corridors identified for preservation in previous Commission planning efforts. Some of the previously delineated boundaries of the primary environmental corridors do not fully encompass some of the Natural Areas and Critical Species Habitat sites. Accordingly, it is recommended that as planning efforts are undertaken to update

Map 62

RECOMMENDED ACQUISITION AND OWNERSHIP OF SELECTED NATURAL AREA SITES OF COUNTYWIDE OR REGIONAL (NA-2) OR LOCAL (NA-3) SIGNIFICANCE IN WASHINGTON COUNTY



LEGEND

NATURAL AREA SITES

- NA-2 OR NA-3 SITE ALREADY FULLY UNDER PROTECTIVE OWNERSHIP (4)
- NA-2 OR NA-3 SITE PARTIALLY UNDER PROTECTIVE OWNERSHIP-RECOMMENDED TO BE EXPANDED (37)
- NA-2 OR NA-3 SITE RECOMMENDED TO BE ACQUIRED FOR PROTECTIVE OWNERSHIP (37)

RECOMMENDED OWNERSHIP

- S STATE GOVERNMENT (23)
- C COUNTY GOVERNMENT (22)
- L LOCAL GOVERNMENT (11)
- P PRIVATE CONSERVANCY ORGANIZATION (22)
- 23 REFERENCE NUMBER (SEE TABLE 117)
- PRIMARY ENVIRONMENTAL CORRIDORS

A total of 78 Natural Area sites of NA-2 or NA-3 quality identified in Washington County are recommended for protective ownership. The recommended agency for acquisition in each case relates to several factors, including prior partial ownership, recommendations made in adopted park and open space plans, and established Wisconsin Department of Natural Resources project boundaries.

Source: SEWRPC.

Table 118

LAND ACQUISITION PRIORITY 2: PROTECTION OF SELECTED NATURAL AREA SITES IN WAUKESHA COUNTY OF COUNTYWIDE OR REGIONAL (NA-2) OR LOCAL (NA-3) SIGNIFICANCE

Site Identification				Site Characteristics		Site Area (acres)					
Reference Number on Map 83	Civil Division(s)	Name	Natural Area Class	Located in Primary Environmental Corridor	Supports Rare, Threatened, or Endangered Species	Already under Protective Ownership[a]	Proposed to Be Acquired	Total	Proposed Acquisition Agency(ies)	Acquisition of Site Recommended in a Prior Regional or County Plan[b]	Formal Project Acquisition Area Established
1	City of Brookfield	Wirth Swamp	NA-3	Yes	No	23	62	85	City of Brookfield	Yes	No
2	City of Brookfield	Bishops Woods	NA-3	No	Yes	42	--	42[c]	Bishops Woods Corporation	Yes	No
3	City of Brookfield	Brookfield Swamp	NA-3	Yes	No	40	163	203	City of Brookfield	Yes	No
4	City of Brookfield	Zion Woods	NA-2	Yes	Yes	44	11	55	City of Brookfield	Yes	No
5	City of Delafield	Bark River School Sedge Meadow	NA-3	Yes	No	--	17	17	Waukesha County	Yes	No
6	City of Delafield Village of Nashotah	Nashotah House Woods	NA-3	Yes	No	--	96	96[d]	Private conservancy organization	Yes	No
7	City of Muskego	Muskego Lake Marsh	NA-3	Yes	Yes	634	427	1,061	Big Muskego-Bass Bay Lake Management District	Yes	No
8	City of New Berlin	New Berlin Woods	NA-3	No	Yes	--	35	35	City of New Berlin	Yes	No
9	City of Oconomowoc Town of Summit	Oconomowoc Swamp	NA-3	Yes	No	5	143	148	Wisconsin Department of Natural Resources	Yes	No
10	City of Waukesha	Fruits Pond Fen	NA-3	Yes	Yes	16	--	16	City of Waukesha	Yes	No
11	City of Waukesha Town of Waukesha	Pebble Creek Wetlands	NA-3	Yes	No	12	48	60	City of Waukesha	Yes	No
12	City of Waukesha Town of Waukesha	Minooka Park Woods	NA-3	Yes	No	89	--	89	Waukesha County	Yes	No
13	Village of Hartland	Hartland Railroad Prairie	NA-3	Yes	No	--	4	4	Village of Hartland[e]	Yes	No
14	Village of Menomonee Falls	Held Maple Woods	NA-2	Yes	No	--	40	40	Waukesha County	Yes	No
15	Village of Menomonee Falls	Menomonee Falls "Tamarack" Swamp	NA-2	Yes	Yes	362	469	831	Village of Menomonee Falls	Yes	Yes
16	Village of Menomonee Falls	Peters Woods	NA-3	Yes	Yes	--	69	69	Private conservancy organization	Yes	No
17	Village of Menomonee Falls	Zuba Woods	NA-3	Yes	Yes	11	40	51	Waukesha County	Yes	No
18	Village of Menomonee Falls City of Milwaukee	Menomonee River Swamp	NA-3	Yes	No	--	29	29	Waukesha County	Yes	No
19	Village of Menomonee Falls	Theater Swamp	NA-3	Yes	No	31	60	91	Village of Menomonee Falls	Yes	No
20	Village of Menomonee Falls Village of Butler	Clarks Woods	NA-3	Yes	No	7	16	23	Waukesha County	Yes	No
21	Village of Mukwonago Town of Mukwonago	Phantom Lake Wetlands	NA-2	Yes	Yes	167	20	187	Village of Mukwonago	Yes	No
22	Village of Pewaukee	Pewaukee Park Sedge Meadow	NA-3	Yes	No	--	42	42	Village of Pewaukee	Yes	No
23	Village of Sussex	Coolings Sedge Meadow	NA-3	No	No	10	3	13	Village of Sussex[f]	Yes	No
24	City of Delafield	Nagawicka Lake Bog and Oak Woods	NA-2	Yes	Yes	81	75	156	Wisconsin Department of Natural Resources	Yes	No
25	Town of Delafield	Pewaukee Lake Access Fen	NA-2	Yes	Yes	10	--	10	Waukesha County	Yes	No
26	Town of Delafield	Lapham Peak Woods	NA-3	Yes	Yes	351	100	451	Wisconsin Department of Natural Resources	Yes	Yes[g]
27	Town of Delafield Town of Pewaukee	Capitol Drive Sedge Meadow and Wet Prairie	NA-3	Yes	No	21	70	91	Lake Pewaukee Sanitary District	Yes	No
28	Town of Delafield Town of Pewaukee	Pewaukee Lake Wetland	NA-3	Yes	Yes	--	68	68	Lake Pewaukee Sanitary District	Yes	No
29	Town of Eagle	Eagle Oak Opening and Dry Prairies	NA-2	Yes	Yes	466	--	466	Wisconsin Department of Natural Resources	Yes	Yes
30	Town of Eagle	Ulrickson Road Cedar Glade	NA-2	Yes	Yes	32	--	32	Wisconsin Department of Natural Resources	Yes	Yes
31	Town of Eagle	Eagle Shrub-Fen	NA-2	Yes	Yes	65	4	69	Wisconsin Department of Natural Resources	Yes	Yes

Table 118 (continued)

Site Identification				Site Characteristics		Site Area (acres)					
Reference Number on Map 63	Civil Division(s)	Name	Natural Area Class	Located in Primary Environmental Corridor	Supports Rare, Threatened, or Endangered Species	Already under Protective Ownership[a]	Proposed to Be Acquired	Total	Proposed Acquisition Agency(ies)	Acquisition of Site Recommended in a Prior Regional or County Plan[b]	Formal Project Acquisition Area Established
32	Town of Eagle	Beaver Dam Lake	NA-2	Yes	Yes	96	25	121	Wisconsin Department of Natural Resources	Yes	No
33	Town of Eagle	Kettle Moraine Limestone Outcrop	NA-2	Yes	No	4	--	4	Wisconsin Department of Natural Resources	Yes	Yes
34	Town of Eagle	Eagle Railroad Prairie	NA-2	Yes	Yes	19	--	19	Wisconsin Department of Natural Resources[h]	Yes	Yes
35	Town of Eagle	Eagle Dry Prairie and Grotjans Fen	NA-2	Yes	Yes	71	8	79	Wisconsin Department of Natural Resources	Yes	Yes
36	Town of Eagle	Fur Farm Pond	NA-2	Yes	No	69	--	69	Wisconsin Department of Natural Resources	Yes	Yes
37	Town of Eagle	Road X Railroad Prairie	NA-3	Yes	No	--	4	4	Private conservancy organization[i]	Yes	No
38	Town of Eagle	Jericho Creek Fen	NA-3	Yes	Yes	--	8	8	Private conservancy organization	Yes	No
39	Town of Eagle	Mailman Road Railroad Prairie	NA-3	No	Yes	--	6	6	Private conservancy organization[i]	Yes	No
40	Town of Eagle	Paradise Springs Woods	NA-3	Yes	Yes	54	43	97	Wisconsin Department of Natural Resources	Yes	No
41	Town of Eagle	STH 59 Oak Woods and Prairies	NA-3	Yes	Yes	209	9	218	Wisconsin Department of Natural Resources	Yes	Yes
42	Town of Eagle Village of Eagle	Eagle Centre (Haffner) Oak Opening	NA-3	Yes	Yes	--	20	20	Waukesha Land Conservancy	Yes	No
43	Town of Eagle	Malek Wetland	NA-3	Yes	Yes	--	94	94	Private conservancy organization	Yes	No
44	Town of Eagle Town of Ottawa	Eagle Fen and Spring	NA-2	Yes	Yes	150	5	155	Wisconsin Department of Natural Resources	Yes	Yes
45	Town of Eagle Town of Ottawa	Ottawa Oak Woods and Dry Prairies	NA-2	Yes	Yes	965	--	965[j]	Wisconsin Department of Natural Resources	Yes	Yes
46	Town of Genesee	CTH D Railroad Prairie	NA-3	Yes	No	--	5	5	Private conservancy organization[i]	Yes	No
47	Town of Genesee	Brown's Fen	NA-3	Yes	Yes	2	--	2	Waukesha County	Yes	No
48	Town of Lisbon	Lisbon Low Woods	NA-3	Yes	No	21	246	267	Waukesha County	Yes	No
49	Town of Lisbon	Sussex Swamp	NA-3	Yes	No	--	147	147	Private conservancy organization	Yes	No
50	Town of Lisbon	Thousand Oaks Tamarack Relict	NA-3	Yes	No	2	28	30	Town of Lisbon	Yes	No
51	Town of Merton	Lake Keesus Fen-Meadow	NA-2	Yes	Yes	33	108	141	Wisconsin Department of Natural Resources	Yes	No
52	Town of Merton	Camp Whitcomb Lowland	NA-3	Yes	No	40	8	48	Camp Whitcomb	Yes	No
53	Town of Merton	Chenequa Wetland Complex	NA-3	Yes	No	11	100	111	Waukesha County	Yes	No
54	Town of Mukwonago	Spring Lake Sedge Meadow and Fens	NA-2	Yes	Yes	115	104	219	Waukesha County	Yes	No
55	Town of Mukwonago	Vernon Tamarack-Fen	NA-2	Yes	Yes	16	--	16	Wisconsin Department of Natural Resources	Yes	Yes
56	Town of Mukwonago	Vernon Prairie-Fen	NA-2	Yes	Yes	36	1	37	Wisconsin Department of Natural Resources	Yes	Yes
57	Town of Mukwonago	Vernon Fen	NA-2	Yes	Yes	10	--	10	Wisconsin Department of Natural Resources	Yes	Yes
58	Town of Mukwonago	Lower Mukwonago River	NA-2	Yes	Yes	15	8	23	Village of Mukwonago	Yes	No
59	Town of Mukwonago	Brown Lake and Sedge Meadow	NA-2	Yes	Yes	20	18	38	Waukesha County	Yes	No
60	Town of Mukwonago	North Prairie Railroad Prairie	NA-3	Yes	Yes	--	5	5	Private conservancy organization[i]	Yes	No
61	Town of Mukwonago Town of East Troy	Mukwonago Low Woods	NA-3	Yes	No	--	322	322[k]	Private conservancy organization	Yes	No
62	Town of Oconomowoc	Ashippun River Lowlands	NA-2	Yes	Yes	82	162	244	Waukesha County	Yes	No

Table 118 (continued)

Site Identification				Site Characteristics		Site Area (acres)					
Reference Number on Map 63	Civil Division(s)	Name	Natural Area Class	Located in Primary Environmental Corridor	Supports Rare, Threatened, or Endangered Species	Already under Protective Ownership[a]	Proposed to Be Acquired	Total	Proposed Acquisition Agency(ies)	Acquisition of Site Recommended in a Prior Regional or County Plan[b]	Formal Project Acquisition Area Established
63	Town of Oconomowoc	Meadow View School Bog	NA-3	Yes	No	5	6	11	Private conservancy organization[l]	Yes	No
64	Town of Oconomowoc	Raasch Tamarack Swamp	NA-3	Yes	No	17	78	95	Wisconsin Department of Natural Resources	Yes	No
65	Town of Oconomowoc Village of Lac La Belle	Lac La Belle Lowlands	NA-3	Yes	No	--	33	33	Village of Lac La Belle	Yes	No
66	Town of Oconomowoc	Oconomowoc River Marsh	NA-3	Yes	No	65	35	100	Wisconsin Department of Natural Resources	Yes	No
67	Town of Oconomowoc	Oconomowoc Sedge Meadow	NA-3	No	Yes	16	3	19	Private conservancy organization	Yes	No
68	Town of Ottawa	Henrietta Lake Bog	NA-2	Yes	No	--	5	5	Wisconsin Department of Natural Resources	Yes	No
69	Town of Ottawa	Nelson Oak Woods and Lowlands	NA-3	Yes	Yes	77	14	91	Waukesha County[m]	Yes	No
70	Town of Ottawa	Casper Creek Sedge Meadow	NA-3	Yes	No	--	16	16	Private conservancy organization	Yes	No
71	Town of Ottawa	Ottawa Limestone Outcrop	NA-3	Yes	Yes	30	40	70	Ice Age Park & Trail Foundation, Inc.	Yes	No
72	Town of Ottawa	Larkin Lake	NA-3	Yes	Yes	34	7	41	Private conservancy organization	Yes	No
73	Town of Ottawa	CTH ZC Lowlands	NA-3	Yes	No	--	380	380	Private conservancy organization	Yes	No
74	Town of Ottawa	Scuppernong Springs Dry Prairie	NA-3	Yes	No	1	--	1	Wisconsin Department of Natural Resources	Yes	Yes
75	Town of Ottawa Town of Summit	Perkins Property	NA-3	Yes	Yes	394	44	438	Izaak Walton League	Yes	No
76	Town of Pewaukee	Pewaukee Sedge Meadow	NA-3	Yes	No	--	11	11	Lake Pewaukee Sanitary District	Yes	No
77	Town of Summit	Genesee Lake Road Bog	NA-2	Yes	No	3	10	13	Waukesha County	Yes	No
78	Town of Summit	Crossroads Bog	NA-3	Yes	Yes	1	3	4	Private conservancy organization	Yes	No
79	Town of Summit	Laura Lake Swamp	NA-3	Yes	Yes	8	266	274	Private conservancy organization	Yes	No
80	Town of Summit	Bark River Marsh	NA-3	Yes	No	4	154	158	Waukesha County	Yes	No
81	Town of Summit	Breens Bay Sedge Meadow	NA-3	Yes	Yes	--	16	16	Town of Summit Sanitary District No. 1	Yes	No
82	Town of Summit	Sawyer Road Sedge Meadow	NA-3	Yes	No	3	35	38	Private conservancy organization	Yes	No
83	Town of Vernon	Big Bend Wet-Mesic Woods	NA-2	Yes	Yes	219	208	427	Waukesha County	Yes	No
84	Town of Vernon	River Oaks Woods and Wetlands	NA-3	Yes	No	58	77	135	Waukesha County	Yes	No
85	Town of Vernon	Porter Low Woods	NA-3	Yes	No	--	245	245	Waukesha County	Yes	No
86	Town of Vernon Town of Waterford	Norris Oak Woods and Wetlands	NA-3	Yes	No	--	352	352[n]	Waukesha and Racine Counties	Yes	No
87	Town of Vernon Town of Waukesha	Fox River Woods	NA-3	Yes	No	351	60	411	Wisconsin Department of Natural Resources	Yes	Yes
88	Town of Waukesha	Fosters Woods	NA-2	Yes	No	86	3	89	Waukesha County	Yes	No
89	Town of Waukesha	Falk Fen and Woods	NA-2	Yes	Yes	114	167	281[o]	Waukesha County	Yes	No
90	Town of Waukesha	Pebble Creek Railroad Prairie	NA-3	Yes	No	7	--	7	Wisconsin Department of Natural Resources[p]	Yes	No
91	Town of Waukesha	Vernon Mesic Prairie	NA-3	Yes	No	16	--	16	Wisconsin Department of Natural Resources	Yes	No
Total	--	--	--	--	--	6,068	5,883	11,931	--	--	--

[a] *Based on 1994 data.*

[b] *This category pertains to site acquisitions recommended in the new park and open space plan for Waukesha County documented in Chapter XIII of SEWRPC Community Assistance Planning Report No. 209, A Development Plan for Waukesha County, Wisconsin, August 1998. That plan was adopted by the Waukesha County Board of Supervisors in November 1998.*

[c] *An additional 10 acres of this site, consisting of platted business park lands, should remain in private ownership and be protected through public land use regulation.*

[d] *An additional four acres of this site, consisting of residential development, should remain in private ownership and be protected through public land use regulation.*

Table 118 Footnotes (continued)

[e]It is recommended that the Village of Hartland enter into a cooperative agreement with CP Rail System to manage that portion of this Natural Area within the railway right-of-way.

[f]Waukesha County currently owns the 10-acre portion of this Natural Area now within public ownership. It is proposed that the Village of Sussex be responsible for acquiring the additional three acres and adjacent primary environmental corridor lands.

[g]A portion of this Natural Area is located within the project boundary for the Lapham Peak Unit of the Kettle Moraine State Forest. It is recommended that the Wisconsin Department of Natural Resources acquire all of this Natural Area.

[h]The railway right-of-way within this Natural Area is currently owned by the Wisconsin Department of Transportation; however, the Wisconsin Department of Natural Resources owns the adjacent lands. It is recommended that the Department of Natural Resources assume responsibility for managing this Natural Area.

[i]The railway right-of-way within this Natural Area is currently owned by the Wisconsin Department of Transportation. It is proposed that a private conservancy organization enter into a cooperative agreement with the Department to manage this Natural Area.

[j]An additional 31 acres of this site, consisting of residential development, should remain in private ownership and be protected through public land use regulation. These 31 acres are excluded from the project boundary for the Southern Unit of the Kettle Moraine State Forest. The remaining 965 acres of the Natural Area are within the project boundary and owned by the Wisconsin Department of Natural Resources.

[k]Includes 157 acres in Waukesha County and 165 acres in Walworth County. An additional 10 acres of this site, located within an existing golf course in Waukesha County, should remain in private ownership and be protected through public land use regulation.

[l]About five acres of this Natural Area are owned by a public school district. It is recommended that a private conservancy organization acquire the remaining six acres.

[m]The 77 acres under existing protective ownership are owned by the Waukesha Land Conservancy. The remaining 14 acres are proposed to be acquired by Waukesha County as part of the Bark River Parkway.

[n]Includes 346 acres in Waukesha County and six acres in Racine County. It is recommended that each County involved acquire these respective portions of this Natural Area located within their respective boundaries. An additional 12 acres of this site, located within an existing golf course in Waukesha County, should remain in private ownership and be protected through public land use regulation.

[o]An additional 25 acres of this site, located within an existing Girl Scout camp, should remain in private ownership and be protected through public land use regulation.

[p]This Natural Area is located between the Glacial Drumlin State Trail, owned by the Wisconsin Department of Natural Resources, and the Wisconsin & Southern Railroad right-of-way, owned by the Wisconsin Department of Transportation. It is proposed that the Department of Natural Resources assume responsibility for managing this Natural Area.

Source: SEWRPC.

the regional land use and park and open space plans and the sanitary sewer service area element of the regional water quality management plan, the boundaries of the primary environmental corridors be adjusted to fully encompass such sites. In some cases, these boundaries have important regulatory implications attendant to zoning or public utility extension policies.

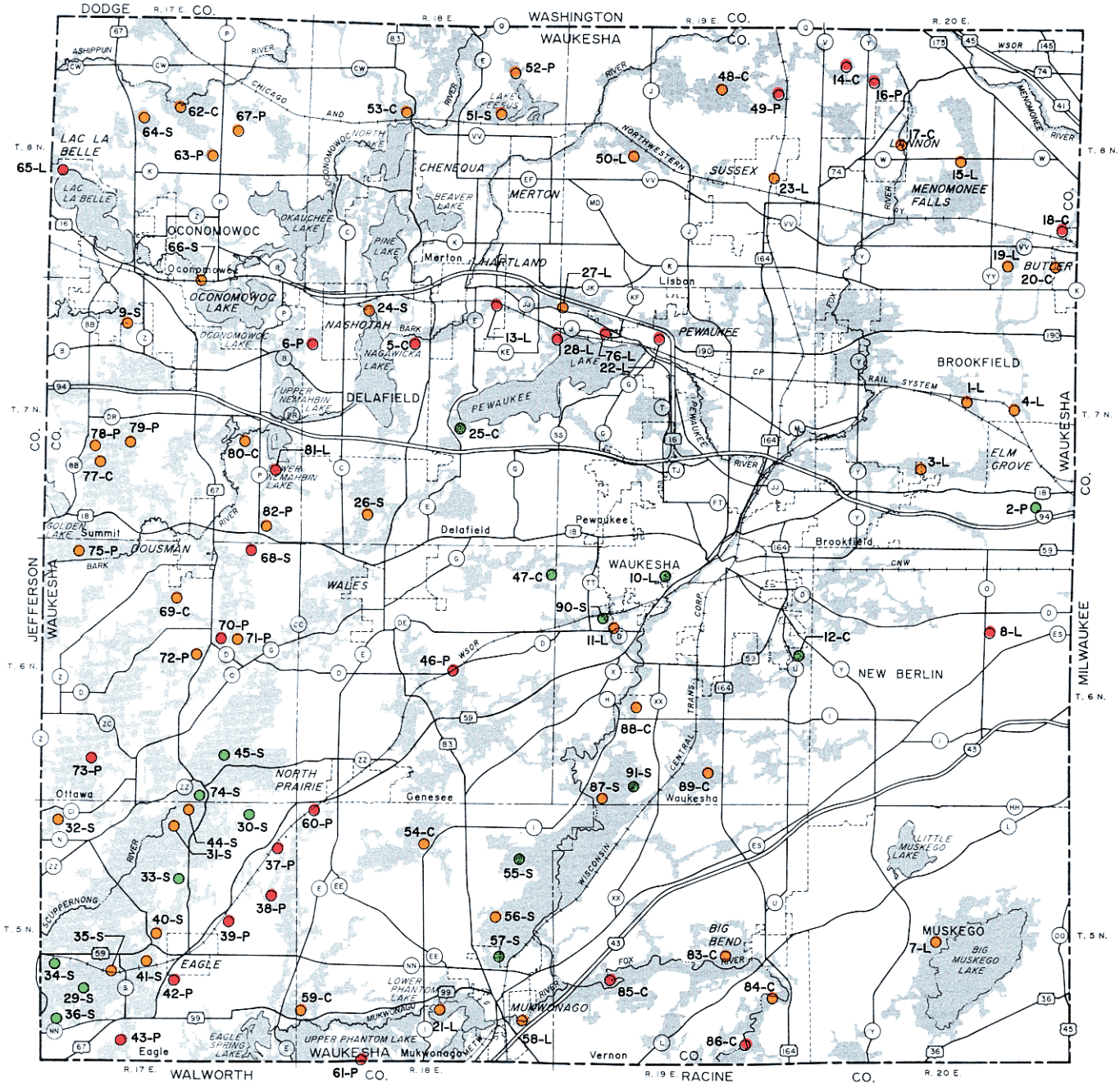
2. Wetland Regulation
As described in Chapter VII of this report, there are a number of Federal, State, and local wetland regulatory programs that have as their primary focus the preservation and protection of wetlands. It is recommended that the agencies and units of government responsible for the conduct of these wetland regulatory programs appropriately reflect in the conduct of activities under such programs the results of this study, including the need to preserve and protect many of the identified Natural Areas and Critical Species Habitat sites. The existence of known Natural Areas and Critical Species Habitat sites can become an important factor in the making of regulatory decisions attendant to land disturbance activities within wetlands. It is recommended that those regulatory decisions be made in a manner consistent with the recommendations of this plan.

3. State Regulation of Sanitary Sewer Extensions and Sewage Disposal Systems
All new increments of urban development in the Region rely upon some form of sewage disposal system. In many cases, such new increments of urban development are served by extensions of public sanitary sewer systems. In other cases, the new development is served by one of several types of onsite sewage disposal systems, including sewage holding tanks. In all cases, there is State regulation and oversight of county and local government activities to extend sanitary sewers or permit private sewage disposal systems. It is recommended that the Wisconsin Department of Natural Resources take the lead in reviewing and, as may be necessary, seeking modifications to State legislation and administrative rules to ensure that State agency actions attendant to the approval of sanitary sewer extensions or private sewage disposal systems do not result in the destruction of those Natural Areas and Critical Species Habitat sites recommended for protection and preservation in this plan.

4. Recognition of Natural Areas in County and Local Planning and Regulation
County and local governments in the Region carry out detailed planning and regulatory activities that can help implement the plan

Map 63

RECOMMENDED ACQUISITION AND OWNERSHIP OF SELECTED NATURAL AREA SITES OF COUNTYWIDE OR REGIONAL (NA-2) OR LOCAL (NA-3) SIGNIFICANCE IN WAUKESHA COUNTY



LEGEND

NATURAL AREA SITES

- NA-2 OR NA-3 SITE ALREADY FULLY UNDER PROTECTIVE OWNERSHIP (16)
- NA-2 OR NA-3 SITE PARTIALLY UNDER PROTECTIVE OWNERSHIP-RECOMMENDED TO BE EXPANDED (49)
- NA-2 OR NA-3 SITE RECOMMENDED TO BE ACQUIRED FOR PROTECTIVE OWNERSHIP (26)

RECOMMENDED OWNERSHIP

S	STATE GOVERNMENT (26)
C	COUNTY GOVERNMENT (22)
L	LOCAL GOVERNMENT (20)
P	PRIVATE CONSERVANCY ORGANIZATION (23)
23	REFERENCE NUMBER (SEE TABLE 118)
	PRIMARY ENVIRONMENTAL CORRIDORS

GRAPHIC SCALE
0 1 2 MILES
0 4000 8000 12000 16000 FEET

A total of 91 Natural Area sites of NA-2 or NA-3 quality identified in Waukesha County are recommended for protective ownership. The recommended agency for acquisition in each case relates to several factors, including prior partial ownership, recommendations made in adopted park and open space plans, and established Wisconsin Department of Natural Resources project boundaries.

Source: SEWRPC.

Table 119

NATURAL AREA SITES OF LOCAL (NA-3) SIGNIFICANCE IN THE SOUTHEASTERN WISCONSIN REGION NOT PROPOSED TO BE ACQUIRED FOR PROTECTIVE OWNERSHIP

County	Site Identification				Site Area (acres)
	Reference Number on Map 64	Civil Division	Name	Natural Area Class	
Kenosha	None	--	--	--	--
Milwaukee	1	City of Franklin	Mission Hills Wetlands	NA-3	38
	2	City of Franklin	Ryan Creek Woods	NA-3	87
	3	City of Wauwatosa	Harley-Davidson Woods	NA-3	11
	Subtotal	--	--	--	136
Ozaukee	4	City of Mequon	Solar Heights Low Woods	NA-3	114
	5	City of Mequon	Triple Woods	NA-3	51
	6	City of Mequon	Mequon Wetland	NA-3	77
	7	Town of Belgium	Belgium Swamp—North	NA-3	150
	8	Town of Belgium	Belgium Swamp—South	NA-3	148
	9	Town of Port Washington	Hawthorn Drive Forest	NA-3	54
	Subtotal	--	--	--	594
Racine	10	Town of Raymond	Six Mile Road Swamp	NA-3	55
	Subtotal	--	--	--	55
Walworth	11	Town of LaGrange	Big Spring Road Prairie	NA-3	93
	12	Town of Richmond	Lake Loraine Woods—West	NA-3	86
	13	Town of Whitewater	Rock Shrub-Fen	NA-3	46
	Subtotal	--	--	--	225
Washington	14	Village of Germantown	Faber-Pribyl Woods	NA-3	39
	15	Town of Barton	Newark Road Wetland	NA-3	9
	16	Town of Jackson	Kowalske Swamp	NA-3	83
	17	Town of Jackson	Sherman Road Swamp	NA-3	96
	18	Town of Trenton	Schalla Tamarack Swamp	NA-3	16
	Subtotal	--	--	--	243
Waukesha	19	City of Muskego	Luther Parker Cemetery Prairie	NA-3	1
	20	Town of Pewaukee	Busse Woods	NA-3	40
	Subtotal	--	--	--	41
Region	Total	--	--	--	1,294

Source: SEWRPC.

Table 120

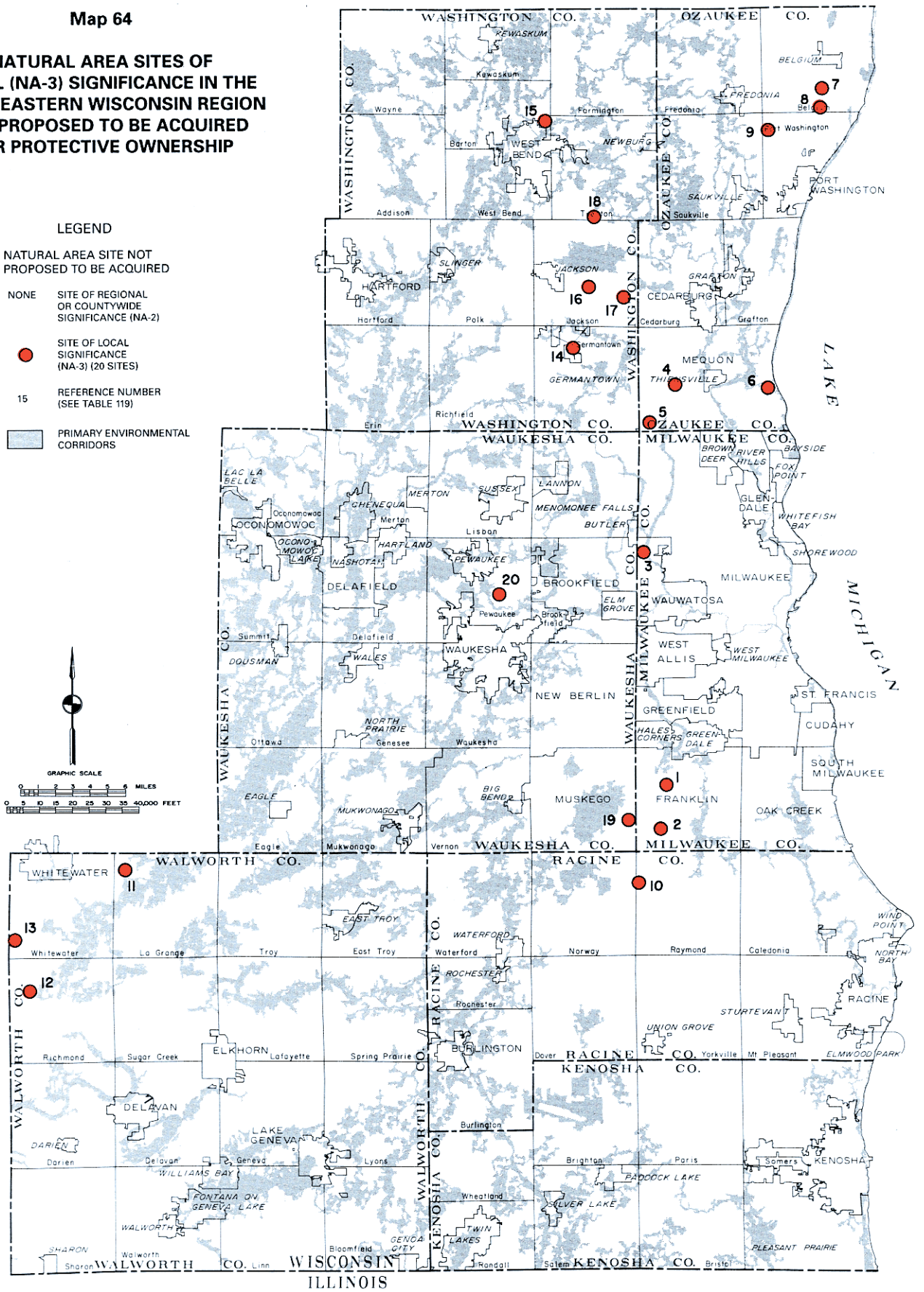
RELATIONSHIP BETWEEN LAND ACQUISITION RECOMMENDATIONS ATTENDANT TO NATURAL AREA SITES OF COUNTYWIDE OR REGIONAL (NA-2) OR LOCAL (NA-3) SIGNIFICANCE IN THE REGION AND PRIOR REGIONAL AND COUNTY PLANS AND ESTABLISHED PROJECT ACQUISITION AREAS

County	Total Land Area Proposed to Be Acquired (acres)	Prior Regional or County Plan Recommendation		Established Project Acquisition Areas	
		Land Area Proposed to Be Acquired (acres)	Percent of Total	Land Area Included in Project Area (acres)	Percent of Total
Kenosha	1,445	810	56	272	19
Milwaukee	635	479	75	--	--
Ozaukee	3,780	729	19	--	--
Racine	3,199	1,952	61	548	17
Walworth	4,009	2,378	59	960	24
Washington	8,688	2,982	34	1,377	16
Waukesha	5,863	5,863	100	656	11
Total	27,619	15,193	54	3,813	14

Source: SEWRPC.

Map 64

NATURAL AREA SITES OF LOCAL (NA-3) SIGNIFICANCE IN THE SOUTHEASTERN WISCONSIN REGION NOT PROPOSED TO BE ACQUIRED FOR PROTECTIVE OWNERSHIP



A total of 20 Natural Area sites identified in the Region are not proposed to be acquired for protective ownership. From a quality perspective, all 20 such sites are of local (NA-3) significance.

Source: SEWRPC.

Table 121

SUMMARY OF PROPOSED ACQUISITION OF LANDS TO PROTECT NATURAL AREA SITES OF COUNTYWIDE OR REGIONAL (NA-2) OR LOCAL (NA-3) SIGNIFICANCE IN THE SOUTHEASTERN WISCONSIN REGION BY COUNTY

County	Land Acquisition Responsibility	Land Area to Be Acquired		Estimated Cost	
		Acres	Percent of Total	Dollars[a]	Percent of Total
Kenosha	State Government	354	24	$ 201,800	17
	County Government	502	35	472,400	41
	Local Government	323	22	265,500	23
	Private Conservancy Organization	266	19	226,200	19
	Subtotal	1,445	100	$ 1,165,900	100
Milwaukee	State Government	--	--	--	--
	County Government	478	75	$ 500,400	65
	Local Government	157	25	263,700	35
	Private Conservancy Organization	--	--	--	--
	Subtotal	635	100	$ 764,100	100
Ozaukee	State Government	411	11	$ 556,900	11
	County Government	1,553	41	2,079,700	40
	Local Government	205	5	274,100	5
	Private Conservancy Organization	1,611	43	2,230,400	44
	Subtotal	3,780	100	$ 5,141,100	100
Racine	State Government	717	22	$ 678,000	17
	County Government	1,272	40	1,479,900	38
	Local Government	273	9	330,100	9
	Private Conservancy Organization	937	29	1,406,500	36
	Subtotal	3,199	100	$ 3,894,500	100
Walworth	State Government	1,477	37	$ 1,034,300	34
	County Government	704	18	604,800	20
	Local Government	74	1	82,000	3
	Private Conservancy Organization	1,754	44	1,301,000	43
	Subtotal	4,009	100	$ 3,022,100	100
Washington	State Government	2,700	31	$ 4,231,900	31
	County Government	2,964	34	4,565,000	34
	Local Government	795	9	1,229,200	9
	Private Conservancy Organization	2,229	26	3,449,900	26
	Subtotal	8,688	100	$13,476,000	100
Waukesha	State Government	699	12	$ 1,061,200	14
	County Government	2,002	34	2,536,300	33
	Local Government	2,170	37	2,174,800	28
	Private Conservancy Organization	992	17	1,908,800	25
	Subtotal	5,863	100	$ 7,681,100	100
Region	State Government	6,358	23	$ 7,764,100	22
	County Government	9,475	34	12,238,500	35
	Local Government	3,997	14	4,619,400	13
	Private Conservancy Organization	7,789	29	10,522,800	30
	Total	27,619	100	$35,144,800	100

[a] *All cost figures are expressed in constant 1994 dollars.*

Source: SEWRPC.

Table 122

LAND ACQUISITION PRIORITY 3: CRITICAL SPECIES HABITAT SITES IN THE SOUTHEASTERN WISCONSIN REGION LYING WHOLLY OR PARTLY OUTSIDE OF DESIGNATED NATURAL AREAS BUT WHICH EITHER LIE WITHIN PRIMARY ENVIRONMENTAL CORRIDORS OR WHICH ARE AT LEAST PARTLY UNDER PROTECTIVE OWNERSHIP

County	Site Identification			Site Area (acres)			Proposed Acquisition Agency	Acquisition of Site Recommended in a Prior Regional or County Plan	Formal Project Acquisition Area Established
	Reference Number on Map 65	Civil Division(s)	Name	Already under Protective Ownership[a]	Proposed to Be Acquired	Total			
Kenosha	1	City of Kenosha	Bradford School Woods	20	--	20	Kenosha Unified School District No. 1	No	No
	2	Village of Pleasant Prairie	Piela Property	--	5	5	Village of Pleasant Prairie	Yes	No
	3	Village of Pleasant Prairie	Barnes Creek	5	23	28	Village of Pleasant Prairie	Yes	No
	4	Village of Twin Lakes	Hamilton Woods	--	17	17	Village of Twin Lakes	No	No
	5	Town of Brighton	Bong State Recreation Area	4,894	246	5,140	Wisconsin Department of Natural Resources	No	No[b]
	6	Town of Brighton	Brighton-Dale Woods	164	--	164	Kenosha County	Yes	No
	7	Town of Brighton	Peterson Creek Wetland	--	100	100	Private conservancy organization	No	No
	8	Town of Salem	Wilmot Ski Hill Prairie	--	84	84	Private conservancy organization[c]	Portion[c]	No
	9	Town of Salem	Trevor Creek Wet Prairie	--	66	66	Private conservancy organization	No	No
	10	Town of Somers	Parkside Woods	14	--	14	University of Wisconsin	No	No
	11	Town of Wheatland	Unnamed wetland	--	36	36	Private conservancy organization	No	No
	Subtotal	--	--	5,097	577	5,674	--	--	--
Milwaukee	12	City of Cudahy	Warnimont Park Woods	24	--	24	Milwaukee County	Yes	No
	13	City of Milwaukee	Cambridge Avenue Woods	12	--	12	Milwaukee County	Yes	No
	14	City of Milwaukee	Stadium Bluff Woods	8	--	8	Wisconsin Department of Natural Resources[d]	No	No
	15	City of Oak Creek	PPG Woods	--	19	19	City of Oak Creek	No	No
	16	City of Oak Creek	Bender Park Woods and Clay Banks	13	--	13	Milwaukee County	Yes	No
	17	City of Oak Creek	Bender Park Woods—South	4	--	4	Milwaukee County	Yes	Yes
	18	City of Wauwatosa	Underwood Parkway Woods	19	--	19	Milwaukee County	Yes	No
	19	Village of Fox Point	Fox Point Clay Bluffs	--	86	86	Private conservancy organization	No	No
	Subtotal	--	--	80	105	185	--	--	--
Ozaukee	20	City of Mequon	Pecard Sedge Meadow	--	13	13	City of Mequon	No	No
	21	City of Mequon	Eastbrook Road Woods	--	8	8	City of Mequon	No	No
	22	Town of Belgium	Harrington Beach State Park Old Fields	202[e]	--	202[e]	Wisconsin Department of Natural Resources	Yes	Yes
	23	Town of Port Washington	Sauk Creek Nature Preserve	22	--	22	Ozaukee Land Trust	No	No
	Subtotal	--	--	224	21	245	--	--	--
Racine	24	City of Racine	Washington Park Woods	12	--	12	City of Racine	No	No
	25	City of Racine	Pritchard Park Woods	9	--	9	Racine County	Yes	Yes
	26	Village of Wind Point	Wind Point	4	--	4	City of Racine	No	No
	27	Town of Burlington	Burlington Crevasse Filling	--	23	23	Private conservancy organization	No	No
	28	Town of Burlington	Mergis Wildlife Area	34	--	34	Wisconsin Department of Natural Resources	Yes	No
	29	Town of Burlington	Ranger Mac Fen	26	2	28	University of Wisconsin-Parkside	No	No
	30	Town of Burlington	Karcher Sedge-Carr	214	21	235	Wisconsin Department of Natural Resources	Yes	Yes
	31	Town of Caledonia	River Meadow Woods	--	13	13	Racine County	Yes	Yes
	32	Town of Caledonia	Forked Aster Site	--	18	18	Racine County	Yes	Yes
	33	Town of Caledonia	Caledonia Sanitary Sewer Right-of-Way	13	62	75	Racine County	Yes	Yes
	34	Town of Caledonia	Caledonia Site South	--[f]	--[f]	--[f]	Racine County	Yes	Yes

Table 122 (continued)

County	Site Identification			Site Area (acres)			Proposed Acquisition Agency	Acquisition of Site Recommended in a Prior Regional or County Plan	Formal Project Acquisition Area Established
	Reference Number on Map 65	Civil Division(s)	Name	Already under Protective Ownership[a]	Proposed to Be Acquired	Total			
Racine (continued)	35	Town of Caledonia	Root River Bluff	18	24	42	Racine County	Yes	Yes
	36	Town of Caledonia	Hoods Creek Swamp	--	20	20	Town of Caledonia	No	No
	37	Town of Caledonia	Breakers Woods	--	5	5	Private conservancy organization	No	No
	38	Town of Caledonia	Dominican Ravine	--	16	16	Private conservancy organization	No	No
	39	Town of Caledonia	North Bay Ravine and Beach	--	4	4	Private conservancy organization	No	No
	40	Town of Caledonia	Four Mile Road Woods	--	30	30	Racine County	Yes	Yes
	41	Town of Caledonia	Caledonia Low Woods	20	9	29	Racine County	Yes	Yes
	42	Town of Caledonia	River Bend Upland Woods	13	--	13	Racine County	No	No
	43	Town of Caledonia	Root River Strip Woods	10	--	10	Racine County	Yes	Yes
	44	Town of Caledonia	Cliffside Park Old Field	5[g]	--	5[g]	Racine County	Yes	No
	45	Town of Norway	Erwin Wetlands	--	2	2	Wind Lake District	Yes[h]	No
	46	Town of Norway	Patzke Fen	--	50	50	Racine County	Yes[h]	No
	47	Town of Norway	Krieser Fen	--	2	2	Wind Lake District	Yes[h]	No
	48	Town of Norway	Landon Wetland	--	11	11	Wind Lake District	Yes[h]	No
	49	Town of Norway	Wind Lake	22	33	55	Wind Lake District[i]	Yes[h]	No
	50	Town of Norway	Waubeesee Lake	--	14	14	Waubeesee Lake Association	Yes	No
	51	Town of Rochester	Ela Park Dry Prairie	16	--	16	Racine County	Yes	No
	52	Town of Rochester	Ela Park Woods	58	--	58	Racine County	Yes	No
	Subtotal	--	--	474	359	833	--	--	--
Walworth	53	Town of Bloomfield	Section Five Marsh and Pond	--	18	18	Private conservancy organization	No	No
	54	Town of Bloomfield	Swift Lake Wetland	--	10	10	Private conservancy organization	No	No
	55	Town of Geneva	Elkhorn Railroad Prairie Remnant	1	--	1	Wisconsin Department of Transportation[j]	No	No
	56	Town of LaFayette	Sugar Creek Woods—North	--	190	190	Walworth County	Portion[k]	Portion[k]
	57	Town of LaFayette	Sugar Creek Wet Woods	--	34	34	Walworth County	Yes	Yes
	58	Town of LaFayette	Sugar Creek Woods—South	--	122	122	Walworth County	Yes	Yes
	59	Town of LaFayette	Abells Corners Fen	--	2	2	Walworth County	Yes	No
	60	Town of LaGrange	LaGrange Campground	200	--	200	Wisconsin Department of Natural Resources	Yes	Yes
	61	Town of LaGrange	Lauderdale Lakes Woods	--	45	45	Lauderdale Lakes Lake Management District	No	No
	62	Town of Lyons	Radio Station Wetland	--	30	30	Private conservancy organization	No	No
	63	Town of Lyons	Peterson Property	--	50	50	Private conservancy organization	No	No
	64	Town of Richmond	Lake Number 10 Open Woods	--	44	44	Wisconsin Department of Natural Resources	Yes	No
	65	Town of Richmond	Island Road Shrub-Carr	--	64	64	Wisconsin Department of Natural Resources	No	No
	66	Town of Richmond	Unnamed wetland	20	2	22	Private conservancy organization	No	No
	67	Town of Sharon	Railroad Lowland	43	17	60	Wisconsin Department of Natural Resources	No	No
	68	Town of Spring Prairie	Hargraves Road Sedge Meadow	--	45	45	Walworth County	No	No
	69	Town of Troy	Camp Timberlee	--	65	65	Private conservancy organization	No	No

Table 122 (continued)

County	Site Identification			Site Area (acres)			Proposed Acquisition Agency	Acquisition of Site Recommended in a Prior Regional or County Plan	Formal Project Acquisition Area Established
	Reference Number on Map 65	Civil Division(s)	Name	Already under Protective Ownership[g]	Proposed to Be Acquired	Total			
Walworth (continued)	70	Town of Troy	Doyles Lake Prairies	--	200	200	Private conservancy organization	No	No
	71	Town of Troy	Harmony Hills Savanna	--	70	70	Private conservancy organization	No	No
	Subtotal	--	--	264	1,008	1,272	--	--	--
Washington	72	City of West Bend	High School Woods	7	--	7	West Bend School District	No	No
	73	Village of Jackson	Jackson Woods	3	21	24	Village of Jackson	No	No
	74	Town of Addison	St. Anthony Maple Woods	--	90	90	Wisconsin Department of Natural Resources	No	No
	75	Town of Addison	Doll Woods	--	22	22	Town of Addison	No	No
	76	Town of Hartford	Unnamed wetland	--	40	40	Village of Slinger	No	No
	77	Town of Trenton	Cameron Property	--	12	12	City of West Bend	Yes	No
	78	Town of West Bend	Gilbert Lake	--[l]	10[l]	10[l]	Cedar Lake Conservation Foundation	Yes	No
	79	Town of West Bend	Silver Lake	--	7	7	City of West Bend	No	No
	80	Town of West Bend	Silver Lake Swamp	--	10	10	City of West Bend	No	No
	Subtotal	--	--	10	212	222	--	--	--
Waukesha[m]	81	City of Delafield	Nagawicka Lake	--[n]	22[n]	22[n]	Waukesha Land Conservancy	Yes	No
	82	City of Muskego	Denoon Lake	--	30	30	City of Muskego	Yes	No
	83	City of New Berlin	Delopst Meadow	--	24	24	City of New Berlin	Yes	No
	84	City of New Berlin	Kostello Property	--	12	12	City of New Berlin	Yes	No
	85	Village of Dousman	Dousman Mill Pond	--	2	2	Village of Dousman	Yes	No
	86	Village of Menomonee Falls	Ranch Woods	--	4	4	Waukesha County	Yes	No
	87	Village of Menomonee Falls	Fox River Woods	2	20	22	Waukesha County	Yes	No
	88	Town of Eagle	Shelter Two Ridge	4	--	4	Wisconsin Department of Natural Resources	Yes	Yes
	89	Town of Eagle	Holtz Oak Opening	--	94	94	Private conservancy organization	Yes	No
	90	Town of Eagle	Mounded Fen	16	--	16	Wisconsin Department of Natural Resources	Yes	Yes
	91	Town of Eagle	Paradise Springs Brook	24	--	24	Wisconsin Department of Natural Resources	Yes	Yes
	92	Town of Eagle	Old World Wisconsin Marsh	30	--	30	Wisconsin Department of Natural Resources	Yes	Yes
	93	Town of Eagle	Headquarters Grasslands	28	--	28	Wisconsin Department of Natural Resources	Yes	Yes
	94	Town of Mukwonago	Mukwonago Park Oak Opening	28	--	28[o]	Waukesha County	Yes	No
	95	Town of Mukwonago	Romanowski Fen	--	8	8	Waukesha County	Yes	Yes
	96	Town of Mukwonago	Spring Lake Woods	--	14	14	Private conservancy organization	Yes	No
	97	Town of Oconomowoc	Stonebank Tamarack Relict	28	138	166	Private conservancy organization	Yes	No
	98	Town of Ottawa	Utica Lake Tamaracks	--	35	35	Waukesha County	Yes	No
	99	Town of Ottawa	Dog Trial Area	175	--	175	Wisconsin Department of Natural Resources	Yes	Yes
	100	Town of Ottawa	School Section Lake		12	12	Private conservancy organization	Yes	No
	101	Town of Ottawa	Unnamed shrub-grassland	328	12	340	Wisconsin Department of Natural Resources	Yes	Yes
	102	Town of Ottawa	Unnamed low woods-thicket	12	176	188	Private conservancy organization	Yes	No

Table 122 (continued)

County	Site Identification			Site Area (acres)			Proposed Acquisition Agency	Acquisition of Site Recommended in a Prior Regional or County Plan	Formal Project Acquisition Area Established
	Reference Number on Map 65	Civil Division(s)	Name	Already under Protective Ownership[a]	Proposed to Be Acquired	Total			
Waukesha[m] (continued)	103	Town of Ottawa	Lurvey Tamaracks	..[p]	..[p]	..[p]	Private conservancy organization	Yes	No
	104	Town of Pewaukee	Meadowbrook Prairie	14	--	14	Lake Pewaukee Sanitary District	Yes	No
	105	Town of Summit	Dousman Road Low Woods	--	3	3	Private conservancy organization	Yes	No
	106	Town of Summit	Massaro Woods	--	12	12	Private conservancy organization	Yes	No
	107	Town of Summit	Genesee Lake Road Tamaracks	--	110	110	Private conservancy organization	Yes	No
	108	Town of Summit	Duck Lake	--	30	30	Private conservancy organization	Yes	No
	109	Town of Vernon Town of Mukwonago	Vernon Marsh	2,861	707	3,568	Wisconsin Department of Natural Resources	Yes	Yes
	110	Town of Vernon	Pheasant Hill Woods	--	24	24	Private conservancy organization	Yes	No
	Subtotal	--	--	3,550	1,489	5,039	--	--	--
Region	Total	--	--	9,699	3,771	13,470	--	--	--

[a] *Based on 1994 data.*

[b] *The 4,894 acres of this habitat site under existing protective ownership are within the adopted project boundary for the Bong State Recreation Area. The remaining 246 acres are adjacent to, but currently outside, the adopted project boundary.*

[c] *It is recommended that a local conservation group enter into a cooperative agreement with the owners of the Wilmot Ski Area to manage the Critical Species Habitat. The Kenosha County park and open space plan recommends that the County acquire about 12 acres of this site. The subject 12 acres had been identified as a natural area in an earlier inventory.*

[d] *This site is owned by the U. S. Department of Veterans Affairs. It is recommended that the Wisconsin Department of Natural Resources assume responsibility for acquiring and managing the site should the Department of Veterans Affairs ever dispose of the site.*

[e] *Does not include 178 acres of this Critical Species Habitat site located within the Harrington Beach Lacustrine Forest Natural Area (see Table 114).*

[f] *The Caledonia Site South Critical Species Habitat site is located entirely within the Caledonia Sanitary Sewer Right-of-Way Critical Species Habitat site.*

[g] *Does not include 55 acres of this Critical Species Habitat site located within the Cliffside Park Woods and Clay Banks Natural Area (see Table 115).*

[h] *Acquisition of this site is recommended in SEWRPC Community Assistance Planning Report No. 215, An Environmentally Sensitive Lands Preservation Plan for the Town of Norway Sanitary District No. 1, Racine County, Wisconsin, June 1996, which was approved in early 1996 by the SEWRPC Technical Coordinating and Advisory Committee overseeing preparation of the plan documented therein.*

[i] *The 22 acres currently under protective ownership are owned by the Wisconsin Department of Natural Resources. The remaining 33 acres are recommended to be acquired by the Wind Lake District.*

[j] *The railway right-of-way is currently owned by the Wisconsin Department of Transportation. It is proposed that a local conservation group enter into a cooperative agreement with the Department to manage this Critical Species Habitat site.*

[k] *The Walworth County park and open space plan recommends that 32 acres of this site be acquired for a new major County park.*

[l] *Does not include 100 acres of this Critical Species Habitat site located within the Gilbert Lake Tamarack Swamp Natural Area (see Table 117).*

[m] *Acquisition of Critical Species Habitat sites in Waukesha County has been recommended in the park and open space plan element of the Waukesha County development plan. That plan was adopted by the Waukesha County Board of Supervisors in November 1996.*

[n] *Does not include 156 acres of this Critical Species Habitat site located within the Nagawicka Lake Bog and Oak Woods Natural Area (see Table 118).*

[o] *An additional 50 acres of this site, consisting of developed residential lots, should remain in private ownership and be protected through public land use regulation.*

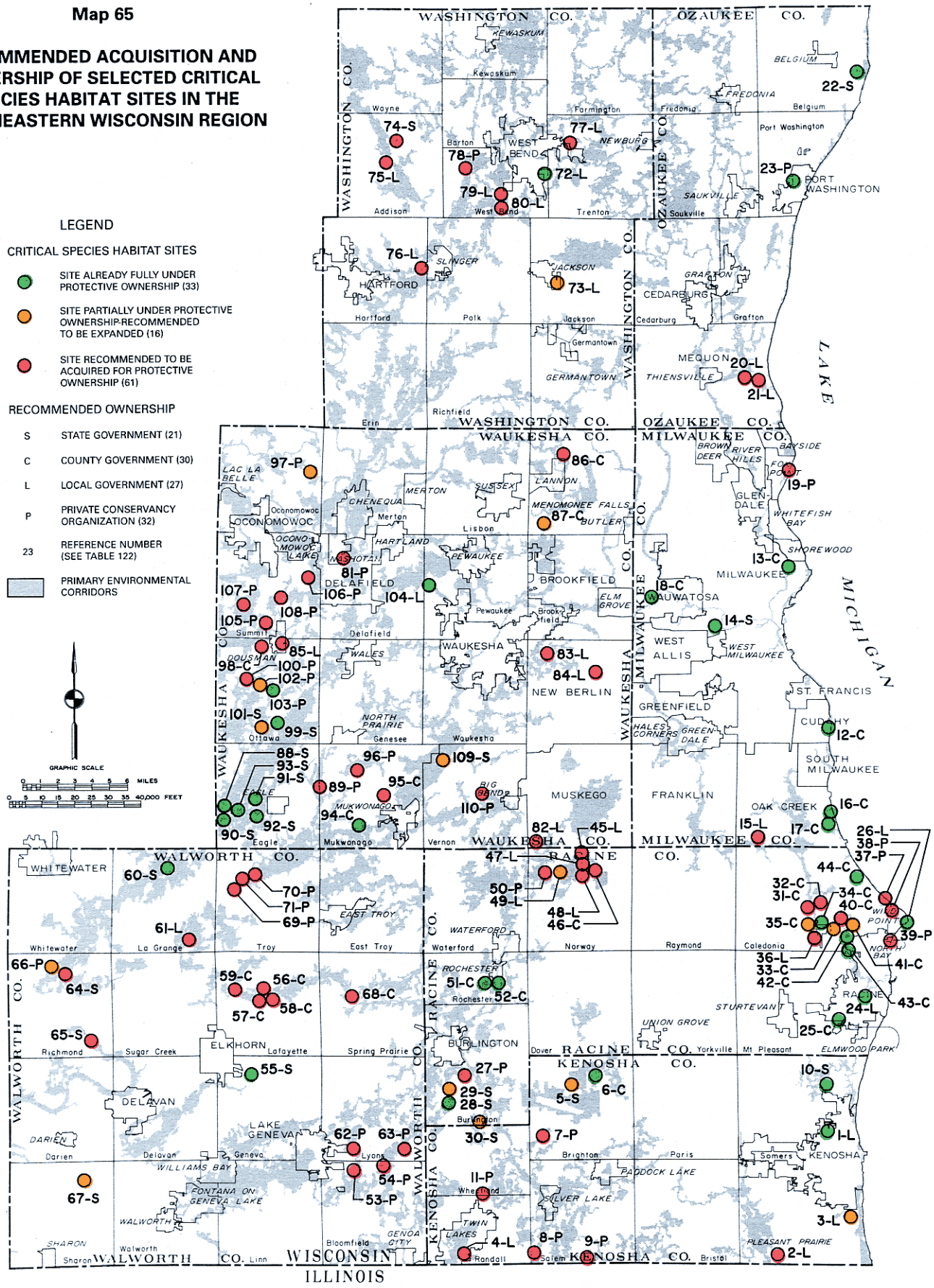
[p] *The Lurvey Tamaracks site is located within the unnamed low woods-thicket Critical Species Habitat site located in the Town of Ottawa.*

Source: SEWRPC.

recommendations attendant to the preservation and protection of Natural Areas and Critical Species Habitat sites. It is recommended that county and local governments use this plan in the review of proposed development projects. More particularly, it is recommended that as county and local governments prepare detailed land use and other development plans, such plans take into account and properly reflect the recommendations set forth herein attendant to the preservation and protection of Natural Areas and Critical Species Habitat sites. It is further recommended that county and local govern-

Map 65

RECOMMENDED ACQUISITION AND OWNERSHIP OF SELECTED CRITICAL SPECIES HABITAT SITES IN THE SOUTHEASTERN WISCONSIN REGION



Critical Species Habitat sites represent known locations of endangered, threatened, or rare plant or animal species, or a combination thereof, that lie outside of Natural Area boundaries. A total of 110 Critical Species Habitat sites are recommended for protection. The recommended agency for acquisition in each case relates to several factors, including prior partial ownership, recommendations made in adopted park and open space plans, and established Wisconsin Department of Natural Resources project boundaries.

Source: SEWRPC.

Table 123

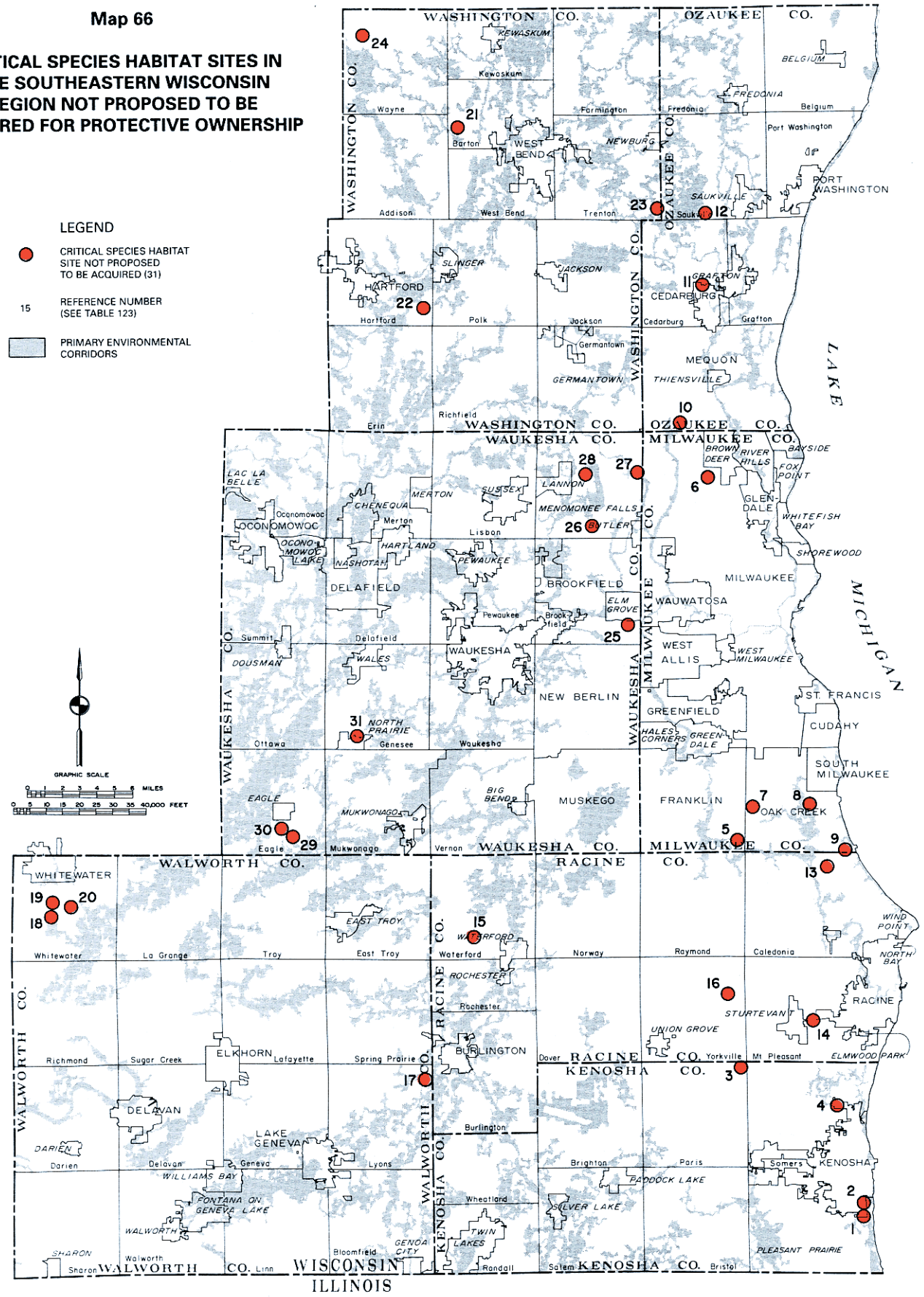
CRITICAL SPECIES HABITAT SITES IN THE SOUTHEASTERN WISCONSIN REGION NOT PROPOSED TO BE ACQUIRED FOR PROTECTIVE OWNERSHIP

County	Site Identification			Site Area (acres)
	Reference Number on Map 66	Civil Division	Name	
Kenosha	1	Village of Pleasant Prairie	Martin Band Parcel	9
	2	Village of Pleasant Prairie	Nedweski Parcel	14
	3	Town of Paris	Poisl Woods	79
	4	Town of Somers	Thompson Woods	7
	Subtotal	--	--	109
Milwaukee	5	City of Franklin	Elm Road Woods—North	19
	6	City of Milwaukee	Brynwood Country Club	7
	7	City of Oak Creek	Meyers Woods	18
	8	City of Oak Creek	Fittshur Wetland	6
	9	City of Oak Creek	Oak Creek Power Plant Woods	16
	Subtotal	--	--	66
Ozaukee	10	City of Mequon	Stauss Woods	7
	11	Town of Cedarburg	Cedarburg Woods—West	4
	12	Town of Saukville	Cedar-Sauk Upland Woods	38
	Subtotal	--	--	49
Racine	13	Town of Caledonia	Sherwood Property	3
	14	Town of Mt. Pleasant	Waxdale Railroad Prairie	2
	15	Town of Waterford	Maple Road Gravel Pit	106
	16	Town of Yorkville	Ives Grove Prairie Remnant	1
	Subtotal	--	--	112
Walworth	17	Town of Lyons	White River Railroad Prairie	22
	18	Town of Whitewater	Mills Road Prairie	1
	19	Town of Whitewater	Anderson Road	1
	20	Town of Whitewater	Island Road Prairie	1
	Subtotal	--	--	25
Washington	21	Town of Barton	Riesch Woods	34
	22	Town of Hartford	Unnamed wetland	17
	23	Town of Trenton	Fechters Woods	6
	24	Town of Wayne	Unnamed wetland	53
	Subtotal	--	--	110
Waukesha	25	Village of Elm Grove	Elm Grove Road Pond	7
	26	Village of Menomonee Falls	Glass-Glick Woods	2
	27	Village of Menomonee Falls	Heritage Woods	12
	28	Village of Menomonee Falls	Rozik Woods	30
	29	Town of Eagle	Eagle Dump Oak Opening	75
	30	Town of Eagle	Domon Prairie Remnant	1
	31	Town of Genesee	Unnamed wetland	50
	Subtotal	--	--	177
Region	Total	--	--	648

Source: SEWRPC.

Map 66

CRITICAL SPECIES HABITAT SITES IN THE SOUTHEASTERN WISCONSIN REGION NOT PROPOSED TO BE ACQUIRED FOR PROTECTIVE OWNERSHIP



Critical Species Habitat sites represent known locations of endangered, threatened, or rare plant or animal species, or a combination thereof, that lie outside of Natural Area boundaries. A total of 31 Critical Species Habitat sites do not meet the criteria for acquisition for protective ownership; that is, they neither occur in any primary environmental corridor, nor are they under at least partial protective ownership.

Source: SEWRPC.

Table 124

RELATIONSHIP BETWEEN LAND ACQUISITION RECOMMENDATIONS ATTENDANT TO CRITICAL SPECIES HABITAT SITES IN THE REGION AND PRIOR REGIONAL AND COUNTY PLANS AND ESTABLISHED PROJECT ACQUISITION AREAS

County	Total Land Area Proposed to Be Acquired (acres)	Prior Regional or County Plan Recommendation		Established Project Acquisition Areas	
		Land Area Proposed to Be Acquired (acres)	Percent of Total	Land Area Included in Project Area (acres)	Percent of Total
Kenosha	577	45	8	--	--
Milwaukee	105	--	--	--	--
Ozaukee	21	--	--	--	--
Racine	359	289	81	177	49
Walworth	1,008	234	23	188	19
Washington	212	22	10	--	--
Waukesha	1,489	1,489	100	727	49
Total	3,771	2,079	55	1,092	29

Source: SEWRPC.

ments review their zoning and land subdivision control ordinances with a view toward amending those ordinances as may be appropriate to help preserve and protect Natural Areas and Critical Species Habitat sites.

Land Management Plan Element

The first two steps in preserving natural areas and their component communities, species, and ecological processes are the identification of the natural areas and then their protection through public or private acquisition and the exercise of land use controls. These two steps alone, however, will not assure the perpetuation of the natural attributes of the sites concerned. Merely leaving a site undisturbed may not be sufficient to ensure the long-term survival of the species and communities that exist there. The basic ecological processes that have helped shape natural areas have often been disrupted by human activity—if not in the areas concerned, then in the environs of those areas. For example, prairies and savannas cannot be preserved while excluding the operation of such natural forces as fire and occasional grazing under which those types of natural areas developed. Without proper management, natural areas may be significantly altered over time, with the resultant loss of natural values. Therefore, the areas must be managed to ensure that native species and natural communities can flourish.

Overview of Management Activities: The management of natural areas and associated habitats may be defined as any activity directed toward maintaining a given condition in the plant or animal populations concerned or in their habitats in accordance with a preservation plan. Management is intended to allow natural processes to function as fully as possible and to minimize the impacts of human-induced changes. Management should thus, ideally, restore and maintain conditions that will assure the long-term preservation of native species and communities. Human influence has interrupted many of the natural processes which, from a human perspective, may seem to be destructive, but are, in fact, vital forces in the formation and continuation of natural communities. For example, natural flooding of wetlands reduces the density of trees and shrubs. Where a regular flooding regime has been controlled by artificial structures such as dams, ditches, and dikes, the absence of the regime may lead to wetlands overgrown with woody plants, frequently including exotic species. Naturally fluctuating water levels may aid plant reproduction in wetlands, but excessive water manipulation may destroy natural vegetation.

Many pre-European-settlement communities in Southeastern Wisconsin, particularly prairies and oak savannas, but also other community types, such as open oak woods and fens, were subject to a

Table 125

SUMMARY OF PROPOSED ACQUISITION OF LANDS TO PROTECT CRITICAL SPECIES HABITAT SITES LYING WHOLLY OR PARTLY OUTSIDE OF DESIGNATED NATURAL AREAS IN THE SOUTHEASTERN WISCONSIN REGION BY COUNTY

County	Land Acquisition Responsibility	Land Area to Be Acquired		Estimated Cost	
		Acres	Percent of Total	Dollars[a]	Percent of Total
Kenosha	State Government	246	42	$ 319,800	63
	County Government	--	--	--	--
	Local Government	45	8	46,900	9
	Private Conservancy Organization	286	50	143,000	28
	Subtotal	577	100	$ 509,700	100
Milwaukee	State Government	--	--	--	--
	County Government	--	--	--	--
	Local Government	19	18	$ 28,500	16
	Private Conservancy Organization	86	82	146,000	84
	Subtotal	105	100	$ 174,500	100
Ozaukee	State Government	--	--	--	--
	County Government	--	--	--	--
	Local Government	21	100	$ 26,800	100
	Private Conservancy Organization	--	--	--	--
	Subtotal	21	100	$ 26,800	100
Racine	State Government	23	6	$ 18,400	4
	County Government	206	57	271,300	63
	Local Government	68	19	62,400	15
	Private Conservancy Organization	62	18	78,700	18
	Subtotal	359	100	$ 430,800	100
Walworth	State Government	125	12	$ 89,600	9
	County Government	393	39	455,000	45
	Local Government	45	4	50,000	5
	Private Conservancy Organization	445	45	419,500	41
	Subtotal	1,008	100	$1,014,100	100
Washington	State Government	90	42	$ 180,000	52
	County Government	--	--	--	--
	Local Government	112	53	154,100	45
	Private Conservancy Organization	10	5	12,000	3
	Subtotal	212	100	$ 346,100	100
Waukesha	State Government	719	48	$ 581,200	33
	County Government	67	4	111,700	6
	Local Government	68	5	64,200	4
	Private Conservancy Organization	635	43	1,006,400	57
	Subtotal	1,489	100	$1,763,500	100
Region	State Government	1,203	32	$1,189,400	28
	County Government	666	17	838,000	20
	Local Government	378	10	432,900	10
	Private Conservancy Organization	1,524	41	1,805,600	42
	Total	3,771	100	$4,265,500	100

[a] *All cost figures are expressed in constant 1994 dollars.*

Source: SEWRPC.

Table 126

SUMMARY OF SITES RECOMMENDED TO HELP REESTABLISH RELATIVELY LARGE TRACTS OF GRASSLANDS AND FOREST INTERIORS IN THE SOUTHEASTERN WISCONSIN REGION

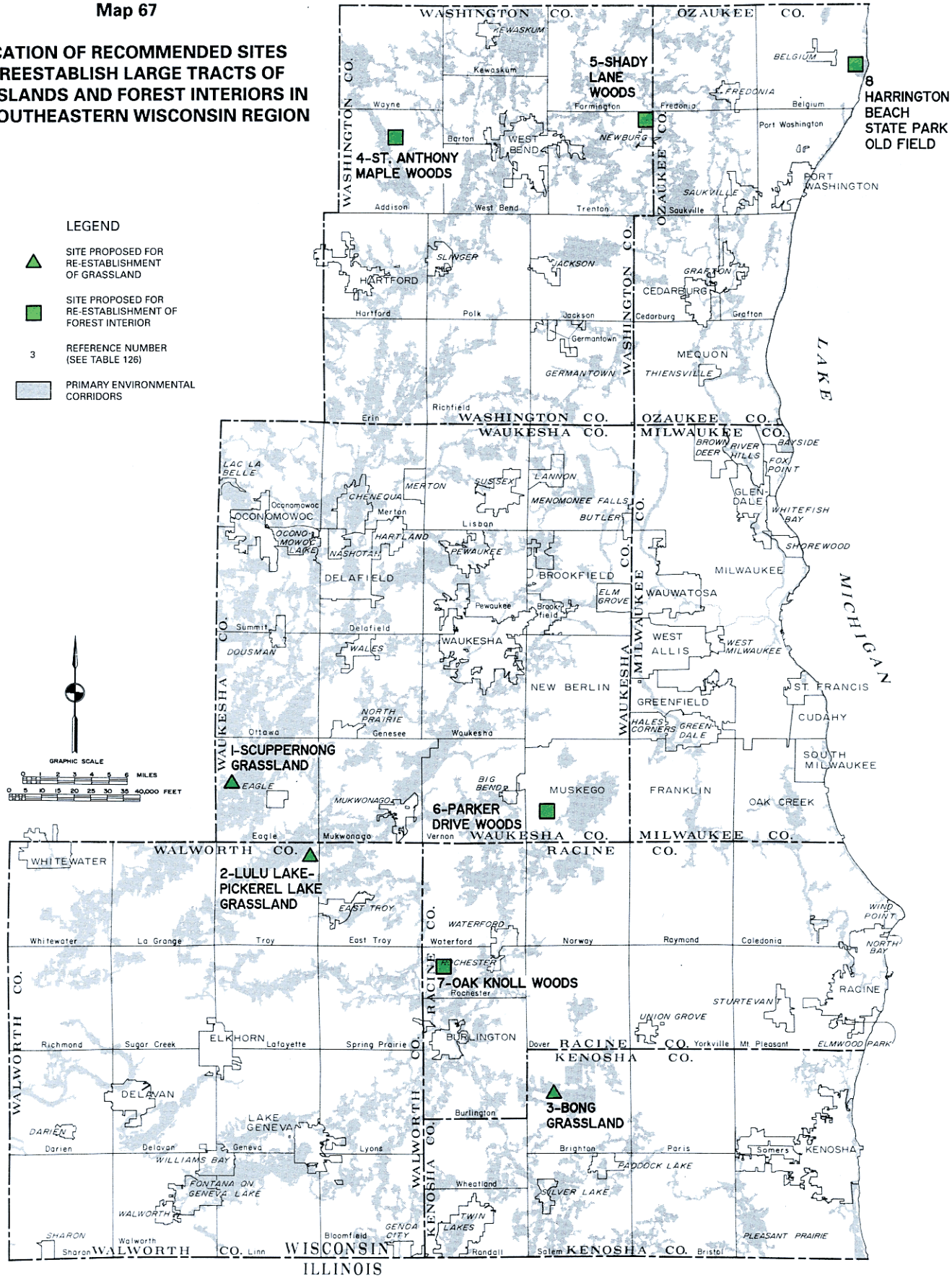
Site Category	Site Identification			Site Area (acres)	Relationship of Site to Inventoried Natural Areas or Critical Species Habitat Sites	Relationship of Site to Already Protectively Owned Lands or Already Established Project Boundaries	Proposed Acquisition Agency	Acquisition Cost[a]
	Reference Number on Map 67	Civil Division	Name					
Grasslands	1	Town of Eagle	Scuppernong	2,115	This site encompasses the entirety of three previously inventoried sites: 1) the Scuppernong Prairie State Natural Area site of statewide significance (572 acres); 2) the Paradise Springs Brook Critical Species Habitat site (24 acres); and 3) the Headquarters Grasslands Critical Species Habitat site (28 acres). Thus, a total of 624 acres, or about 30 percent, of this proposed large grassland site has already been recommended for preservation and protection. The remaining 1,491 acres of this site represent additional lands either already acquired or proposed to be acquired	This entire site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest. The Wisconsin Department of Natural Resources already owns 1,532 acres, or 72 percent, of the entire site	Wisconsin Department of Natural Resources	$1,784,000
	2	Town of Troy	Lulu Lake-Pickerel Lake	1,530	This site is adjacent to, but does not contain, inventoried Natural Areas or Critical Species Habitat sites	About 455 acres, or 30 percent, of this site lies within either the Lulu Lake State Natural Area project boundary established by the Wisconsin Department of Natural Resources, or within the Lulu Lake Natural Area-Pickerel Lake Fen project boundary established by The Nature Conservancy. The Wisconsin Department of Natural Resources and The Nature Conservancy together now own a total of 265 acres, or 17 percent of the entire site	Wisconsin Department of Natural Resources	$2,277,000
	3	Town of Brighton	Bong	10,000	Nearly 50 percent of this site, or 4,780 acres, consists of the great majority of the previously inventoried Bong State Recreation Area Critical Species Habitat site	About one-half of this site is publicly owned, lying within the Bong State Recreation Area and the Kenosha and Salem School Forest properties. The remaining acreage would be protected through management agreements with private landowners	Wisconsin Department of Natural Resources	--
Forest Interiors	4	Town of Addison	St. Anthony Maple Woods	160	This site encompasses the entirety of the St. Anthony Maple Woods Critical Species Habitat site (90 acres). These 90 acres have already been recommended for preservation and protection. The remaining 70 acres of this site represent additional lands proposed to be acquired	This site is not in existing protective ownership or located within an established project boundary; however, this site is located approximately 0.25 mile from the Theresa Marsh State Wildlife Area	Wisconsin Department of Natural Resources	$124,000
	5	Town of Trenton	Shady Lane Woods	147	This site does not contain inventoried Natural Areas or Critical Species Habitat sites	This site is not in existing protective ownership or located within an established project boundary	Wisconsin Department of Natural Resources	$276,800
	6	City of Muskego	Parker Drive Woods	123	This site does not contain inventoried Natural Areas or Critical Species Habitat sites	This site is not in existing protective ownership or located within an established project boundary	Wisconsin Department of Natural Resources	$312,000
	7	Town of Rochester	Oak Knoll Woods	162	This site does not contain inventoried Natural Areas or Critical Species Habitat sites	About 40 acres, or 25 percent, of this site is currently owned by the Wisconsin Department of Natural Resources. This site is adjacent to the Honey Creek State Wildlife Area, but is not located within an established project boundary	Wisconsin Department of Natural Resources	$183,000
	8	Town of Belgium	Harrington Beach State Park Old Fields	400	This site does not contain inventoried Natural Areas. However, critical bird species have been identified as using this site	This site is located entirely within Harrington Beach State Park	Wisconsin Department of Natural Resources	--

[a] *All cost figures are expressed in constant 1994 dollars.*

Source: SEWRPC.

Map 67

LOCATION OF RECOMMENDED SITES TO REESTABLISH LARGE TRACTS OF GRASSLANDS AND FOREST INTERIORS IN THE SOUTHEASTERN WISCONSIN REGION



Three large grassland tracts and five forest interior areas are recommended to be established in order to increase habitat for native grassland-nesting and forest-interior-nesting bird species in the Region. These areas are intended to enhance the grassland and forest interior habitat recommended for protection as Natural Areas or Critical Species Habitat sites.

Source: SEWRPC.

Prescribed-burn management conducted during appropriate seasons and at appropriate time intervals keeps certain fire-adapted communities, such as prairies and oak savannas, open and vigorous by inhibiting the invasion of woody plants, releasing nutrients tied up in plant biomass, and allowing native species to compete better.

Source: Donald M. Reed.

natural fire regime. Fires kept these communities open and vigorous by inhibiting invasion of certain woody plants, releasing nutrients held in plant biomass, and allowing native species to compete better. Thus, fire was a beneficial force, maintaining the health of these fire-adapted communities and their associated species populations. Cessation of recurrent fire has therefore led to alterations in these communities, especially through the establishment of certain woody and exotic species. Prescribed burning as a management measure, at appropriate seasons and intervals, seeks to return a natural regime to these fire-adapted communities.

For some community types, a policy of noninterference, or passive management, may be sufficient. Such an approach generally is adequate for such self-sustaining community types as the upland mesic forest, which requires only protection from outside forces for continued existence. In most cases, however, human activities may still pose a threat, and disturbances may continue. Therefore, for the majority of natural community types, some form of active management is essential for long-term protection of the ecological systems concerned; such management is an important tool to help preserve biodiversity.

Management measures should be designed to support the plant and animal communities for which the protection of a Natural Area or Critical Species Habitat site is being sought. For Natural Areas, this will involve preserving the integrity of the component communities, that is, their native species complement, vegetational structure, and ecological processes. Conflicts may arise, however, between management objectives, as, for example, management for the maintenance of community integrity and for the maintenance of individual species. As noted above, periodic fires are essential to maintain the health of prairie communities by inhibiting invasion by woody species. Fire also acts to release nutrients into the soil by burning dead plant material and increasing soil pH, aids in water infiltration, and increases soil microbial activity. Without fire, the ecological processes of the prairie systems are inhibited and certain sensitive prairie species, such as the small white lady's-slipper orchid, may be lost from a site entirely. Conversely, certain prairie-inhabiting butterflies, such as the Poweshiek skipperling, may be vulnerable to fire at every stage of their life cycle. A policy of completely burning a prairie would have devastating effects on the occurrence of these butterflies, but a "no-burning" policy would lead to degradation of the prairie and, ultimately, to loss of the butterflies which depend on the prairie plant species for survival.

This conflict has arisen because of the dramatic change in the landscape of Southeastern Wisconsin effected by European settlement. In 1836, the thousands of acres of prairie then present did not burn uniformly; rather, fires occurred in patches, creating a heterogeneous pattern across the landscape. In any given year, portions would remain unburned, enabling such fire-sensitive species as the butterflies to persist. In the Region today, however, remnants of the natural landscape tend to be small, scattered, and fragmented. A management technique that would serve to preserve both the prairie and the butterflies would be to burn prairies only partly on a rotation basis, so that different portions of each prairie would remain unburned each burning season. This would serve to simulate the original disturbance pattern, albeit on a much smaller scale.

Another management problem is presented by the fact that biological communities are constantly changing through ecological succession. This process may cause the desirable features for which a Natural Area was originally protected to disappear. In certain cases, then, natural succession must be retarded to allow particular species to exist as does, for example, the showy lady's-slipper orchid in tamarack swamps.

Certain exotic animal species, such as the European starling and English sparrow, have become widespread throughout the Region. These species, however, tend to exist in close proximity to human settlements and only occasionally visit Natural Areas, usually as transients, and their effects on native ecosystems are minimal. More important are feral dogs, cats, and ferrets, which prey on native animals. Also, increased populations of such native species as raccoons may endanger other native animals, such as mussels. On the other hand, one of the major threats to Natural Area integrity within the Region is invasion by exotic plant species which may displace native species and simplify community structure. Control of exotics is vital before they become a problem, it being far easier to keep exotics out of Natural Areas than to try to eradicate them after invasion. A good deterrent to weed invasion is to keep the Natural Area healthy, which again may involve a return to natural disturbance regimes, or simply to keep the Natural Area free from such artificial disturbances as worn trails and roads, which provide avenues for invasion by exotic species.

Many species-specific control measures have been developed. Whatever the method, the control efforts must balance the resultant improvement in the Natural Area with damage done by the control method itself, while being cost-effective and having a minimal impact on the environment. Certain control measures are intrinsically more cost-effective than others. Whichever appropriate control measures are used, they must be site-specific, and they must depend upon the community type and the exotic species involved.

Typical Management Activities for Types of Natural Areas: Management techniques appropriate for one type of natural area may not be appropriate for others. The type of management, and the degree of management intensity, should depend upon the specific characteristics of the target community, and the management objective. Therefore, management measures must be developed and applied on a site-by-site basis. The large number of Natural Areas and Critical Species Habitat sites identified in Southeastern Wisconsin makes it impractical to specifically address in this report the management needs of each individual area. The management element of the plan thus identifies in a generic manner the types of activities required to properly protect, preserve, and manage Natural Areas and Critical Species Habitat sites. Detailed management plans should be prepared for each site to be preserved by the agency or agencies proposed under this plan to be responsible for that site. The generic management activities which should be considered in the preparation of those plans are listed in Table 127.

RECOMMENDED PLAN—GEOLOGICAL AREAS

The inventory of designated Geological Area sites reported in Chapter VI of this report identified 86 such sites in the Region, including 29 sites classified as glacial in character and 57 sites classified as bedrock in character. In structuring a set of recommendations attendant to these sites, the Advisory Committee recognized a number of considerations. First, some sites wholly or partly overlap Natural Area sites and Critical Species Habitat sites also identified in this study, and would be protected and preserved under prior recommendations. Second, many Geological Area sites are either already in public ownership, or would be brought under public ownership upon implementation of existing State, regional, and county plans. Third, some of the sites lie within primary environmental corridors and are deserving of protection and preservation for that reason alone. Finally, some sites in the glacial category represent landforms over large areas and include lands already developed for urban use. In those situations, the Committee determined to represent such sites by limiting recommended acquisition to lands lying within established project boundaries, e.g., the various units of the Kettle Moraine State Forest.

A total of 48 Geological Areas would be fully or substantially preserved through acquisition upon implementation of existing State, regional, or county plans. These sites are identified in Table 128 and are shown on Map 68. This category of Geological Areas includes 19 glacial sites and 29 bedrock sites. In total, these 48 sites encompass 52,816 acres, or about 82.6 square miles. Of these 52,816 acres, 20,491 acres, or about 39 percent, are located within Natural Areas or Critical Species Habitat sites already recommended by this plan to be preserved, or within another designated Geological Area. Of the remaining 32,325 acres, 22,458 acres, or 35.1 square miles, have been recommended in existing plans to be acquired for protective ownership. An additional seven acres have been recommended to be protected by the acquisition of a conservation easement. Of the resulting total of 22,465 acres so proposed to be protected, it is estimated that 15,359 acres, or 24.0 square miles, representing 68 percent of the total area recommended to be acquired under existing plans, already are in pro-

Table 127

MANAGEMENT PRACTICES TYPICALLY APPLICABLE TO NATURAL AREAS

Natural Area Type	Typical Management Practices
Upland Forest–Mesic	When in good condition, a mesic forest is a low-maintenance community type. The dense canopy of maples, beech, basswood, and other mesophytic species produces deep shade on the forest floor, preventing the establishment of most exotics. The key to proper management is to maintain the closed canopy while maximizing the forest area. Specific management objectives include maintenance of a complete canopy; maximization of forest interior by maximizing forest area and minimizing forest edge; provision of adequate buffer areas, including allowing the surrounding forest to mature and attain old-growth status; preservation of mature, or old-growth, forests wherever found; reduction of the width and extent of interior trails which may fragment the forest into smaller habitat areas, creating more edge, and permitting the introduction of exotics; minimization of off-road vehicle and horse use; control of local deer population to help preserve native plant species, especially such browse-sensitive plants as lady's-slipper orchids (Cypripedium spp.); and removal of exotics as they appear, including, but not limited to, European buckthorn (Rhamnus cathartica), honeysuckles (Lonicara morrowii, L. tatarica, L. maackii, and L. x bella), garlic mustard (Alliaria petiolata), lily-of-the-valley (Convallaria majalis), periwinkle (Vinca minor), and others that may from time to time become established.
Upland Forest–Xeric	Basically, the same management methods are called for in the xeric forest as in the mesic forest, except that because of the greater openness of the canopy, more attention must be paid to the management of buckthorn and honeysuckle shrubs, which tend to occur at higher densities in this forest type. Specific management objectives include encouragement of a complete, closed canopy for those stands at the dry-mesic end of the forest continuum. In addition, drier stands, formerly very open oak woods, may need occasional prescribed burn management techniques, such as light ground fires.
Upland Forest–Oak Savanna	The cessation of periodic fires has all but eliminated oak savannas—or oak openings—as a community type in Southeastern Wisconsin. These formerly open communities have been converted into closed, shrubby woodlands. Present-day management techniques primarily involve removal of this shrub layer through a combination of cutting and regular prescribed burning. Specific management points include burning and cutting of brush, particularly exotics, but also such native invaders as dogwoods, hawthorns, prickly-ash, and viburnums; removal of invading woody mesic species such as basswood and species of elms, maples, and ashes; reintroduction of light grazing where practicable; and provision of adequate buffer areas, including shrub land, degraded savanna, or xeric forest.
Lowland Forest–Lowland Hardwoods (including riverine and lacustrine swamps)	Management measures for lowland hardwood forests are similar to those used for mesic forests, except that any artificial drainage may have to be reversed to maintain seasonal water-level regimes and help eliminate reed canary grass (Phalaris arundinacea).
Lowland Forest–Conifer Swamps (including tamarack and white cedar swamps)	Management measures for conifer swamps are similar to those for lowland hardwoods. However, it is especially important to control the size of deer populations in these habitats because of browse damage to tree seedlings and endangered and threatened species, such as orchids.
Prairies	The primary management problem facing prairies, other than reduction in habitat size, is invasion by woody plants. This calls for a reintroduction of periodic prescribed burning. Larger prairies may be burned on a patchwork basis, allowing for a series of burns of different ages. This will ensure that some areas will not be burned in any given year. Specific management measures include prescribed burning on a regular basis; cutting of brush where necessary; provision of adequate buffer areas, such as shrub land, old fields, and xeric woods; elimination, or minimization of, herbicide application along traversing highway and railway rights-of-way; reintroduction of light grazing; and reversal of artificial drainage to maintain seasonal water-level regimes within wet to wet-mesic prairies. In those situations where periodic burning is impractical, properly timed mowing may provide a viable alternative.
Wetlands–Bogs	Specific management points include maintenance of natural water levels; maintenance of adequate buffer areas; minimization of trampling of sensitive vegetation; removal of exotics, such as glossy buckthorn (Rhamnus frangula); and reduction and control of nutrient runoff from adjacent agricultural areas.
Wetlands–Sedge Meadows and Shrub-Carr	Management techniques should control invasion by certain tree species, including green ash (Fraxinus pennsylvanica) and willows (Salix spp.), that may have increased, especially with artificially lowered water levels. Specific maintenance points include controlled burning as appropriate to restrict woody plant invasion; maintenance of natural water regimes; and removal of exotic species, such as glossy buckthorn (Rhamnus frangula) and purple loosestrife (Lythrum salicaria), as warrented.
Wetlands–Fens	These communities may suffer from an invasion of glossy buckthorn, but also from an increase in shrubby cinquefoil (Potentilla fruticosa), a native shrub that increases in the absence of fire. Specific control management measures include burning as appropriate to suppress woody vegetation; removal of glossy buckthorn; maintenance of natural groundwater discharge areas; minimization of trampling; and maintenance of adequate buffer areas.
Wetlands–Deep and Shallow Marshes and Low Prairies	Specific management measures include maintenance of natural water-level regimes; controlled burning as appropriate; and removal of exotic species, such as purple loosestrife (Lythrum salicaria).
Aquatic Communities	The management of aquatic communities, as with wetlands, depends on maintenance of the hydrologic regime supporting the system and the type of habitat desired. Specific management measures include control of exotic species, such as purple loosestrife and Eurasian water milfoil (Myriophyllum spicatum); maintenance of natural water levels; control of pollution and excessive nutrient loadings; and prohibition and removal of artificial structures.

Source: SEWRPC.

Table 128

GEOLOGICAL AREAS IN THE SOUTHEASTERN WISCONSIN REGION THAT WOULD BE FULLY OR SUBSTANTIALLY PRESERVED THROUGH ACQUISITION UPON IMPLEMENTATION OF EXISTING STATE, REGIONAL, OR COUNTY PLANS

Type of Geological Area	Site Identification					Total Site Area (acres)[a]	Portion of Area to Be Acquired for Protective Ownership[a]			Responsible Agency(ies)	Remarks
	County	Civil Division(s)	Name	Geological Area Class	Reference Number on Map 68		Already under Protective Ownership	Proposed to Be Acquired	Total		
Glacial	Kenosha	City of Kenosha	Kenosha Dunes and Buried Forest	GA-2	1	-- (99)	-- (88)	-- (13)	-- (99)	Wisconsin Department of Natural Resources	This site lies wholly within the established project boundary of the Chiwaukee Prairie-Carol Beach State Natural Area and is contained within a Natural Area of statewide or greater significance
	Racine	Town of Burlington	Burlington Crevasse Filling	GA-3	2	12 (35)	-- --	12 (35)	12 (35)	Private conservancy organization	This site contains a Critical Species Habitat site of about 23 acres. It is recommended that the entire area, which lies entirely within the primary environmental corridor, be acquired for protective ownership
		Town of Caledonia	Cliffside Park Clay Banks	GA-3	3	-- (20)	-- (20)	-- --	-- (20)	Racine County	The entire area lies within an existing County park and a Natural Area of countywide or regional significance
	Walworth	Town of LaGrange Town of Whitewater	Kettle Moraine Interlobate Moraine[b]	GA-1	4	3,968 (7,138)[c]	2,485 (5,635)	1,503 --	3,988 (7,138)[c]	Wisconsin Department of Natural Resources	The entire site is within the established project boundary of the Southern Unit of the Kettle Moraine State Forest. This area contains four Natural Areas of statewide or greater significance (609 acres), two Natural Areas of countywide or regional significance (1,382 acres), six Natural Areas of local significance (999 acres), and one Critical Species Habitat site (200 acres), for a total of 3,170 acres within such sites
		Town of Troy	Lulu Lake Glacial Lake and Crevasse Filling	GA-1	5	-- (103)	-- (103)	-- --	-- (103)	Wisconsin Department of Natural Resources	The entire site is within a Natural Area of statewide or greater significance, is in existing State ownership, and is within the Lulu Lake State Natural Area project boundary
		Town of Whitewater	Whitewater Lake-Rice Lake Eskers[d]	GA-2	6	16 (191)	-- (113)	-- (62)	-- (175)	Wisconsin Department of Natural Resources	About 175 acres, or 92 percent, of this 191-acre site are within the established project boundary of the Southern Unit of the Kettle Moraine State Forest. About 113 acres, or 59 percent, are in existing State ownership
		Town of LaGrange	John Muir Trail Kettle Holes[d]	GA-2	7	-- (28)	-- (28)	-- --	-- (28)	Wisconsin Department of Natural Resources	The entire site is within the established project boundary of the Southern Unit of the Kettle Moraine State Forest and is in existing State ownership. The entire site is located within a Natural Area of countywide or regional significance
		Town of Darien Town of Richmond	Turtle Creek Glacial Spillway	GA-3	8	6,530 (6,903)	830 (830)	1,337 (1,710)	2,167 (2,540)	Wisconsin Department of Natural Resources	A portion of this site, about 1,745 acres, or 30 percent, is located within the established project boundary of the Turtle Creek State Wildlife Area. About 730 acres, or 12 percent, of the site is within existing Wisconsin Department of Natural Resources ownership as part of the Wildlife Area. An additional 100 acres, or about 2 percent of the site, are owned by the Wisconsin Department of Transportation as part of a wetland mitigation project. That portion of the site outside existing State ownership contains one Natural Area of countywide or regional significance, one Natural Area of local significance, and one Critical Species Habitat site encompassing 373 acres, all of which are to be acquired for protective ownership
		Town of Richmond	Moraine Triple Point	GA-3	9	306 (350)	-- --	174 (218)	174 (218)	Wisconsin Department of Natural Resources	About 44 acres, or 13 percent, of this site are within an identified Critical Species Habitat site proposed to be acquired for protective ownership. An additional 174 acres are proposed to be acquired as a trail corridor in the adopted Walworth County park and open space plan
		Town of LaGrange	Spirits Wash Bowl[d]	GA-3	10	-- (1)	-- (1)	-- --	-- (1)	Wisconsin Department of Natural Resources	This area is within existing public ownership as part of the Southern Unit of the Kettle Moraine State Forest, and is located within a Natural Area of countywide or regional significance
		Town of LaGrange	Nordic Trail Kettle Holes[d]	GA-3	11	-- (32)	-- (22)	-- (10)	-- (32)	Wisconsin Department of Natural Resources	This area is within the established project boundary of the Southern Unit of the Kettle Moraine State Forest. About 22 acres, or 69 percent of the area, are in existing State ownership. The site is within a Natural Area of local significance

Table 128 (continued)

Type of Geological Area	Site Identification					Total Site Area (acres)[a]	Portion of Area to Be Acquired for Protective Ownership[a]			Responsible Agency(ies)	Remarks
	County	Civil Division(s)	Name	Geological Area Class	Reference Number on Map 68		Already under Protective Ownership	Proposed to Be Acquired	Total		
Glacial (continued)	Walworth (continued)	Town of Lyons Town of Burlington (Racine County)	Lyons Glacial Deposits	GA-3	12	3,251 (3,888)	-- --	-- (637)	-- (637)	Private conservancy organization	About 637 acres, or 16 percent, of this area are within an identified Natural Area of local significance proposed to be acquired by a private conservancy organization
	Washington	Town of Erin Town of Kewaskum Town of Richfield	Kettle Moraine Interlobate Moraine[b]	GA-1	4	3,931 (5,577)	1,055 (2,701)	2,876 --	3,931 (5,577)[e]	Wisconsin Department of Natural Resources	This area contains two Natural Areas of statewide or greater significance (221 acres), five Natural Areas of countywide or regional significance (990 acres), and three Natural Areas of local significance (435 acres), for a total of 1,646 acres within such sites
		Town of Richfield	Friess Lake (Hogsback) Crevasse Filling[d]	GA-1	13	-- (25)	-- --	-- (25)	-- (25)	Wisconsin Department of Natural Resources	The entire area is within the established project boundary of the Loew Lake Unit of the Kettle Moraine State Forest, although none of the area is in existing State ownership. The area is wholly contained within a Natural Area of countywide or regional significance
		City of West Bend	Lac Lawrann Kame and Esker	GA-3	14	-- (12)	-- (12)	-- --	-- (12)	City of West Bend	The entire area is located within a Natural Area of countywide or regional significance, and is currently in City ownership
	Waukesha	City of Delafield Town of Delafield Town of Eagle Town of Ottawa	Kettle Moraine Interlobate Moraine[b]	GA-1	4	11,866 (15,714)[e]	10,739 (14,587)	1,127 --	11,866 (15,714)[f]	Wisconsin Department of Natural Resources	The entire area is within the established project boundary of the Southern Unit or the Lapham Peak Unit of the Kettle Moraine State Forest. The site contains three Natural Areas of statewide or greater significance (706 acres), nine Natural Areas of countywide or regional significance (1,858 acres), four Natural Areas of local significance (667 acres), and seven Critical Species Habitat sites (617 acres), for a total of 3,848 acres within such sites
		Town of Delafield Town of Genesee	Scuppernong Creek Spillway[g]	GA-1	15	316 (460)	-- (104)	40 --	40 (144)	Wisconsin Department of Natural Resources	A portion of the site, 144 acres, or 31 percent, is within the established project boundary of the Lapham Peak Unit of the Kettle Moraine State Forest (104 acres), or is located within the Ice Age Trail corridor (40 acres). Of the 144 acres, 104 acres, or 72 percent, are in existing public ownership
		Town of Eagle	Scuppernong Glacial Lake[g]	GA-3	16	2,729 (7,832)	-- (2,178)	-- (2,925)	-- (5,103)	Wisconsin Department of Natural Resources	A portion of this site, 4,552 acres, or 58 percent, is within the established project boundary of the Southern Unit of the Kettle Moraine State Forest. Of the 3,280 acres outside the project boundary, 551 acres lie within two Natural Areas proposed to be acquired for protective ownership, or are lands in existing State ownership
		Town of Eagle	Scuppernong Pitted Outwash[d]	GA-2	17	-- (4,880)	-- --	-- (2,702)	-- (4,880)	Wisconsin Department of Natural Resources	The entire area is within the established project boundary of the Southern Unit of the Kettle Moraine State Forest, and lies within the Scuppernong Glacial Lake Geological Area
		Town of Eagle	Eagle Esker[d]	GA-2	18	-- (36)	-- (20)	-- (11)	-- (31)	Wisconsin Department of Natural Resources	A portion of this area, about 31 acres, or 86 percent, is located within the established project boundary of the Kettle Moraine State Forest. Of the 31 acres, about 20 are currently in State ownership
		Town of Eagle	Eagle Kettle Hole[d]	GA-2	19	-- (13)	-- (13)	-- --	-- (13)	Wisconsin Department of Natural Resources	The entire area is within the Southern Unit of the Kettle Moraine State Forest and in existing State ownership
	Subtotal	--	--	--	--	31,925	16,089[h]	7,069[h]	22,158[h]	--	--
Bedrock	Milwaukee	City of Glendale Village of Shorewood	Estabrook Park-Lincoln Park Area	GA-1	20	40	40	--	40	Milwaukee County	The entire site lies within Estabrook and Lincoln Parks, both County parks
		City of Milwaukee	Soldiers' Home Reef	GA-1	21	-- (5)	-- (5)	-- --	-- (5)	U. S. Department of Veterans Affairs and Wisconsin Department of Natural Resources	The Geological Area is coincident with the Stadium Bluff Woods Critical Species Habitat site. It is recommended that the Wisconsin Department of Natural Resources assume responsibility for managing the site should it be disposed of by the U. S. Department of Veterans Affairs
		City of Cudahy	Warnimont Park Clay Banks	GA-2	22	18 (23)	18 (23)	-- --	18 (23)	Milwaukee County	The entire site lies within Warnimont Park, a County park. About five acres are located within a Critical Species Habitat site

Table 128 (continued)

Type of Geological Area	Site Identification					Total Site Area (acres)[a]	Portion of Area to Be Acquired for Protective Ownership[a]			Responsible Agency(ies)	Remarks
	County	Civil Division(s)	Name	Geological Area Class	Reference Number on Map 68		Already under Protective Ownership	Proposed to Be Acquired	Total		
Bedrock (continued)	Milwaukee (continued)	City of Franklin	Root River Outcrops	GA-2	23	18	18	--	18	Milwaukee County	The entire site lies within the Root River Parkway and is owned by Milwaukee County
		City of Milwaukee	McGovern Park	GA-2	24	1	1	--	1	Milwaukee County	The entire site lies within McGovern Park, a County park
		City of Milwaukee City of Wauwatosa	Menomonee River Outcrops	GA-2	25	6	6	--	6	Milwaukee County	The entire area lies within the Menomonee River Parkway and is owned by Milwaukee County
		City of Milwaukee	Mill Road Reef	GA-3	26	5	5	--	5	Milwaukee County	The entire area lies within the Little Menomonee River Parkway and is owned by Milwaukee County
		City of Milwaukee	Lincoln Creek	GA-3	27	11	11	--	11	Milwaukee County	The entire area lies within the Lincoln Creek Parkway and is owned by Milwaukee County
	Ozaukee	Village of Grafton Town of Grafton	Milwaukee River-Grafton Outcrops and Lime Kiln Park	GA-1	28	57	47	10	57	Village of Grafton	About 47 acres, or 82 percent, of the site are in existing Village ownership. The entire area is located within the Milwaukee River Parkway recommended for acquisition in the Village park plan
		Town of Cedarburg	Cedar Creek-Anschuetz Quarries	GA-1	29	5	4	1	5	City of Cedarburg	About four acres, or 80 percent, of the site are in existing park or parkway ownership. The balance of the site lies within the proposed Cedar Creek Parkway
		Town of Fredonia	Phyllocarid Quarry	GA-1	30	4	--	4	4	Ozaukee County	The entire site is located within the Milwaukee River Parkway recommended for acquisition in the County park plan
		City of Mequon	Virmond Park Clay Banks	GA-2	31	10	10	--	10	Ozaukee County	The entire site is located within Virmond Park, a County park
		City of Cedarburg	Groth Quarry	GA-2	32	7	7	--	7	City of Cedarburg	The entire area is located within an existing City park
		Town of Belgium	Harrington Beach State Park Quarry	GA-2	33	-- (25)	-- (25)	-- --	-- (25)	Wisconsin Department of Natural Resources	The entire area is located within Harrington Beach State Park and within an identified Critical Species Habitat site
		Town of Fredonia	Fredonia Quarries	GA-3	34	-- (8)	-- --	-- (8)	-- (8)	Ozaukee County	The entire area is located within the proposed Milwaukee River Parkway and a Natural Area of countywide or regional significance
		Town of Fredonia	Waubeka Quarry	GA-3	35	2	--	2	2	Ozaukee County	The entire area is located within the Milwaukee River Parkway recommended for acquisition in the County park plan
		Town of Saukville	Riveredge Bluff	GA-3	36	1 --	-- 1	-- --	-- (1)	Riveredge Nature Center	The entire area is located within the Riveredge Nature Center
	Racine	Town of Mt. Pleasant	Horlickville Bluffs and Quarries	GA-1	37	30	23	7	30	Racine County	About 23 acres, or 77 percent, are in County ownership. It is recommended that a conservation easement be acquired over the remaining seven acres
		Village of Wind Point	Wind Point	GA-2	38	1 (5)	-- (4)	1 --	1 (5)	Village of Wind Point	Four acres of this site are within a Critical Species Habitat site located within the City of Racine's Shoop Park. The remaining one acre is the site of the Wind Point lighthouse, currently owned by the U. S. Coast Guard. It is recommended that the Village of Wind Point acquire this one acre if it is disposed of by the Coast Guard
		Town of Caledonia	Root River Outcrops	GA-3	39	20 --	-- (20)	-- --	-- (20)	Racine County	The entire area is located within the Root River Parkway and is owned by Racine County. The site is within a Critical Species Habitat site
	Walworth	Town of Spring Prairie	Sugar Creek Quarry	GA-2	40	3	--	3	3	Walworth County	The entire area is located within the Sugar Creek Parkway recommended for acquisition in the County park plan
	Waukesha	Village of Menomonee Falls	Menomonee Falls Reef	GA-1	41	9	9	--	9	Village of Menomonee Falls	The entire area is within the Menomonee River Parkway and is owned by the Village
		Village of Menomonee Falls	Menomonee Park Quarry and Domes	GA-2	42	140	88	--	88	Waukesha County	88 acres, or 49 percent, of this area are within Menomonee County Park
		Village of Menomonee Falls	Derrick Quarry	GA-3	43	-- (1)	-- --	-- (1)	-- (1)	Private conservancy organization	The entire area is located within the Peters Woods Natural Area and is proposed to be acquired by a private conservancy organization

Table 128 (continued)

Type of Geological Area	Site Identification					Total Site Area (acres)[a]	Portion of Area to Be Acquired for Protective Ownership[a]			Responsible Agency(ies)	Remarks
	County	Civil Division(s)	Name	Geological Area Class	Reference Number on Map 68		Already under Protective Ownership	Proposed to Be Acquired	Total		
Bedrock (continued)	Waukesha (continued)	Village of Butler Village of Menomonee Falls	Menomonee River Outcrops	GA-2	44	5	--	5	5	Waukesha County	The entire area is within the Menomonee River Parkway and is recommended for acquisition in the County park plan
		Village of Pewaukee	Pewaukee Stone Pits, Quarries, and Outcrops	GA-1	45	7	3	4	7	Village of Pewaukee	Three acres of this site are owned by the Wisconsin Department of Transportation as part of the STH 18 right-of-way. The remaining four acres are recommended to be acquired by the Village of Pewaukee as an expansion of Village Park
		Town of Eagle	Stark Road Quarry[d]	GA-3	46	-- (3)	-- (3)	-- --	-- (3)	Wisconsin Department of Natural Resources	The entire area is within the Southern Unit of the Kettle Moraine State Forest and is in State ownership
		Town of Eagle	Brady's Rock[d]	GA-3	47	-- (19)	-- (17)	-- (2)	-- (19)	Wisconsin Department of Natural Resources	The entire area is within the project boundary of the Southern Unit of the Kettle Moraine State Forest. About 17 acres, or 89 percent, are in State ownership
		Town of Ottawa	Hunter's Bluff	GA-3	48	-- (18)	-- --	-- (18)	-- (18)	Private conservancy organization	The entire area is located within the Ottawa Limestone Outcrop Natural Area and is proposed to be acquired by a private conservancy organization
	Subtotal	--	--	--	--	400	270[h]	37[h]	307[h]	--	--
--	Total	--	--	--	--	32,325 (52,816)	15,359[h] --	7,106[h] --	22,465[h] --	--	--

[a] *The number in parentheses denotes the total site area; that portion of the site not included within a designated Natural Area or Critical Species Habitat site or another Geological Area is listed above the total site area.*

[b] *The Kettle Moraine Interlobate Moraine Geological Area is listed three times, once each in Walworth, Washington, and Waukesha Counties.*

[c] *Includes the area within the Southern Unit of the Kettle Moraine State Forest within Walworth County.*

[d] *This Geological Area lies within that portion of the Kettle Moraine Interlobate Moraine Geological Area proposed to be acquired for protective ownership.*

[e] *Includes all of the area within the Loew Lake Unit of the Kettle Moraine State Forest and that portion of the Northern Unit of the Kettle Moraine State Forest located in Washington County.*

[f] *Includes all of the area within the Lapham Peak Unit of the Kettle Moraine State Forest and that portion of the Southern Unit of the Kettle Moraine State Forest in Waukesha County.*

[g] *This Geological Area lies partially within the area proposed to be acquired for protection of the Kettle Moraine Interlobate Moraine Geological Area.*

[h] *Includes only those portions of Geological Areas located outside Natural Areas, Critical Species Habitat sites, or larger Geological Areas.*

Source: SEWRPC.

tective public or private ownership. The Advisory Committee recommended that the highest priority in land acquisition be given to completing implementation of these previously proposed preservation recommendations, thereby protecting to the greatest extent possible 48 of the 86 Geological Area sites identified in the inventories.

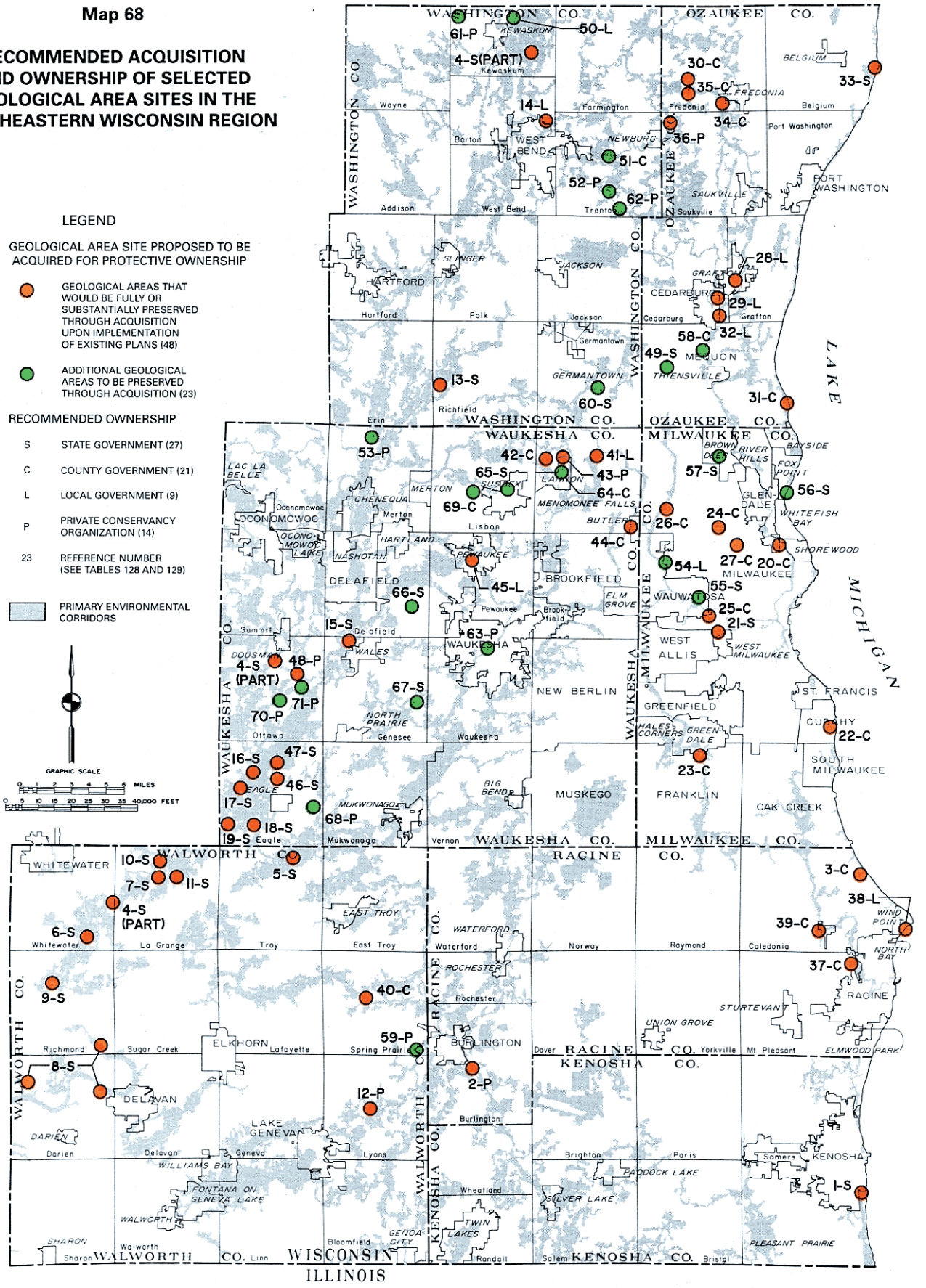
The second-highest acquisition priority was given to bringing under protective ownership another 23 Geological Area sites in the Region, including five glacial sites and 18 bedrock sites. Protective ownership could, in some cases, be accomplished through conservation easements. The details attendant to this recommendation are set forth in Table 129. The 23 sites concerned are also identified on Map 68. In total, the site areas concerned in this plan recommendation approximate 291 acres. Of that total, it is estimated that about 13 acres, or 4 percent, could appropriately be protected through conservation easements.

The remaining 15 Geological Area sites not proposed to be placed under protective ownership are identified in Table 130 and shown on Map 69. This includes five glacial and 10 bedrock sites. These sites have not been proposed in prior plans to be preserved and protected, nor do they lie within primary environmental corridors. While no specific land acquisition recommendations have been made attendant to these sites, it is recommended that such sites be taken into account in county and local planning efforts and through such efforts preserved and protected to the extent possible.

A summary by county of the proposed acquisition of lands to protect Geological Area sites in the Region is set forth in Table 131. This table also identifies the extent to which the acquisition recommendations have been directed at State, county, and local government and private conservancy organizations. Because of the large areas involved in completing acquisition for the Kettle Moraine State Forest

Map 68

RECOMMENDED ACQUISITION AND OWNERSHIP OF SELECTED GEOLOGICAL AREA SITES IN THE SOUTHEASTERN WISCONSIN REGION



A total of 71 Geological Areas are recommended for protective ownership. The recommended agency for acquisition in each case relates to several factors, including prior partial ownership, recommendations made in adopted park and open space plans, and established Wisconsin Department of Natural Resources project boundaries.

Source: SEWRPC.

Table 129

ADDITIONAL GEOLOGICAL AREAS IN THE SOUTHEASTERN WISCONSIN REGION RECOMMENDED TO BE PRESERVED THROUGH ACQUISITION[a]

Type of Geological Area	Site Identification					Total Site Area (acres)[b]	Portion of Area to Be Acquired for Protective Ownership[b]			Located in Primary Environmental Corridor	Responsible Agency	Remarks
	County	Civil Division	Name	Geological Area Class	Reference Number on Map 69		Already under Protective Ownership	Proposed to Be Acquired	Total			
Glacial	Ozaukee	City of Mequon	Ozaukee Buried Forest	GA-1	49	32	--	32	32	No	Wisconsin Department of Natural Resources	--
	Washington	Town of Kewaskum	Kewaskum Conical Kame	GA-2	50	47	--	47	47	Yes	Village of Kewaskum	This site is adjacent to a proposed neighborhood park located in the Village of Kewaskum urban service area
		Town of Trenton	Myra Esker	GA-2	51	16	--	16	16	Yes	Washington County	This site is adjacent to the Myra Wetlands Natural Area
		Town of Trenton	Camp Wowitan Esker	GA-3	52	54 (57)	--	54 (57)	54 (57)	Yes	Private conservancy organization	About three acres, or 5 percent of this area, are located within the Camp Wowitan Wetlands Natural Area
	Waukesha	Town of Merton	Merton Esker	GA-3	53	14	--	14	14	Yes	Private conservancy organization	--
	Subtotal	--	--	--	--	163	--	163	163	--	--	--
Bedrock	Milwaukee	City of Milwaukee	Hartung Quarry	GA-1	54	17	17	--	17	No	City of Milwaukee	The entire area is currently owned by the City of Milwaukee, but is used as a landfill
		City of Wauwatosa	Schoonmaker Reef	GA-1	55	5	--	5	5	No	Wisconsin Department of Natural Resources	It is recommended that this area be protected through a conservation easement
		Village of Fox Point	Whitefish Bay Shore Exposure	GA-1	56	2	--	2	2	Yes	Wisconsin Department of Natural Resources	It is recommended that this area be protected through a conservation easement
		Village of Brown Deer	Brown Deer Railroad Cut	GA-1	57	2	--	2	2	No	Wisconsin Department of Natural Resources[c]	It is recommended that this area be protected through a conservation easement
	Ozaukee	City of Mequon	Thiensville Roadcut and Quarry	GA-1	58	9	5	4	9	No	Ozaukee County	About five acres, or 56 percent, of this site are within MeeKwon County Park. The remainder of the Geological Area is surrounded by a Natural Area of countywide or regional significance
	Walworth	Town of Spring Prairie	Voree Quarry	GA-3	59	18	--	18	18	Yes	Private conservancy organization	--
	Washington	Village of Germantown	Germantown Road Cut	GA-3	60	5	5	--	5	No	Wisconsin Department of Transportation	Area is within the right-of-way of STH 45
		Town of Kewaskum	Kewaskum Quarry and Lime Kiln	GA-3	61	5	--	5	5	Yes	Private conservancy organization	--
		Town of Trenton	Trenton Quarry and Lime Kiln	GA-3	62	3	--	3	3	Yes	Private conservancy organization	--
	Waukesha	City of Waukesha	Carroll College Quarry	GA-1	63	1	1	--	1	No	Carroll College	--
		Village of Lannon	Raasch's Dome	GA-1	64	7	--	7	7	No	Waukesha County	Adjacent to County's Bugline Trail
		Village of Sussex	Sussex Lime Kiln	GA-1	65	1	--	1	1	No	Wisconsin Department of Natural Resources	--
		Town of Delafield	Jones Quarry	GA-1	66	4	--	4	4	No	Wisconsin Department of Natural Resources[d]	--
		Town of Genesee	Johnston Quarry and Kilns	GA-1	67	14	--	14	14	No	Wisconsin Department of Natural Resources	This site is listed on the National Register of Historic Places

Table 129 (continued)

Type of Geological Area	Site Identification					Total Site Area (acres)[b]	Portion of Area to Be Acquired for Protective Ownership[b]			Located in Primary Environmental Corridor	Responsible Agency	Remarks
	County	Civil Division	Name	Geological Area Class	Reference Number on Map 68		Already under Protective Ownership	Proposed to Be Acquired	Total			
Bedrock (continued)	Waukesha (continued)	Town of Eagle	Jericho Creek Outcrop	GA-3	68	8	--	8	8	Yes	Private conservancy organization	--
		Town of Lisbon	Sussex Railroad Cut	GA-3	69	4	2	--	2	Yes	Waukesha County	A portion of this site—about two acres, or 50 percent—is located within the County's Bugline Trail right-of-way. The remainder of the site is within the right-of-way of the Union Pacific Railroad, and is not recommended to be protected through public ownership
		Town of Ottawa	Unnamed bluff	GA-3	70	24	--	24	24	Yes	Private conservancy organization	--
		Town of Ottawa	Unnamed quarry	GA-3	71	3	--	3	3	Yes	Private conservancy organization	--
	Subtotal	--	--	--	--	130	30	98	128	--	--	--
--	Total	--	--	--	--	293[e]	30[e]	261[e]	291[e]	--	--	--

[a]*The sites listed in this table as recommended for acquisition are in addition to those identified in Table 128.*

[b]*The number in parentheses denotes the total site area; that portion of the site not included within a designated Natural Area or Critical Species Habitat site or another Geological Area is listed above the total site area.*

[c]*This geological feature is located within the right-of-way of Wisconsin Central Ltd. It is recommended that the Department of Natural Resources enter into a cooperative agreement with the railway to protect the Geological Area.*

[d]*This geological feature is located within an existing golf course. It is recommended that the Department of Natural Resources acquire a conservation easement to protect the Geological Area.*

[e]*Includes only that area located outside Natural Areas, Critical Species Habitat sites, or larger Geological Areas.*

Source: SEWRPC.

project, State government is recommended to bear the great majority of responsibility in preserving Geological Areas.

RECOMMENDED PLAN—ARCHAEOLOGICAL AREAS

The inventory of significant archaeological areas reported in Chapter VI of this report noted that there were 14 archaeological sites in the Region that are of such significance that they have been placed on the National Register of Historic Places. One of the 14 sites, the Lizard Mound Park archaeological site, is located within a Natural Area of local significance and is in an existing Washington County park. One additional site, the Barnes Creek archaeological site, lies partly within a Critical Species Habitat site currently owned by the Village of Pleasant Prairie, and partly within the established Wisconsin Department of Natural Resources project boundary for the Chiwaukee Prairie-Carol Beach area. The Barnes Creek site will therefore be protected through existing or planned public ownership.

Two of the three National Register-listed archaeological sites in Milwaukee County, the Lake Park Mound and the Spring Grove Mounds-Garden Beds sites, are located in existing County parks. A third site, the Light Vessel #57 site, is located underwater in Lake Michigan, and is under Wisconsin Department of Natural Resources jurisdiction.

None of the remaining nine National Register-listed archaeological sites lies within a designated Natural Area, Critical Species Habitat site, or Geological Area, as identified in this study. Accordingly, implementation of the foregoing recommendations attendant to such areas would not affect the protection and preservation of these nine highly significant archaeological sites. The Advisory Committee determined not to make any specific recommendations attendant to the acquisition of these archaeological sites, noting that in their cases Federal and State laws afford site protection.

PLAN COSTS

In order to estimate the costs that would be associated with acquiring the sites recommended to be

Table 130

GEOLOGICAL AREAS IN THE SOUTHEASTERN WISCONSIN REGION NOT RECOMMENDED FOR PRESERVATION THROUGH ACQUISITION

County	Site Identification				Total Site Area (acres)	Type of Geological Area
	Civil Division(s)	Name	Geological Area Class	Reference Number on Map 69		
Milwaukee	City of Milwaukee	Lime Ridge	GA-2	1	1	Bedrock
	Village of Brown Deer	Brazelton's Creek Outcrop	GA-3	2	3	Bedrock
Ozaukee	City of Mequon	Little Menomonee River Reef District	GA-2	3	1	Bedrock
	Town of Port Washington	Druecker's Lime Kiln	GA-2	4	1	Bedrock
	Town of Port Washington	Sauk Creek Outcrop	GA-2	5	3	Bedrock
	Town of Belgium	Belgium Abandoned Shoreline	GA-3	6	108	Glacial
	Town of Saukville	Saukville Reef	GA-3	7	3	Bedrock
Walworth	Town of East Troy	Casselman's Quarry	GA-2	8	2	Bedrock
	Town of Whitewater	Whitewater Quarry	GA-2	9	2	Bedrock
Washington	Village of Germantown	Little Menomonee River Reef District	GA-2	3	10	Bedrock
	Town of Erin	Erin Esker	GA-2	10	192	Glacial
Waukesha	Town of Delafield	Delafield Interurban Cut	GA-2	11	14	Bedrock
	Town of Delafield Town of Genesee	Delafield Drumlin Field	GA-2	12	3,763	Glacial
	Town of Delafield	Tessmann Drumlin	GA-3	13	--[a]	Glacial
	City of Delafield	Audley's Quarry	GA-3	14	14	Bedrock
	City of New Berlin	Prospect Hill Drumlin	GA-3	15	213	Glacial
Total	--	--	--	--	4,330	--

[a]*The Tessmann Drumlin is located within the Delafield Drumlin Field.*

Source: SEWRPC.

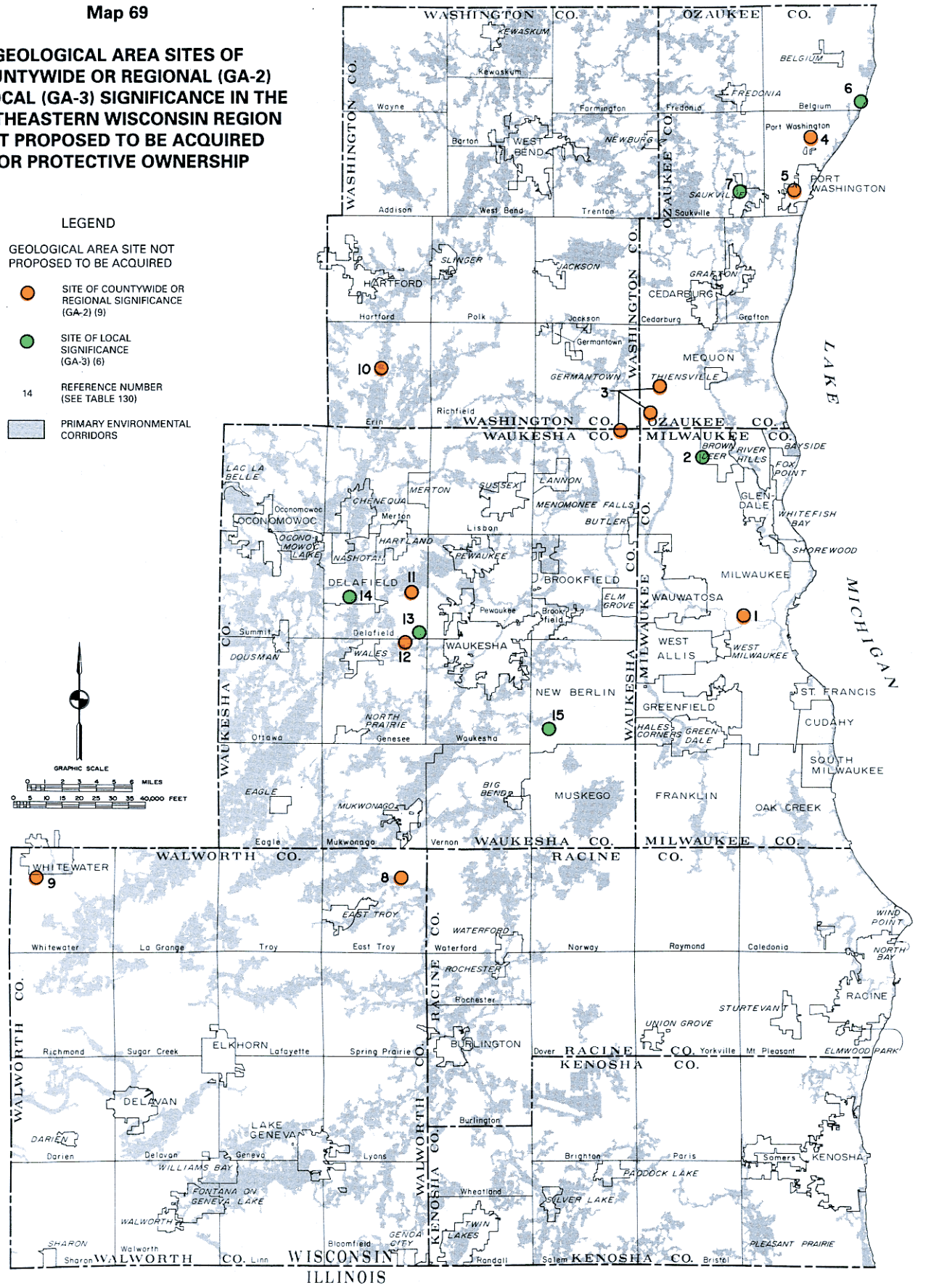
preserved and protected under the foregoing plan recommendations, an analysis was made of real-property sales which occurred within the Region during 1994. Such sales are reported to the Wisconsin Department of Revenue. The analysis took into account each type of land that was sold, categorizing such lands into upland woodlands, wooded wetlands, nonforested wetlands, grasslands and prairies, oak openings, and upland shrub lands. Based upon sale prices reported for such lands during that year, unit values, in terms of dollars per acre, were established for each category of land and for each county in the Region. These unit values are set forth in Table 132 and were used to generate the land acquisition cost estimates reported below. All such cost estimates are expressed in constant 1994 dollars.

Based upon the unit cost values and the areal extent of the sites recommended to be acquired, Table 133 presents a summary of the estimated land acquisition costs associated with implementation of the plan recommendations. These estimates are summarized by land acquisition category—Natural Area sites of statewide or greater significance, Natural Area sites of other significance, Critical Species Habitat sites, grassland and forest interior sites, and Geological Area sites—and by party recommended to be responsible for land acquisition—State government, county government, local government, and private conservancy organizations.

The total cost of implementing the recommended plan is estimated at $55.9 million. Of this total, about $3.5 million, or 6 percent, would be required

Map 69

GEOLOGICAL AREA SITES OF COUNTYWIDE OR REGIONAL (GA-2) OR LOCAL (GA-3) SIGNIFICANCE IN THE SOUTHEASTERN WISCONSIN REGION NOT PROPOSED TO BE ACQUIRED FOR PROTECTIVE OWNERSHIP



A total of 15 Geological Areas, all of either GA-2 or GA-3 quality, do not meet the criteria for protection and thus are not proposed for protective ownership.

Source: SEWRPC.

Table 131

SUMMARY OF PROPOSED ACQUISITION OF LANDS TO PROTECT GEOLOGICAL AREA SITES IN THE SOUTHEASTERN WISCONSIN REGION BY COUNTY[a]

County	Land Acquisition Responsibility	Land Area to Be Acquired		Estimated Cost[b]	
		Acres	Percent of Total	Dollars	Percent of Total
Kenosha	State Government	--	--	--	--
	County Government	--	--	--	--
	Local Government	--	--	--	--
	Private Conservancy Organization	--	--	--	--
	Subtotal	--	--	--	--
Milwaukee	State Government	9	100	$ 70,000[c]	100
	County Government	--	--	--	--
	Local Government	--	--	--	--
	Private Conservancy Organization	--	--	--	--
	Subtotal	9	100	$ 70,000	100
Ozaukee	State Government	32	60	$ 28,800	37
	County Government	10	19	29,400	38
	Local Government	11	21	19,600	25
	Private Conservancy Organization	--	--	--	--
	Subtotal	53	100	$ 77,800	100
Racine	State Government	--	--	--	--
	County Government	7	35	$ 7,000[d]	28
	Local Government	1	5	--[e]	--
	Private Conservancy Organization	12	60	18,000	72
	Subtotal	20	100	$ 25,000	100
Walworth	State Government	3,014	99	$3,252,900	99
	County Government	3	--[f]	3,900	--[f]
	Local Government	--	--	--	--
	Private Conservancy Organization	16	--[f]	16,000	--[f]
	Subtotal	3,033	100	$3,272,800	100
Washington	State Government	2,876	96	$1,765,800	88
	County Government	16	--[f]	32,000	2
	Local Government	47	2	84,000	4
	Private Conservancy Organization	62	2	130,000	6
	Subtotal	3,001	100	$2,011,800	100
Waukesha	State Government	1,186	95	$2,408,600	95
	County Government	12	1	26,400	1
	Local Government	4	--[f]	3,200	--[f]
	Private Conservancy Organization	49	4	107,800	4
	Subtotal	1,251	100	$2,546,000	100
Region	State Government	7,117	97	$7,526,100	94
	County Government	48	--[f]	98,700	1
	Local Government	63	1	106,800	1
	Private Conservancy Organization	139	2	271,800	4
	Total	7,367	100	$8,003,400	100

[a]Includes only those Geological Areas or portions of Geological Areas located outside Natural Areas or Critical Species Habitat sites.

[b]All cost figures are expressed in constant 1994 dollars.

[c]Estimated cost of acquiring conservation easements for the Schoonmaker Reef and Whitefish Bay Shore Exposure sites.

[d]Estimated cost of acquiring a conservation easement for the nonpublic portions (seven acres) of the Horlickville Bluffs and Quarries site.

[e]It is anticipated that the one-acre site involved will be transferred from the U. S. Coast Guard to the Village of Wind Point at no cost.

[f]Less than 1 percent.

Source: SEWRPC.

Table 132

UNIT VALUES (DOLLARS PER ACRE) USED TO ESTIMATE THE COST OF ACQUIRING LAND IN SOUTHEASTERN WISCONSIN UNDER THE NATURAL AREAS AND CRITICAL SPECIES HABITAT PROTECTION AND MANAGEMENT PLAN: 1994

Type of Land	County						
	Kenosha	Milwaukee	Ozaukee	Racine	Walworth	Washington	Waukesha
Upland Woodlands	$1,700	$1,700	$1,400	$1,500	$1,300	$2,000	$2,200
Wooded Wetlands	1,100	1,300	1,300	1,200	900	1,500	1,500
Nonforested Wetlands	500	900	1,200	800	400	900	800
Grasslands and Prairies	1,300	1,100	900	1,500	1,000	1,000	1,300
Oak Openings	1,700	1,700	1,400	1,500	1,300	2,000	2,200
Upland Shrub Lands	1,500	1,400	1,400	1,500	1,200	1,500	1,800

Source: SEWRPC.

to complete site acquisition of those Natural Area sites of statewide or greater significance; $35.1 million, or 63 percent, would be required to complete site acquisition of Natural Area sites of other significance; $4.3 million, or 8 percent, would be required to acquire Critical Species Habitat sites; $5.0 million, or 9 percent, would be required to acquire the recommended grassland and forest interior sites; and the remaining $8.0 million, or 14 percent, would be required to complete acquisition of the Geological Area sites.

State government would be responsible for land acquisitions totaling about $22.6 million, representing about 40 percent of the total plan costs. Of the $22.6 million, about $14.2 million, or 63 percent, represents land acquisition within State project boundaries already established by the Wisconsin Natural Resources Board. An additional $5.1 million, or 23 percent, represents land acquisition recommendations made in prior regional or county plans. The remaining $3.3 million, or 14 percent, represents land acquisition recommendations newly made in this plan.

County government would be responsible for land acquisitions totaling about $13.9 million, representing about 25 percent of the total plan costs. Of the $13.9 million, about $8.2 million, or 59 percent, represents land acquisitions either lying within county project boundaries already approved by county boards, or represents land acquisition recommendations made in prior regional or county plans. The remaining $5.7 million, or 41 percent, represents land acquisition recommendations newly made in this plan.

Local government would be responsible for land acquisitions totaling about $5.5 million, representing about 10 percent of the total plan costs. Of the $5.5 million, about $3.2 million, or 58 percent, represents land acquisition recommendations made in prior plans. The remaining $2.3 million, or 42 percent, represents land acquisition recommendations newly made in this plan.

Private conservancy organizations would be responsible for land acquisitions totaling the remaining $13.9 million, representing about 25 percent of the total plan costs. Of the $13.9 million, about $2.4 million, or about 17 percent, represents land acquisition recommendations made in prior plans. The remaining $11.5 million, or 83 percent, represents land acquisition recommendations newly made in this plan.

Of the total plan implementation costs of $55.9 million, then, about $33.1 million, or 59 percent, may be attributed to the land acquisition costs associated with recommendations that have been made in prior State, regional, county, and local plans and do not, therefore, represent proposed new expenditures. The remaining $22.8 million, or 41 percent, may be classified as proposed new expenditures derived from the recommendations set forth in this plan.

The recommended natural areas and critical species habitat protection and management plan does not have a design year. If it were assumed, however, that the plan were to be implemented over a 20-year period, the average annual cost of plan implementation in terms of land acquisition, expressed in

Table 133

SUMMARY OF THE ESTIMATED LAND ACQUISITION COSTS ASSOCIATED WITH IMPLEMENTATION OF THE RECOMMENDED NATURAL AREAS AND CRITICAL SPECIES HABITAT PLAN FOR THE SOUTHEASTERN WISCONSIN REGION[a]

County	Land Acquisition Category	Responsible Party				Total
		State Government	County Government	Local Government	Private Conservancy Organization	
Kenosha	Natural Area Sites of Statewide or Greater (NA-1) Significance	$ 31,900	--	--	$ 93,500	$ 125,400
	Natural Area Sites of Other (NA-2 and NA-3) Significance	201,800	$ 472,400	$ 265,500	226,200	1,165,900
	Critical Species Habitat Sites	319,800	--	46,900	143,000	509,700
	Grassland and Forest Interior Sites	--	--	--	--	--
	Geological Area Sites	--	--	--	--	--
	Subtotal	$ 553,500	$ 472,400	$ 312,400	$ 462,700	$ 1,801,000
Milwaukee	Natural Area Sites of Statewide or Greater (NA-1) Significance	--	--	--	--	--
	Natural Area Sites of Other (NA-2 and NA-3) Significance	--	$ 500,400	$ 263,700	--	$ 764,100
	Critical Species Habitat Sites	--	--	28,500	$ 146,000	174,500
	Grassland and Forest Interior Sites	--	--	--	--	--
	Geological Area Sites	$ 70,000	--	--	--	70,000
	Subtotal	$ 70,000	$ 500,400	$ 292,200	$ 146,000	$ 1,008,600
Ozaukee	Natural Area Sites of Statewide or Greater (NA-1) Significance	$ 568,800	--	--	$ 165,800	$ 734,600
	Natural Area Sites of Other (NA-2 and NA-3) Significance	556,900	$ 2,079,700	$ 274,100	2,230,400	5,141,100
	Critical Species Habitat Sites	--	--	26,800	--	26,800
	Grassland and Forest Interior Sites	--	--	--	--	--
	Geological Area Sites	28,800	29,400	19,600	--	77,800
	Subtotal	$ 1,154,500	$ 2,109,100	$ 320,500	$ 2,396,200	$ 5,980,300
Racine	Natural Area Sites of Statewide or Greater (NA-1) Significance	$ 124,000	$ 72,750	--	$ 6,000	$ 202,750
	Natural Area Sites of Other (NA-2 and NA-3) Significance	678,000	1,479,900	$ 330,100	1,406,500	3,894,500
	Critical Species Habitat Sites	18,400	271,300	62,400	78,700	430,800
	Grassland and Forest Interior Sites	183,000	--	--	--	183,000
	Geological Area Sites	--	7,000	--	18,000	25,000
	Subtotal	$ 1,003,400	$ 1,830,950	$ 392,500	$ 1,509,200	$ 4,736,050
Walworth	Natural Area Sites of Statewide or Greater (NA-1) Significance	$ 209,300	--	--	$ 74,800	$ 284,100
	Natural Area Sites of Other (NA-2 and NA-3) Significance	1,034,300	$ 604,800	$ 82,000	1,301,000	3,022,100
	Critical Species Habitat Sites	89,600	455,000	50,000	419,500	1,014,100
	Grassland and Forest Interior Sites	2,277,000	--	--	--	2,277,000
	Geological Area Sites	3,252,900	3,900	--	16,000	3,272,800
	Subtotal	$ 6,863,100	$ 1,063,700	$ 132,000	$ 1,811,300	$ 9,870,100
Washington	Natural Area Sites of Statewide or Greater (NA-1) Significance	$ 157,700	--	$ 296,500	$ 921,600	$ 1,375,800
	Natural Area Sites of Other (NA-2 and NA-3) Significance	4,231,900	$ 4,565,000	1,229,200	3,449,900	13,476,000
	Critical Species Habitat Sites	180,000	--	154,100	12,000	346,100
	Grassland and Forest Interior Sites	400,800	--	--	--	400,800
	Geological Area Sites	1,765,800	32,000	84,000	130,000	2,011,800
	Subtotal	$ 6,736,200	$ 4,597,000	$1,763,800	$ 4,513,500	$17,610,500
Waukesha	Natural Area Sites of Statewide or Greater (NA-1) Significance	$ 80,400	$ 680,500	--	--	$ 760,900
	Natural Area Sites of Other (NA-2 and NA-3) Significance	1,061,200	2,536,300	$2,174,800	$ 1,908,600	7,681,100
	Critical Species Habitat Sites	581,200	111,700	64,200	1,006,400	1,763,500
	Grassland and Forest Interior Sites	2,096,000	--	--	--	2,096,000
	Geological Area Sites	2,408,600	26,400	3,200	107,800	2,546,000
	Subtotal	$ 6,227,400	$ 3,354,900	$2,242,200	$ 3,023,000	$14,847,500
Region	Natural Area Sites of Statewide or Greater (NA-1) Significance	$ 1,172,100	$ 753,250	$ 296,500	$ 1,261,700	$ 3,483,550
	Natural Area Sites of Other (NA-2 and NA-3) Significance	7,764,100	12,238,500	4,619,400	10,522,800	35,144,800
	Critical Species Habitat Sites	1,189,000	838,000	432,900	1,805,600	4,265,500
	Grassland and Forest Interior Sites	4,956,800	--	--	--	4,956,800
	Geological Area Sites	7,526,100	98,700	106,800	271,800	8,003,400
	Total	$22,608,100	$13,928,450	$5,455,600	$13,861,900	$55,854,050

[a] *All cost figures are expressed in constant 1994 dollars.*

Source: SEWRPC.

Table 134

ENDANGERED, THREATENED, AND RARE PLANT SPECIES OCCURRENCES IN NATURAL AREAS, CRITICAL SPECIES HABITAT SITES, AND GEOLOGICAL AREAS IN SOUTHEASTERN WISCONSIN

Species Status[a]	Number of Occurrences[b]	Occurrences to Be Protected		Occurrences Not to Be Protected	
		Number	Percent	Number	Percent
Endangered	73	66	90.4	7	9.6
Threatened	187	176	94.1	11	5.9
Rare[c]	558	543	97.3	15	2.7
Total	818	785	96.0	33	4.0

[a]*Based on the Wisconsin Natural Heritage Inventory Working List.*

[b]*A total of 16 endangered species was identified in 73 occurrences; 20 threatened species in 187 occurrences; and 50 rare species in 558 occurrences; for a total of 86 endangered, threatened, or rare species in 818 occurrences.*

[c]*"Rare" includes species designated as having "watch" or "special concern" status.*

Source: SEWRPC.

Table 135

ENDANGERED, THREATENED, AND RARE BIRD SPECIES OCCURRENCES IN NATURAL AREAS, CRITICAL SPECIES HABITAT SITES, AND GEOLOGICAL AREAS IN SOUTHEASTERN WISCONSIN

Species Status[a]	Number of Occurrences[b]	Occurrences to Be Protected		Occurrences Not to Be Protected	
		Number	Percent	Number	Percent
Endangered	11	11	100.0	0	0.0
Threatened	60	59	98.3	1	1.7
Rare[c]	134	132	98.5	2	1.5
Total	205	202	98.5	3	1.5

[a]*Based on the Wisconsin Natural Heritage Inventory Working List.*

[b]*A total of six endangered species was identified in 11 occurrences; six threatened species in 60 occurrences; and 32 rare species in 134 occurrences; for a total of 44 endangered, threatened, or rare species in 205 occurrences.*

[c]*"Rare" includes species designated as having "watch" or "special concern" status.*

Source: SEWRPC.

constant 1994 dollars, would approximate $2.8 million. This represents an annual regional per capita cost of $1.48.

PLAN PERFORMANCE

An important measure of the performance of the recommended plan relates to the extent to which full implementation of the plan would protect the critical plant species occurrences reported in the Region. In Chapter VI of this report, a total of 818 known occurrences in the Region of endangered, threatened, and rare plant species was reported. As shown in Table 134, if the recommended plan were to be fully implemented, lands encompassing a total of 785 such occurrences, or about 96 percent of the total, would be placed under protective ownership. Similarly, as shown in Table 135, a total of 202 occurrences of endangered, threatened, and rare bird species, representing nearly 99 percent of the number of known occurrences found in the Region, would be protected upon full plan implementation.

Additional information is provided in Table 136 relative to the number of Natural Area sites, Critical Species Habitat sites, and Geological Area sites that are recommended under the plan to be placed under protective ownership. Of the total 447 Natural Area sites, full implementation of the plan would bring under protective ownership 427 sites, or 96 percent. These 427 sites contain 98 percent of the areal extent of all Natural Area sites. With respect to Critical Species Habitat sites, full implementation of the plan would bring under protective ownership 110 of the 141 such sites, or 78 percent. These 110 sites encompass about 95 percent of the areal extent of all such sites.

Finally, full implementation of the plan would bring under protective ownership 71 of the 86 Geological Area sites found in the inventory. These 71 sites represent 83 percent of the sites concerned. Those 71 sites also represent about 62 percent of the total areal extent of all 86 identified Geological Area sites.

PLAN IMPLEMENTATION

The recommended natural areas and critical species habitat protection and management plan described above provides a design for attainment of the specific objectives formulated under the regional natural areas and critical species habitat protection and management planning effort. In a practical sense, however, the recommended plan is not complete until the steps required to implement the plan—that is, to convert the plan into action policies and programs—are specified.

This section is intended as a guide for use in the implementation of the recommended natural areas and critical species habitat protection and management plan for Southeastern Wisconsin. Basically, this section outlines the activities which must be taken by the various levels and agencies of government concerned if the recommended plan is to be fully carried out. Those units and agencies of government which have plan adoption and plan

Table 136

SUMMARY OF NUMBERS AND ACREAGES OF NATURAL AREAS, CRITICAL SPECIES HABITAT SITES, AND GEOLOGICAL AREAS RECOMMENDED TO BE PROTECTED THROUGH LAND PROTECTION MEASURES

Area Type	Rank[a]	Total		Areas to Be Protected				Areas Not to Be Protected			
		Number of Sites	Area (acres)	Number of Sites	Percent of Sites	Area (acres)	Percent of Area	Number of Sites	Percent of Sites	Area (acres)	Percent of Area
Natural Areas	NA-1	40	8,700	40	100	8,700	100	--	--	--	--
	NA-2	122	21,191	122	100	21,191	100	--	--	--	--
	NA-3	285	27,758	265	93	26,464	95	20	7	1,294	5
Subtotal	--	447	57,649	427	96	56,355	98	20	4	1,294	2
Critical Species Habitat Sites[b]	All Sites	141	14,118	110	78	13,470	95	31	22	648	5
Geological Areas[c]	GA-1	23	20,327	23[d]	100[d]	20,051	99	--[d]	--[d]	276	1
	GA-2	28	4,277	19	68	200	5	9	32	4,077	95
	GA-3	35	12,344	29	83	2,505	20	6	17	9,839	80
Subtotal	--	86	36,948	71	83	22,756	62	15	17	14,192	38
Total	--	674	108,715	608	90	92,581	85	66	10	16,134	15

[a] *NA-1 denotes Natural Areas of statewide or greater significance*
NA-2 denotes Natural Areas of countywide or regional significance
NA-3 denotes Natural Areas of local significance
GA-1 denotes Geological Areas of statewide or greater significance
GA-2 denotes Geological Areas of countywide or regional significance
GA-3 denotes Geological Areas of local significance

[b] *Acreages for Critical Species Habitat sites to be acquired do not include situations where such sites overlap with Natural Areas.*

[c] *Acreages for Geological Areas to be acquired do not include situations where such areas overlap with Natural Areas or Critical Species Habitat sites, or where Geological Areas are located within larger Geological Areas. The total acreage of Geological Areas to be protected is therefore understated by 20,494 acres.*

[d] *A portion of one GA-1 site, encompassing 276 acres, is not proposed to be acquired.*

Source: SEWRPC.

implementation powers applicable to the recommended plan are identified; necessary formal plan adoption actions are specified; and specific implementation activities are recommended for the land acquisition, regulation, and management elements for each of the units and agencies of government concerned. In addition, some plan implementation recommendations are directed to private-sector interests.

To the maximum extent possible, the plan implementation recommendations are based upon, and related to, existing governmental programs and are predicated upon existing enabling legislation. However, because of the ever-present possibility of unforeseen changes in economic conditions, State and Federal legislation, case-law decisions, governmental agencies, and fiscal policies, it is not possible to precisely predict the exact manner in which the regional natural areas and critical species habitat protection and management plan implementation process will be administered and financed. Consequently, changes over time in the means of implementation may be expected.

Although the Regional Planning Commission can promote and encourage natural areas and critical species habitat protection and management plan implementation in various ways, the advisory role of the Commission makes actual implementation of the recommended regional natural areas and critical species habitat protection and management plan entirely dependent upon action by certain local, State, and Federal agencies of government, as well as private conservation organizations. The public agencies concerned include general-purpose local units of government, such as cities, villages, and towns, as well as counties; State agencies responsible for the acquisition and management of natural areas; and Federal agencies that provide assistance for plan implementation.

Because of the number of units and agencies of government and the number and types of private conservancy organizations operating within the Southeastern Wisconsin Region, it is important to identify those agencies having the legal authority and financial capability to most effectively implement the recommended natural areas and critical

species habitat protection and management plan. Accordingly, those agencies whose actions will have significant effects either directly or indirectly upon the successful implementation of the recommended plan and whose full cooperation in plan implementation will be essential are listed and discussed below.

Plan Implementation Agencies

The list of potential implementation agencies, that is, those public and private conservation agencies deemed most suited to acquire and manage selected Natural Areas, Critical Species Habitat sites, and Geological Areas, is as follows:

1. State Government

   The largest conservation landowner in Southeastern Wisconsin is the State of Wisconsin, primarily through the Department of Natural Resources (DNR). At present, a number of identified Natural Areas and Critical Species Habitat sites and wildlife habitat areas are administered by the DNR within State Natural Areas, State parks, State forests, wildlife areas, and fisheries areas. Although landholdings of the DNR are located throughout the Region, such holdings are concentrated in the Northern and Southern Units of the Kettle Moraine State Forest in Walworth, Waukesha, and Washington Counties. Not all holdings of the DNR meet the criteria for inclusion in the regional Natural Areas inventory; however, those that do include a number of particularly significant areas, including the Kettle Moraine Fen and Low Prairie, Ottawa Lake Fen, and Scuppernong Prairie State Natural Areas in Waukesha County; the Beulah Bog, Bluff Creek Fens and Oak Woods, and Young Prairie State Natural Areas in Walworth County; the Peat Lake State Natural Area and the Bong Low Prairie area in Kenosha County; the Cherry Lake Sedge Meadow State Natural Area and the Tichigan Fen area in Racine County; the Cedarburg Bog State Natural Area and Harrington Beach State Park in Ozaukee County; and the Kewaskum Maple-Oak Woods State Natural Area in Washington County.

2. County Government

   The counties of Southeastern Wisconsin have acted to protect a number of Natural Areas within the Region, usually by inclusion in county park systems. Examples of such areas include the Bristol Woods and Petrifying Springs Woods in Kenosha County; the Muskego Park Hardwoods State Natural Area and Monches Woods in Waukesha County; the Cudahy Woods, Falk Park Woods, and Grant Park Woods areas in Milwaukee County; the Sanders Park Hardwoods State Natural Area and Cliffside Park Woods and Clay Banks in Racine County; and the Sandy Knoll Swamp in Washington County.

3. Local Government

   The local units of government—cities, villages, and towns—have also acted to protect a number of Natural Areas within the Region, again usually by inclusion in local park systems. Examples include the Village of Fontana-on-Geneva Lake in Walworth County, which owns and protects the Fontana Prairie and Fen; the City of Brookfield in Waukesha County, which owns and protects Wirth Swamp, Brookfield Swamp, and Zion Woods; the Village of Germantown in Washington County, which owns and protects the Germantown Swamp; and the Town of Caledonia in Racine County, which owns and protects the Caledonia Wildlife Area. Special-purpose local units of government, such as lake management districts and school districts, can also own land and protect Natural Areas.

4. Private Conservation Organizations

   A number of private organizations have acted to protect Natural Areas in the Region, the most prominent of which is the Wisconsin Chapter of The Nature Conservancy (TNC). The Nature Conservancy is an international nonprofit conservation organization committed to the preservation of natural diversity. To achieve this goal, TNC resources are devoted to identifying, protecting, and managing biologically critical natural areas and the variety of life dependent upon the preservation of those areas. TNC owns and operates the largest private sanctuary system in the United States, but because of the wide geographic area over which TNC operates, only the very best natural areas can be considered for TNC preservation action. Virtually all funding is from membership dues and contributions, foundation grants, and corporate and individual gifts. As of 1994, the Wisconsin Chapter of TNC had protected 16 sites encompassing about 3.7 square miles of land within the Region. Examples of Natural Areas in Southeastern Wisconsin protected through

TNC action include portions of the Lulu Lake and Pickerel Lake Fen State Natural Areas in Walworth County and portions of the Chiwaukee Prairie State Natural Area, Kenosha Sand Dunes and Low Prairie, and Des Plaines River Lowlands in Kenosha County. In some instances, TNC has transferred ownership of a Natural Area to another organization, as in the case of the Renak-Polak Maple-Beech Woods State Natural Area in Racine County, which, while initially acquired by TNC, was subsequently transferred to the University of Wisconsin-Parkside for ownership and management.

Private conservation organizations have also been formed within the Region at the county level. These organizations have goals similar to those of The Nature Conservancy, but operate on a much smaller geographic scale. These private, nonprofit organizations are dedicated to preserving natural areas within a given county by establishing conservation easements, accepting land donations, purchasing land, and working with public and private entities to ensure land protection. Such county-level organizations presently exist within the Region in Ozaukee and Waukesha Counties. Natural Areas in Waukesha County that the Waukesha Land Conservancy has protected include portions of the Eagle Centre (Haffner) Oak Opening in the Town of Eagle and Village of Eagle.

Private conservancy organizations have also been formed within the Region at the local level. These include the Cedar Lakes Conservation Foundation in Washington County, which owns and protects the Little Cedar Lake Wetlands; Ducks Limited in the Town of Saukville in Ozaukee County, which owns and protects Ducks Limited Bog; the Ice Age Park & Trail Foundation, Inc., which owns and protects the Ottawa Limestone Outcrop in Waukesha County; and the Izaak Walton League, which owns and protects the Perkins Property in Waukesha County.

Private nature centers also help protect a number of Natural Areas in the Region. Examples include the Riveredge Nature Center in Ozaukee County, which owns and protects the Riveredge Creek and Ephemeral Pond State Natural Area and Riveredge Mesic Woods; and Hawthorn Hollow Nature Sanctuary in Kenosha County, which owns and protects portions of the Pike River Low Woods. In addition, organizations associated with the National Audubon Society help protect Natural Areas, such as the Schlitz Audubon Center, which owns and protects the Schlitz Audubon Center Woods and Beach in Milwaukee County, and the Kettle Moraine Audubon Society, which owns and protects portions of the CTH J Swamp in Washington County.

5. Educational Institutions
   A number of private and public colleges and universities help protect Natural Areas in the Region. For example, George Williams College owns and protects the George Williams Sedge Meadow in Walworth County. Among universities, the University of Wisconsin-Parkside owns and protects portions of the Chiwaukee Prairie State Natural Area, Harris Marsh and Oak Woods, and Petrifying Springs Woods, all in Kenosha County, and the Renak-Polak Maple-Beech Woods State Natural Area in Racine County, while the University of Wisconsin-Milwaukee owns and protects portions of the Cedarburg Bog, Sapa Spruce Bog, and Cedarburg Beech Woods State Natural Areas in Ozaukee County and all of Benedict Prairie in Kenosha County and Downer Woods in Milwaukee County.

Plan Adoption and Integration

Upon adoption of the natural areas and critical species habitat protection and management plan by formal resolution of the Southeastern Wisconsin Regional Planning Commission, in accordance with Section 66.945(10) of the Wisconsin Statutes, the Commission will transmit a certified copy of the adopting resolution, together with the plan as documented in this report, to all county and municipal units of government within the Region and to all of the concerned State and Federal agencies and private conservation organizations for which plan implementation responsibilities are recommended in this report. Adoption, endorsement, or formal acknowledgment of the regional natural areas and critical species habitat protection and management plan by the county and municipal governing bodies and by the State and Federal agencies concerned is highly desirable to assure a common understanding among the several governmental levels and to enable their staffs to program the necessary implementation work and funding.

The following sections identify plan adoption, endorsement, or acknowledgment actions which should be taken in order to promote plan implementation.

County and Local Agencies: It is recommended that the seven county boards in the Region formally adopt and implement the recommended natural areas and critical species habitat protection and management plan as a guide to future natural area and critical species habitat site acquisition and management in their respective areas of jurisdiction. Such adoption should follow consideration by the respective county park and planning agencies and committees and land conservation departments.

It is further recommended that the cities, villages, and towns in the Region formally adopt and implement the recommended natural areas and critical species habitat protection and management plan as a guide to future open space preservation by the respective municipal park and planning agencies. Upon adoption by each local unit of government concerned, the plan should be referred to the appropriate committees and boards for implementation.

State Agencies: It is recommended that the Wisconsin Natural Resources Board endorse the natural areas and critical species habitat protection and management plan and direct the staff of the Wisconsin Department of Natural Resources to integrate the plan recommendations into its broad range of agency responsibilities, as well as to assist in coordinating plan implementation activities over time. It is further recommended that the Department staff coordinate the recommended natural areas and critical species habitat protection and management plan with activities relating to floodland and shoreland zoning, water quality standards for wetlands, public sanitary sewer service areas, wildlife and fisheries management plans, and the State natural areas and endangered resource management and protection plans. Finally, it is recommended that the Wisconsin Department of Natural Resources integrate the inventory of the Natural Areas and Critical Species Habitat sites set forth in this report into its natural heritage inventory data base.

It is recommended that the Natural Areas Preservation Council act to endorse the regional natural areas and critical species habitat protection and management plan.

It is recommended that the State Historical Society of Wisconsin endorse the plan and integrate the inventory of unmarked historic sites into the State's program of marking historical, archaeological, and geological sites in the Region.

Federal Agencies: It is recommended that the U. S. Fish and Wildlife Service acknowledge the regional natural areas and critical species habitat protection and management plan and utilize the plan in its administration and granting of Federal acquisition and technical assistance funds and Federal Endangered Species Act reviews.

It is recommended that the U. S. Environmental Protection Agency acknowledge the regional natural areas and critical species habitat protection and management plan and utilize the plan in its administration of Federal Clean Water Act matters.

It is recommended that the U. S. Department of the Army, Corps of Engineers, acknowledge the regional natural areas and critical species habitat protection and management plan and utilize the plan in its reviews and actions concerning the Federal Clean Water Act and the Rivers and Harbors Act of 1899.

It is recommended that the U. S. Department of Agriculture, Natural Resources Conservation Service, acknowledge the regional natural areas and critical species habitat protection and management plan and utilize the plan in its review and actions concerning the National Food Security Act.

Private Conservancy Organizations: It is recommended that the boards of trustees of the private conservancy organizations operating in the Region, including The Nature Conservancy and the county conservation trusts, act to endorse the natural areas and critical species habitat protection and management plan. It is further recommended that these private conservancy organizations use the plan as a guide to their natural area and critical species habitat preservation and management efforts within the Region.

FINANCIAL AND TECHNICAL ASSISTANCE

Upon adoption of the recommended regional natural areas and critical species habitat protection and management plan, it is important that the local, county, and State units and agencies of government and the private conservancy organizations concerned within the Region effectively utilize all

sources of financial and technical assistance available for execution of the plan elements. There are numerous financial and technical assistance programs available. Listed below are those which may have a particularly significant effect upon the direct implementation of the recommended regional natural areas and critical species habitat protection and management plan.

Park and Open Space Grants

Federal and State park and open space aid programs provide county and local units of government and private conservancy organizations with substantial financial assistance in the acquisition of park and open space lands. In general, county and local units of government and private conservancy organizations in the Region are eligible for these grants; however, the eligibility of individual projects is based upon certain planning and other prerequisites. The following is a brief description of the two most important programs.

Stewardship Program: The Wisconsin Legislature established this program, administered by the Wisconsin Department of Natural Resources, to provide assistance funds to acquire and develop park and open space lands and facilities, restore wildlife habitat, preserve natural areas, and protect water quality. Two programs under the Stewardship Program, the Aids for the Acquisition and Development of Local Parks program and the Urban Green Space program, provide grants to counties and other local units of government in amounts of up to 50 percent of the cost of acquisition and development of lands to be used for county and local park and open space systems. Grants are also awarded to private conservancy organizations to acquire lands having important natural resources.

Federal Land and Water Conservation Fund Program: This program, administered by the U. S. Department of the Interior, National Park Service, through the Wisconsin Department of Natural Resources, provides grants to state and local units of government in amounts of up to 50 percent of the cost of acquisition and improvement of park and open space areas.

Technical Assistance

Certain Federal, State, regional, and county agencies and private conservation organizations provide, upon request, various levels and types of technical assistance useful in implementation of the natural areas and critical species habitat protection and management plan to local units of government and individual landowners. Limited guidance and assistance is usually provided for a nominal fee. In some cases, the local unit of government may contract with the agency or organization for more extensive technical assistance services. A summary of the various levels and types of assistance available from the various government agencies involved is set forth below.

County Agencies: Those counties with park or planning staffs generally provide to local units of government and private groups certain technical services related to open space land acquisition and management.

Areawide Agencies: The Southeastern Wisconsin Regional Planning Commission engages in the provision of educational, advisory, and review services to units of government, including participation in educational programs, such as workshops; provision of speakers; sponsorship of regional planning conferences; publication of bimonthly newsletters; selection of staff and consultants; preparation of natural area planning and management programs, special base and soil mapping, and aerial photography; provision of information regarding Federal and State aid programs; review of local natural area planning and management programs and proposals and most Federal grant applications; and provision of field survey and staking services for Natural Areas and Critical Species Habitat sites. In addition, the Commission is empowered to contract with local units of government under Section 66.30 of the Wisconsin Statutes to conduct studies and offer advice regarding Natural Areas, Critical Species Habitat sites, and environmental corridors.

State Agencies: The University of Wisconsin-Extension, through county agents and extension specialists, provides important educational and technical assistance to private conservancy organizations and to local units of government in conservation, plant and animal identification and management, and habitat management design.

The Wisconsin Department of Natural Resources provides advice on endangered and threatened species management and natural area project design and management. The Department is authorized to provide technical assistance to local units of government and private conservation organizations in efforts to initiate or engage in specific types of resource management, such as shrub and exotic

species control. The Department also provides plan review services for locally designed natural areas and critical species habitat plans for specific sites.

Federal Agencies: The U. S. Department of the Interior, Fish and Wildlife Service, provides technical assistance to states, counties, and local agencies and units of government and private conservation organizations concerning the protection and management of wildlife habitat areas and critical species habitats.

The U. S. Department of the Interior, National Biological Service, also provides technical assistance to states, counties, and local agencies and units of government and private conservation organizations concerning the protection and management of natural areas and critical species habitats.

Specific Plan Implementation Responsibilities

The specific plan implementation responsibilities set forth in the recommended natural areas and critical species habitat protection and management plan are summarized in a series of tables beginning with Table 137 and extending through Table 154. These implementation responsibilities are as follows:

1. Wisconsin Department of Natural Resources
   It is recommended that the Wisconsin Department of Natural Resources undertake all of the site acquisition and management responsibilities summarized in Table 137. Given its mission to protect the State's natural resources, the recommendations directed at the Department are broad and varied, and involve Natural Areas, Critical Species Habitat sites, grasslands, forest interior lands, and Geological Areas. In total, plan implementation recommendations directed at the Department pertain to 169 individual sites in the Region.

2. Individual Counties
   It is recommended that the seven counties in Southeastern Wisconsin undertake, as appropriate, all of the site acquisition and management responsibilities summarized on a county-by-county basis in Tables 138 through 144. Each of these recommendations should be reviewed and, to the extent feasible, reflected in county park and open space plans. In total, plan implementation recommendations directed at the seven counties pertain to 178 individual sites in the Region.

3. Local Governments, Lake Management Districts, Sanitary Districts, and School Districts
   It is recommended that the local governments, including city, village, and town governments, lake management districts, sanitary districts, and school districts, in Southeastern Wisconsin undertake, as appropriate, all of the site acquisition and management responsibilities summarized on a county-by-county basis in Tables 145 through 151. Each of these recommendations should be reviewed and, to the extent feasible, reflected in local park and open space plans. In total, plan implementation recommendations directed at local governments and school districts pertain to 97 individual sites in the Region.

4. Private Conservancy Organizations
   It is recommended that The Nature Conservancy undertake all of the site acquisition and management responsibilities summarized in Table 152. These recommendations pertain to 11 individual sites in the Region. In addition, it is recommended that other private conservancy organizations, including land trusts, lake management associations, nature centers, sportsmen's clubs, and similar conservation-minded organizations and institutions undertake, as appropriate, all of the site acquisition and management responsibilities summarized in Table 153. In total, plan implementation recommendations directed at these other conservation organizations pertain to 151 individual sites in the Region. To aid in the foregoing, it is recommended that county-wide land trusts be created in Kenosha, Milwaukee, Racine, Walworth, and Washington Counties to provide a focal point for active private-sector participation in plan implementation. Such county-level land trusts already exist and are active in Ozaukee and Waukesha Counties.

5. Other State Agencies
   It is recommended that the University of Wisconsin and the Wisconsin Department of Transportation undertake, as appropriate, the site acquisition and management responsibilities summarized in Table 154. These recommendations pertain to 11 individual sites in the Region.

Table 137

SUMMARY OF SITES RECOMMENDED FOR ACQUISITION AND MANAGEMENT BY THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Type of Area	County	Civil Division(s)	Name	Site Area (acres)			Comments
				Already under Protective Ownership[a]	Proposed to Be Acquired[a]	Total[a]	
NA-1 Natural Areas	Kenosha	City of Kenosha	Kenosha Sand Dunes and Low Prairie	86	13	99	Site lies within the established project boundary for the Chiwaukee Prairie-Carol Beach Area
		Village of Pleasant Prairie	Carol Beach Low Prairie and Panné State Natural Area	29	10	39	Site lies within the established project boundary for the Chiwaukee Prairie-Carol Beach Area
		Town of Salem	Peat Lake State Natural Area	136	4	140	Represents expansion of an existing State project
	Ozaukee	Town of Saukville	Cedarburg Bog State Natural Area	1,572	437	2,009	Site lies within the established project boundary for the Cedarburg Bog Scientific Area
	Racine	Town of Rochester	Cherry Lake Sedge Meadow State Natural Area	163	27	190	Site lies within the established project boundary for the Honey Creek Wildlife Area
		Town of Waterford	Tichigan Fen	95	23	118	Site lies within the established project boundary for the Tichigan Wildlife Area
	Walworth	Town of Eagle Town of Troy	Lulu Lake and Eagle Spring Lake Wetland Complex and Adjacent Uplands	726	244	970	Site lies within the established project boundary for the Lulu Lake State Natural Area. About 791 acres of this site lie within Walworth County and about 179 acres lie within Waukesha County
		Town of East Troy	Beulah Bog State Natural Area	58	14	72	Represents expansion of an existing State project
		Town of LaGrange Town of Whitewater	Bluff Creek Woods	319	19	338	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest
		Town of LaGrange	Young Prairie State Natural Area	53	--	53	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest. An additional nine acres of this site extend into Jefferson County
		Town of Whitewater	Bluff Creek Fens	106	--	106	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest
			Clover Valley Fen	93	19	112	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest
	Washington	Town of Addison	Aurora Road Fen	--	22	22	Site lies within the established project boundary for the Allenton Wildlife Area
		Town of Barton	Smith Lake and Wetlands	85	45	130	New recommendation
		Town of Kewaskum	Kewaskum Maple-Oak Woods State Natural Area	46	40	86	Site lies within the established project boundary for the Northern Unit of the Kettle Moraine State Forest
			Milwaukee River Floodplain Forest State Natural Area	130	5	135	Site lies within the established project boundary for the Northern Unit of the Kettle Moraine State Forest
		Town of West Bend	Paradise Lake Fen	11	11	22	Acquisition recommended in County park plan
	Waukesha	Town of Eagle	Scuppernong Springs Dry Prairie	544	28	572	Site lies within the esteblished project boundary for the Southern Unit of the Kettle Moraine State Forest
			Kettle Moraine Fen and Low Prairie State Natural Area	109	--	109	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest
		Town of Genesee	Genesee Oak Opening and Yatzeck's Fen State Natural Area	40	55	95	Represents expansion of an existing State project

Table 137 (continued)

Type of Area	County	Civil Division(s)	Name	Site Area (acres)			Comments
				Already under Protective Ownership[a]	Proposed to Be Acquired[a]	Total[a]	
NA-1 Natural Areas (continued)	Waukesha (continued)	Town of Ottawa	Ottawa Lake Fen State Natural Area	25	--	25	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest
		Subtotal	21 sites	4,426	1,016	5,442	--
NA-2 Natural Areas	Kenosha	Village of Pleasant Prairie	104th Street Mesic Prairie	8	3	11	Site lies within the established project boundary for the Chiwaukee Prairie-Carol Beach Area
			Carol Beach Prairie	50	21	71	Site lies within the established project boundary for the Chiwaukee Prairie-Carol Beach Area
			Barnes Creek Dunes and Panné	6	2	8	Site lies within the established project boundary for the Chiwaukee Prairie-Carol Beach Area
			Tobin Road Prairie	9	5	14	Site lies within the established project boundary for the Chiwaukee Prairie-Carol Beach Area
		Town of Randall	Elizabeth Lake Lowlands	--	48	48	Acquisition recommended in County park plan
		Town of Salem	Camp Lake Marsh	116	177	293	Site lies within the established project boundary for the New Munster Wildlife Area
		Town of Wheatland	New Munster Shrub-Carr and Tamarack Relict	289	95	384	Acquisition recommended in County park plan
	Ozaukee	Town of Belgium	Harrington Beach Lacustrine Forest	178	--	178	Existing State ownership (Harrington Beach State Park)
		Town of Saukville	South Conifer Swamp	3	49	52	Acquisition recommended in County park plan
			Max's Bog	6	24	30	Acquisition recommended in County park plan
	Racine	Town of Burlington	Karcher Springs State Natural Area	23	--	23	Existing State ownership
			Leda Lake Fen-Meadow	124	97	221	Represents expansion of an existing State project
		Town of Norway	Wind Lake Tamarack Swamp	122	212	334	Represents expansion of an existing State project
		Town of Rochester	Brock Lake Fen	68	163	231	Site lies within the established project boundary for the Honey Creek Wildlife Area
		Town of Waterford	Tichigan Marsh	252	195	447	Site lies within the established project boundary for the Tichigan Wildlife Area
			Tichigan Wetlands and Low Woods	154	16	170	Site lies within the established project boundary for the Tichigan Wildlife Area
	Walworth	Town of Delavan	Comus Lake Wetland Complex	9	282	291	Acquisition recommended in County park plan
		Town of LaGrange	Kestol Dry Prairie	1	--	1	Existing State ownership (Kettle Moraine State Forest)
			LaGrange Oak Woods	685	13	698	Site lies within the established project boundary for the Southern Unit of the Kettle Moreine State Forest
			Muir Oak Woods and Duffin Road Fen	622	42	664	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest
		Town of Lyons	Lake Ivanhoe Fen and Sedge Meadow	58	35	93	Represents expansion of an existing State project

Table 137 (continued)

Type of Area	County	Civil Division(s)	Name	Site Area (acres)			Comments
				Already under Protective Ownership[a]	Proposed to Be Acquired[a]	Total[a]	
NA-2 Natural Areas (continued)	Walworth (continued)	Town of Spring Prairie Town of Burlington	Honey Lake Marsh and Sedge Meadow	132	259	391	Site lies within the established project boundary for the Honey Creek Wildlife Area. About 141 acres of this site lie within Walworth County and about 250 acres lie within Racine County
	Washington	Town of Erin	Loew's Lake Wetland Complex	280	201	481	Site lies within the established project boundary for the Loew Lake Unit of the Kettle Moraine State Forest
		Town of Erin Town of Richfield	Friess Lake Tamarack Swamp	--	228	228	Site lies partially within the established project boundary for the Loew Lake Unit of the Kettle Moraine State Forest
		Town of Jackson	Jackson Swamp	1,221	350	1,571	Site lies within the established project boundary for the Jackson Marsh Wildlife Area
		Town of Kewaskum	Kettle Moraine Drive Bog	29	10	39	Site lies within the established project boundary for the Northern Unit of the Kettle Moraine State Forest
			Glacial Trail Forest	212	11	223	Site lies within the established project boundary for the Northern Unit of the Kettle Moraine State Forest
			St. Michael's Woods	81	3	84	Site lies within the established project boundary for the Northern Unit of the Kettle Moraine State Forest
		Town of West Bend	Silverbrook Lake Woods	148	256	404	Acquisition recommended in County park plan
			Hacker Road Bog	25	--	25	Existing State ownership
	Waukesha	City of Delafield	Nagawicka Lake Bog and Oak Woods	81	75	156	Represents expansion of an existing State project
		Town of Eagle	Eagle Oak Opening and Dry Prairies	466	--	466	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest
			Ulrickson Road Cedar Glade	32	--	32	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest
			Eagle Shrub-Fen	65	4	69	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest
			Beaver Dam Lake	96	25	121	Represents expansion of an existing State project
			Kettle Moraine Limestone Outcrop	4	--	4	Existing State ownership (Kettle Moraine State Forest)
			Eagle Railroad Prairie	19	--	19	Existing State ownership (Kettle Moraine State Forest)
			Eagle Dry Prairie and Grotjans Fen	71	8	79	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest
		Town of Eagle	Fur Farm Pond	69	--	69	Existing State ownership (Kettle Moraine State Forest)
		Town of Eagle Town of Ottawa	Eagle Fen and Spring	150	5	155	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest
		Town of Eagle Town of Ottawa	Ottawa Oak Woods and Dry Prairies	965	--	965	Existing State ownership (Kettle Moraine State Forest)
		Town of Merton	Lake Keesus Fen-Meadow	33	108	141	Represents expansion of an existing State project
		Town of Mukwonago	Vernon Tamarack-Fen	16	--	16	Existing State ownership (Vernon Marsh Wildlife Area)
			Vernon Prairie-Fen	36	1	37	Site lies within the established project boundary for the Vernon Marsh Wildlife Area

Table 137 (continued)

Type of Area	County	Civil Division(s)	Name	Site Area (acres)			Comments
				Already under Protective Ownership[a]	Proposed to Be Acquired[a]	Total[a]	
NA-2 Natural Areas (continued)	Waukesha (continued)	Town of Mukwonago (continued)	Vernon Fen	10	--	10	Existing State ownership (Vernon Marsh Wildlife Area)
		Town of Ottawa	Henrietta Lake Bog	--	5	5	Acquisition recommended in County park plan
		Subtotal	46 sites	7,024	3,028	10,052	--
NA-3 Natural Areas	Kenosha	Town of Brighton	Bong Low Prairie	2	--	2	Existing State ownership (Bong State Recreation Area)
		Town of Salem	Hooker Lake Marsh	45	3	48	Represents expansion of an existing State project
	Ozaukee	Town of Cedarburg	Five Corners Swamp	19	154	173	Represents expansion of an existing State project
		Town of Fredonia	Department of Natural Resources Lowlands	45	141	186	Represents expansion of an existing State project
	Racine	Town of Dover	Dover Wildlife Area Wetlands	38	1	39	Site lies within the established project boundary for the Dover Wildlife Area
			Church Road Lowlands	22	3	25	Represents expansion of an existing State project
			Eagle Lake Wetlands	16	30	46	Represents expansion of an existing State project
		Town of Waterford	Tichigan Wet Prairie	15	--	15	Existing State ownership (Tichigan Wildlife Area)
	Walworth	Town of Bloomfield	Lake Ivanhoe Fen and Sedge Meadow	63	8	71	Represents expansion of an existing State project
			Bloomfield Sedge Meadow and Tamarack Relict	129	42	171	Represents expansion of an existing State project
		Town of Bloomfield	Pell Lake Railroad Prairie	--	4	4	Represents expansion of an existing State project
		Town of Darien	Turtle Creek Sedge Meadow and Fen	124	35	159	Site lies within the established project boundary for the Turtle Creek Wildlife Area
			Creek Road Fen	9	--	9	Existing State ownership (Turtle Creek Wildlife Area)
		Town of Delavan	Lake Lawn Wetland Complex	35	241	276	Represents expansion of an existing State project
		Town of Delavan Town of Sugar Creek	CTH P Sedge Meadow	--	18	18	Site is included in a Geological Area recommended to be acquired by the Department of Natural Resources
		Town of East Troy	East Troy Tamaracks	26	--	26	Existing State ownership
		Town of Geneva	Warbler Trail Wetlands	33	7	40	Represents expansion of an existing State project
		Town of LaGrange	Duffin Road Prairie	8	--	8	Existing State ownership (Kettle Moraine State Forest)
			Connelly Fen	--	2	2	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest
			Nordic Trail Oak Woods	277	206	483	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest
		Town of Lyons	Lake Geneva Tamarack Relict	--	160	160	Acquisition recommended in County park plan
		Town of Troy	Troy Fen	11	2	13	Represents expansion of an existing State project
			Honey Creek Fen	--	7	7	Acquisition recommended in County park plan

Table 137 (continued)

Type of Area	County	Civil Division(s)	Name	Site Area (acres)			Comments
				Already under Protective Ownership[a]	Proposed to Be Acquired[a]	Total[a]	
NA-3 Natural Areas (continued)	Walworth (continued)	Town of Whitewater	Lone Tree Trail Oak Woods	204	61	265	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest
			Whitewater Oak Woods	187	53	240	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest
			Rice Lake Dry Prairie	1	--	1	Existing State ownership (Kettle Moraine State Forest)
	Washington	Village of Germantown	Kleinman Swamp	38	33	71	Represents expansion of an existing State project[b]
		Town of Addison	Allenton Swamp	844	247	1,091	Site lies within the established project boundary for the Allenton Wildlife Area
		Town of Barton	Smith Lake Swamp	--	38	38	New recommendation; site is adjacent to an NA-1 area recommended for State acquisition
			Lange Hardwoods	--	53	53	Acquisition recommended in County park plan
			Wildwood Hardwood Swamp	--	98	98	Acquisition recommended in County park plan
		Town of Erin	Donegal Road Woods	26	111	137	Site lies within the established project boundary for the Loew Lake Unit of the Kettle Moraine State Forest
			St. Augustine Road Sedge Meadow	--	11	11	Site lies within the established project boundary for the Loew Lake Unit of the Kettle Moraine State Forest
		Town of Hartford	Pike Lake Woods	131	--	131	Existing State ownership (Pike Lake State Park)
		Town of Kewaskum	Kettle Moraine Drive Woods	287	--	287	Existing State ownership (Kettle Moraine State Forest). An additional 30 acres of this site extend into Fond du Lac County
		Town of Polk	Slinger Upland Woods	--	196	196	Acquisition recommended in County park plan
		Town of Wayne	Theresa Swamp	879	65	944	Site lies within the established project boundary for the Theresa Marsh Wildlife Area
			Wayne Creek Swamp	--	178	178	Site is adjacent to the established project boundary for the Allenton Marsh Wildlife Area
			Rock River Marsh	186	140	326	Site lies within the established project boundary for the Allenton Marsh Wildlife Area
		Town of West Bend	Ziegler Woods	--	170	170	Acquisition recommended in County park plan
	Waukesha	City of Oconomowoc Town of Summit	Oconomowoc Swamp	5	143	148	Represents expansion of an existing State project
		Town of Delafield	Lapham Peak Woods	351	100	451	Represents expansion of an existing State project
		Town of Eagle	Paradise Springs Woods	54	43	97	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest
		Town of Eagle	STH 59 Oak Woods and Prairies	209	9	218	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest
		Town of Oconomowoc	Raasch Tamarack Swamp	17	78	95	Represents expansion of an existing State project
			Oconomowoc River Marsh	65	35	100	Represents expansion of an existing State project
		Town of Ottawa	Scuppernong Springs Dry Prairie	1	--	1	Existing State ownership (Kettle Moraine State Forest)

Table 137 (continued)

Type of Area	County	Civil Division(s)	Name	Site Area (acres)			Comments
				Already under Protective Ownership[a]	Proposed to Be Acquired[a]	Total[a]	
NA-3 Natural Areas (continued)	Waukesha (continued)	Town of Vernon Town of Waukesha	Fox River Woods	351	60	411	Site lies within the established project boundary for the Vernon Marsh Wildlife Area
		Town of Waukesha	Pebble Creek Railroad Prairie	7	--	7	Existing State ownership (Glacial Drumlin Trail right-of-way)
			Vernon Mesic Prairie	16	--	16	Existing State ownership (Vernon Marsh Wildlife Area)
		Subtotal	50 sites	4,776	2,986	7,762	--
		All Natural Areas Subtotal	117 sites	16,226	7,030	23,256	--
Critical Species Habitat Sites	Kenosha	Town of Brighton	Bong State Recreation Area	4,894	246	5,140	Represents expansion of an existing State project (Bong State Recreation Area)
	Milwaukee	City of Milwaukee	Stadium Bluff Woods	8	--	8	Site contains a Geological Area recommended for State acquisition if the site is disposed of by the U. S. Department of Veterans Affairs
	Ozaukee	Town of Belgium	Harrington Beach State Park Old Fields	202 (482)	-- --	202 (482)	Existing State ownership (Harrington Beach State Park); site contains a Natural Area of countywide or regional significance
	Racine	Town of Burlington	Margis Wildlife Area	34	--	34	Existing State ownership (Margis Wildlife Area)
			Karcher Sedge-Carr	214	21	235	Site lies within an established project boundary for the Karcher Marsh Wildlife Area
	Walworth	Town of LaGrange	LaGrange Campground	200	--	200	Existing State ownership (Kettle Moraine State Forest)
		Town of Richmond	Lake Number 10 Open Woods	--	44	44	Acquisition recommended in County park plan
			Island Road Shrub-Carr	--	64	64	Site lies within a Geological Area (Turtle Creek Glacial Spillway) to be acquired by the State
		Town of Sharon	Railroad Lowland	43	17	60	Represents expansion of an existing State project
	Washington	Town of Addison	St. Anthony Maple Woods	--	90	90	Site lies within a forest interior habitat site recommended to be acquired by the Department of Natural Resources
	Waukesha	Town of Eagle	Shelter Two Ridge	4	--	4	Existing State ownership (Kettle Moraine State Forest)
			Mounded Fen	16	--	16	Existing State ownership (Kettle Moraine State Forest)
			Paradise Springs Brook	24	--	24	Existing State ownership (Kettle Moraine State Forest)
			Old World Wisconsin Marsh	30	--	30	Existing State ownership (Kettle Moraine State Forest)
			Headquarters Grasslands	28	--	28	Existing State ownership (Kettle Moraine State Forest)
		Town of Ottawa	Dog Trial Area	175	--	175	Existing State ownership (Kettle Moraine State Forest)
			Unnamed shrub-grassland	328	12	340	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest
		Town of Vernon Town of Mukwonago	Vernon Marsh	2,861	707	3,568	Site lies within the established project boundary for the Vernon Marsh Wildlife Area
		Subtotal	18 sites	9,061	1,201	10,262	--

Table 137 (continued)

Type of Area	County	Civil Division(s)	Name	Site Area (acres)			Comments
				Already under Protective Ownership[a]	Proposed to Be Acquired[a]	Total[a]	
Grasslands	Kenosha	Town of Brighton	Bong	-- (4,780)	--[c] (5,220)	-- (10,000)	About one-half of this site is within existing public ownership as part of the Bong State Recreation Area, the Kenosha School Forest, and the Salem School Forest. That portion of the grassland within the Bong State Recreation Area is within a Critical Species Habitat site. The remaining acreage would be protected through management agreements with private landowners
	Walworth	Town of Troy	Lulu Lake-Pickerel Lake	265	1,265	1,530	About 370 acres of this site are within the established project boundary for the Lulu Lake State Natural Area
	Waukesha	Town of Eagle	Scuppernong	929 (1,532)	562 (583)	1,491 (2,115)	Entire site lies within established project boundary for the Southern Unit of the Kettle Moraine State Forest
	--	Subtotal	3 sites	1,194	1,827	3,021	--
Forest Interiors	Ozaukee	Town of Belgium	Harrington Beach State Park Old Fields	-- (400)	-- --	-- (400)	Existing State ownership (Harrington Beach State Park)
	Racine	Town of Rochester	Oak Knoll Woods	40	122	162	New recommendation; site is partially within existing State ownership and is adjacent to the established project boundary for the Honey Creek Wildlife Area
	Washington	Town of Addison	St. Anthony Maple Woods	-- --	70 (160)	70 (160)	Site contains a Critical Species Habitat site encompassing 90 acres
		Town of Trenton	Shady Lane Woods	--	147	147	New recommendation
	Waukesha	City of Muskego	Parker Drive Woods	--	123	123	New recommendation
	--	Subtotal	5 sites	40	462	502	--
Geological Areas	Kenosha	City of Kenosha	Kenosha Dunes and Buried Forest	-- (86)	-- (13)	-- (99)	Site lies within the established project boundary for the Chiwaukee Prairie-Carol Beach area, and is within a Natural Aree of statewide or greater significance
	Milwaukee	City of Milwaukee	Soldiers' Home Reef	-- (5)	-- --	-- (5)	Site lies within the Stadium Bluff Woods Critical Species Habitat site
		City of Wauwatosa	Schoonmaker Reef	--	5[d]	5	New recommendation
		Village of Brown Deer	Brown Deer Railroad Cut	--	2[d]	2	New recommendation
		Village of Fox Point	Whitefish Bay Shore Exposure	--	2[d]	2	New racommendation
	Ozaukee	City of Mequon	Ozaukee Buried Forest	--	32	32	New recommendation
		Town of Belgium	Harrington Beach State Park Quarry	-- (25)	-- --	-- (25)	Existing State ownership (Harrington Beach State Park); site lies within a Critical Species Habitat site
	Walworth	Town of LaGrange	Nordic Trail Kettle Holes[e]	-- (22)	-- (10)	-- (32)	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest and is located within a Natural Area of local significance
			Spirits Wash Bowl[e]	-- (1)	-- --	-- (1)	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest and is located within a Natural Area of countywide or regional significance
			John Muir Trail Kettle Holes[e]	(28)	-- --	-- (28)	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest and is located within a Natural Area of countywide or regional significance

Table 137 (continued)

Type of Area	County	Civil Division(s)	Name	Site Area (acres)			Comments
				Already under Protective Ownership[a]	Proposed to Be Acquired[a]	Total[a]	
Geological Areas (continued)	Walworth (continued)	Town of LaGrange Town of Whitewater	Kettle Moraine Interlobate Moraine[f]	2,465 (5,635)	1,503 --	3,968 (7,138)	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest; site contains four NA-1, two NA-2, and four NA-3 sites and one Critical Species Habitat site, for a total of 3,170 acres within such sites
		Town of Darien Town of Richmond	Turtle Creek Glacial Spillway	830 (830)	1,337 (1,710)	2,167 (2,540)	Portions of this site either lie within the established project boundary for the Turtle Creek Wildlife Area or are in existing State ownership, or both. Site contains one NA-2, one NA-3, and one Critical Species Habitat site
		Town of Richmond	Moraine Triple Point	-- --	174 (218)	174 (218)	Acquisition recommended in County park plan as part of the Ice Age Trail corridor. The site contains one Critical Species Habitat site of 44 acres
		Town of Troy	Lulu Lake Glacial Lake and Crevasse Filling	-- (103)	-- --	-- (103)	Site lies within the established project boundary for the Lulu Lake State Natural Area and is located within a Natural Area of statewide or greater significance
		Town of Whitewater	Whitewater Lake-Rice Lake Eskers[e]	-- (113)	-- (62)	-- (175)	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest
	Washington	Town of Richfield	Friess Lake Hogsback Crevasse Filling[e]	-- --	-- (25)	-- (25)	Site lies within the established project boundary for the Loew Lake Unit of the Kettle Moraine State Forest and is located within a Natural Area of countywide or regional significance
		Town of Erin Town of Kewaskum Town of Richfield	Kettle Moraine Interlobate Moraine[g]	1,055 (2,701)	2,876 --	3,931 (5,577)	Site lies within the established project boundary for the Kettle Moraine State Forest and contains two Natural Areas of statewide or greater significance, five Natural Areas of countywide or regional significance, and three Natural Areas of local significance, for a total of 1,646 acres within such sites
	Waukesha	Village of Sussex	Sussex Lime Kiln	--	1	1	New recommendation
		Town of Delafield	Jones Quarry	--	4	4	New recommendation
		Town of Delafield Town of Genesee	Scuppernong Creek Spillway[h]	-- (104)	40 --	40 (144)	Site is located partially within the established project boundary for the Lapham Peak Unit of the Kettle Moraine State Forest and partially within the Ice Age Trail corridor
		City of Delafield Town of Delafield Town of Eagle Town of Ottawa	Kettle Moraine Interlobate Moraine[i]	10,739 (14,587)	1,127 --	11,866 (15,714)	Site lies within the established project boundary for the Kettle Moraine State Forest. The site contains three Natural Areas of statewide or greater significance, nine Natural Areas of countywide or regional significance, four Natural Areas of local significance, and seven Critical Species Habitat sites, for a total of 3,848 acres within such sites
		Town of Eagle	Brady's Rock[e]	-- (17)	-- (2)	-- (19)	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest
			Eagle Esker[e]	-- (20)	-- (11)	-- (31)	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest
			Stark Road Quarry[e]	-- (3)	-- --	-- (3)	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest

Table 137 (continued)

Type of Area	County	Civil Division(s)	Name	Site Area (acres)			Comments
				Already under Protective Ownership[a]	Proposed to Be Acquired[a]	Total[a]	
Geological Areas (continued)	Waukesha (continued)	Town of Eagle (continued)	Scuppernong Glacial Lake[h]	-- (2,178)	-- (2,925)	-- (5,103)	A portion of this site, 4,552 acres, or 58 percent, is within the established project boundary of the Southern Unit of the Kettle Moraine State Forest. Of the 3,280 acres outside the project boundary, 551 acres lie within two Natural Areas proposed to be acquired for protective ownership or are in existing State ownership
			Scuppernong Pitted Outwash[e]	-- (2,178)	-- (2,702)	-- (4,880)	Site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest, and lies within the Scuppernong Glacial Lake Geological Area
			Eagle Kettle Hole[e]	-- (13)	-- --	-- (13)	The site is within the Southern Unit of the Kettle Moraine State Forest and owned by the Department of Natural Resources
		Town of Genesee	Johnston Quarry and Kilns	--	14	14	New recommendation
	--	Subtotal	26 sites[j]	15,089	7,117	22,206	--
--	--	Total	169 sites	41,610	17,637	59,247	--

[a] *In applicable cases, the number in parentheses denotes total site area; that portion of the site not included within another Natural Area, Critical Species Habitat site, or Geological Area is listed above the total site area.*

[b] *Site is currently partially owned by the Wisconsin Department of Transportation as a potential wetland mitigation site. It is recommended that the Wisconsin Department of Natural Resources acquire the remainder of the site and work with the Department of Transportation to cooperatively manage the Natural Area.*

[c] *It is proposed that the 5,220 acres of this site not currently under public ownership be maneged for bird habitat through cooperative agreements between the Department of Natural Resources and private lendowners.*

[d] *It is proposed that a conservation easement be acquired for this site.*

[e] *This Geological Area lies within the area proposed to be ecquired for protection of the Kettle Moraine Interlobate Moraine Geological Aree.*

[f] *Includes the area within the established project boundary for the Southern Unit of the Kettle Moraine State Forest within Walworth County. The acreage total does not include Natural Areas or Critical Species Habitat sites within the project boundary. Portions of this Geological Area are also listed with entries for Washington and Waukeshe Counties.*

[g] *Includes the area within the established project boundaries of the Loew Lake Unit and the Northern Unit of the Kettle Moraine State Forest within Washington County. The acreege total does not include Natural Areas or Critical Species Habitat sites within these project boundaries. Portions of this Geological Area ere also listed with entries for Walworth and Waukesha Counties.*

[h] *This Geological Area lies partially within the aree proposed to be acquired for protection of tha Kettle Moraine Interlobate Moraine.*

[i] *Includes the erea within the established project boundaries of the Laphem Peek Unit and the Southern Unit of the Kettle Moreine Stete Forest in Waukeshe County. The acreage total does not include Natural Areas or Critical Species Habitat sites within these project boundaries. Portions of this Geological Area are also listed with entries for Welworth and Washington Counties.*

[j] *The Kettle Moraine Interlobate Moraine Geological Aree extends across Walworth, Weshington, and Waukesha Counties. Although it is one site, it is reported in this table with entries for each of the three counties.*

Source: SEWRPC.

SUMMARY

This chapter sets forth a recommended natural areas and critical species habitat protection and management plan for the Southeastern Wisconsin Region. The plan was designed with two basic objectives in mind: 1) maintaining the integrity of the remaining biodiversity of the Region; and 2) preserving and protecting the remaining significant geological and archaeological sites of the Region. The plan includes elements relating to land acquisition, land regulation, and land management. The key aspects of the plan may be summarized as follows:

1. All 40 designated Natural Area sites in the Region found to be of statewide or greater (NA-1) significance are recommended to be preserved and protected. These 40 sites encompass 8,700 acres, or 13.6 square miles.

Table 138

SUMMARY OF SITES RECOMMENDED FOR ACQUISITION AND MANAGEMENT BY KENOSHA COUNTY

Type of Area	Civil Division(s)	Name	Site Area (acres)			Comments
			Already under Protective Ownership	Proposed to Be Acquired	Total	
NA-2 Natural Areas	Town of Brighton	Friendship Lake Marsh	11	108	119	New recommendation
		CTH NN Sedge Meadow	--	60	60	New recommendation
		Schroeder Road Marsh[a]	--	111	111	New recommendation. An additional 77 acres of this site are located in Racine County (see Table 141)
	Town of Brighton Town of Paris	Harris Marsh and Oak Woods	212	13	225	Acquisition recommended in Des Plaines River watershed plan
	Town of Bristol	Merkt Woods	--	91	91	New recommendation
		Bristol Woods	154	28	182	Expansion of existing County ownership to include entire site
		Mud Lake Sedge Meadow	--	51	51	New recommendation
	Town of Somers	Petrifying Springs Woods	113	32	145	Expansion of existing County ownership to include entire site
	Subtotal	8 sites	490	494	984	--
NA-3 Natural Areas	Town of Bristol	Des Plaines River Lowlands	--	66	66	Acquisition recommended in Des Plaines River watershed plan
	Town of Somers	Pike River Low Woods	15	53	68	Acquisition recommended in Kenosha Urban Planning District plan
	Subtotal	2 sites	15	119	134	--
--	Subtotal— All Natural Areas	10 sites	505	613	1,118	--
Critical Species Habitat Sites	Town of Brighton	Brighton Dale Woods	164	--	164	Existing County ownership
	Subtotal	1 site	164	--	164	--
--	Total	11 sites	669	613	1,282	--

[a]*The Schroeder Road Marsh Natural Area is located in both Kenosha and Racine Counties and is therefore listed in this table and in Table 141.*

Source: SEWRPC.

The great majority of these sites lie within primary environmental corridors identified in the regional land use plan as requiring protection and preservation. In addition, most of these sites support rare, threatened, or endangered plant, bird, or mammal species, or a combination thereof. Six of these 40 sites are already under protective ownership. An additional 29 sites are partly under such ownership. The plan generally recommends that protective ownership be completed for those 29 sites and that the remaining five sites also be placed under protective ownership.

2. All 122 designated Natural Area sites in the Region found to be of countywide or regional (NA-2) significance, as well as 265 of the 285 designated Natural Area sites found to be of local (NA-3) significance, are also recommended to be preserved and protected. The acreage recommended to be acquired for protective ownership within these 387 sites encompasses about 47,563 acres, or 74.3 square miles. The remaining 92 acres within these 387 sites are now in private ownership. It is recommended that those 92 acres remain in such ownership and be protected through public land use regulation. Many of the 387 sites lie within a primary environmental corridor and support rare, threatened, or endangered species. Of the 387 sites, 56 sites are already under protective ownership. An additional 179 sites are partly under such

Table 139

SUMMARY OF SITES RECOMMENDED FOR ACQUISITION AND MANAGEMENT BY MILWAUKEE COUNTY

Type of Area	Civil Division(s)	Name	Site Area (acres)			Comments
			Already under Protective Ownership	Proposed to Be Acquired	Total	
NA-2 Natural Areas	City of Cudahy	Warnimont Park Fens	2	--	2	Existing County ownership
	City of Franklin	Root River Canal Woods[a]	111	10	121	Represents an expansion of an existing County project. An additional 158 acres of this site are located in Racine County (see Table 141)
		Root River Wet-Mesic Woods—West	153	107	260	Represents an expansion of an existing County project
	City of Greenfield	Greenfield Park Woods	52	--	52	Existing County ownership
	City of Oak Creek	Cudahy Woods	41	6	47	Represents an expansion of an existing County project
		Falk Park Woods	71	6	77	Represents an expansion of an existing County project
		Root River Wet-Mesic Woods—East[b]	50	--	50	Existing County ownership. An additional two acres of this site are located in Racine County (see Table 141)
	City of St. Francis	St. Francis Seminary Woods	--	37	37	New recommendation[c]
	City of South Milwaukee	Rawson Park Woods	23	--	23	Existing County ownership
	Subtotal	9 sites	503	166	669	--
NA-3 Natural Areas	City of Franklin	Grobschmidt Park Wetlands and Upland Woods	76	4	80	Acquisition recommended in County park plan
		Root River Parkway Woods	53	--	53	Existing County ownership
		Monastery Lake Wetlands	31	14	45	Acquisition recommended in County park plan
		Root River Parkway Prairie	27	--	27	Existing County ownership
		Franklin Oak Woods and Oak Savanna	76	--	76	Existing County ownership
	City of Franklin Village of Hales Corners	Whitnall Park Woods—South	136	1	137	Acquisition recommended in County park plan
	City of Glendale	Kletzsch Park Woods	13	--	13	Existing County ownership
	City of Milwaukee	Brown Deer Park Woods	40	--	40	Existing County ownership
		Haskell Noyes Park Woods	20	--	20	Existing County ownership
		Harbinger Woods[d]	34	--	34	Existing County ownership. An additional 13 acres of this site are located in the Village of Menomonee Falls in Waukesha County (see Table 151)
		Menomonee River Swamp—North[e]	59	15	74	Represents an expansion of an existing County project. An additional four acres of this site are located in Waukesha County (see Table 144)
	City of Oak Creek	Esch-Honadel Woods	--	72	72	Acquisition recommended in County park plan
		Oak Creek Low Woods	31	37	68	Represents an expansion of an existing County project
		Root River Riverine Forest[f]	140	--	140	Acquisition recommended in County park plan. An additional 184 acres of this site are located in Racine County (see Table 141)
	City of South Milwaukee	Grant Park Woods—South	45	--	45	Existing County ownership
		Grant Park Woods—Old Growth	38	--	38	Existing County ownership
	City of Wauwatosa	Menomonee River Swamp—South	39	--	39	Existing County ownership
		Currie Park Low Woods	27	--	27	Existing County ownership
		Wil-O-Way Woods	41	--	41	Existing County ownership
		Jacobus Park Woods	11	--	11	Existing County ownership

Table 139 (continued)

Type of Area	Civil Division(s)	Name	Site Area (acres)			Comments
			Already under Protective Ownership	Proposed to Be Acquired	Total	
NA-3 Natural Areas (continued)	City of Wauwatosa (continued)	Blue Mound Country Club Woods	4	12	16	Represents an expansion of an existing County project
	Village of Hales Corners	Whitnall Park Woods—North	82	--	82	Existing County ownership
	Subtotal	22 sites	1,023	155	1,178	--
--	Subtotal— All Natural Areas	31 sites	1,526	321	1,847	--
Critical Species Habitat Sites	City of Cudahy	Warnimont Park Woods	24	--	24	Existing County ownership
	City of Milwaukee	Cambridge Avenue Woods	12	--	12	Existing County ownership
	City of Oak Creek	Bender Park Woods and Clay Banks	13	--	13	Existing County ownership
		Bender Park Woods—South	4	--	4	Existing County ownership
	City of Wauwatosa	Underwood Parkway Woods	19	--	19	Existing County ownership
	Subtotal	5 sites	72	--	72	--
Geological Areas	City of Cudahy	Warnimont Park Clay Banks	18 (23)[g]	--	18 (23)[g]	Existing County ownership; five acres of this area are located within a Critical Species Habitat site
	City of Franklin	Root River Outcrops	18	--	18	Existing County ownership
	City of Glendale Village of Shorewood	Estabrook Park-Lincoln Park	40	--	40	Existing County ownership
	City of Milwaukee	McGovern Park	1	--	1	Existing County ownership
		Mill Road Reef	5	--	5	Existing County ownership
		Lincoln Creek	11	--	11	Existing County ownership
	City of Milwaukee City of Wauwatosa	Menomonee River Outcrops	6	--	6	Existing County ownership
	Subtotal	7 sites	99	--	99	--
--	Total	43 sites	1,697	321	2,018	--

[a] *The Root River Canal Woods Natural Area is located in both Milwaukee and Racine Counties and is therefore listed in this table and in Table 141.*

[b] *The Root River Wet-Mesic Woods—East Natural Area is located in both Milwaukee and Racine Counties and is therefore listed in this table and in Table 141.*

[c] *It is recommended that a conservation easement be acquired for this site.*

[d] *The Harbinger Woods Natural Area is located in both Milwaukee and Waukesha Counties. That portion located in Waukesha County is proposed to be acquired by the Village of Menomonee Falls. The site is therefore listed both in this table and in Table 151.*

[e] *The Menomonee River Swamp—North Natural Area is located in both Milwaukee and Waukesha Counties and is therefore listed in this table and in Table 144.*

[f] *The Root River Riverine Forest Natural Area is located in both Milwaukee and Racine Counties and is therefore listed in this table and in Table 141.*

[g] *The number in parentheses denotes the total site area; thet portion of the site outside the Critical Species Habitat site is indicated above the total site area.*

Source: SEWRPC.

ownership. Except for the 92 acres noted above, the plan recommends that protective ownership be completed for those 179 sites and that the remaining 152 sites also be placed under protective ownership.

3. An additional 110 sites in the Region found to constitute critical species habitat are recommended to be preserved and protected. These 110 sites, designated as Critical Species Habitat sites, encompass 13,470 acres, or 21.0 square miles. Most of these sites lie within primary environmental corridors. Thirty-three of these 110 sites are already under protective ownership. An additional 16 sites are partly under such ownership. The plan recommends

Table 140

SUMMARY OF SITES RECOMMENDED FOR ACQUISITION AND MANAGEMENT BY OZAUKEE COUNTY

Type of Area	Civil Division(s)	Name	Site Area (acres)			Comments
			Already under Protective Ownership	Proposed to Be Acquired	Total	
NA-2 Natural Areas	City of Mequon	Pigeon Creek Low and Mesic Woods	--	81	81	Acquisition recommended in County park plan
		Oonges Bay Gorge	--	22	22	New recommendation
	Village of Fredonia Town of Saukville Town of Fredonia	Milwaukee River Mesic Woods	67	315	382	Represents an expansion of an existing County project
	Town of Fredonia	Huiras Lake Woods and Bog	22[a]	413	435	New recommendation
		Janik's Woods	--	163	163	Acquisition recommended in County park plan
	Town of Saukville	Kinnamon Conifer Swamp	--	382	382	New recommendation
	Subtotal	6 sites	89	1,376	1,465	--
NA-3 Natural Areas	City of Mequon	Pigeon Creek Maple Woods	--	13	13	Acquisition recommended in County park plan
	Town of Fredonia	Beekeeper Bog	9	6	15	Represents an expansion of an existing project
		Waubeka Low Woods	21	140	161	Represents an expansion of an existing project
	Town of Grafton	Grafton Woods	--	18	18	Acquisition recommended in County park plan
	Subtotal	4 sites	30	177	207	--
--	Subtotal--All Natural Areas	10 sites	119	1,553	1,672	--
Geological Areas	City of Mequon	Virmond Park Clay Banks	10	--	10	Existing County ownership
		Thiensville Roadcut and Quarry	5	4	9	A portion of this site is located within Mee-Kwon County Park; the remainder is surrounded by the Pigeon Creek Low and Mesic Woods Natural Area recommended to be acquired by the County
	Town of Fredonia	Phyllocarid Quarry	--	4	4	Acquisition recommended in County park plan; site lies within the proposed Milwaukee River Parkway
		Fredonia Quarries	-- (6)[b]	-- --	-- (6)[b]	The entire site is in existing County ownership and is located within a Natural Area of countywide or regional significance
		Waubeka Quarry	--	2	2	Acquisition recommended in County park plan; site lies within the proposed Milwaukee River Parkway
	Subtotal	5 sites	15	10	25	--
--	Total	15 sites	134	1,563	1,697	--

[a] *Area under protective ownership consists of surface water.*

[b] *The number in parentheses denotes the total site area, which is located entirely within a Natural Area and is therefore not counted in the Geological Areas or overall acreage totals in this table.*

Source: SEWRPC.

that protective ownership be completed for those 16 sites and that the remaining 61 sites also be placed under protective ownership.

4. In order to strengthen efforts to enhance bird populations in the Region, efforts should be made to reestablish three relatively large tracts of grasslands and five relatively large tracts of forest interiors in the Region. One grassland reserve site would be established in the Town of Eagle within the project boundaries of the Southern Unit of the Kettle Moraine State Forest. The second proposed grassland reserve site lies in the Lulu Lake-Pickerel Lake area of the Town of Troy and could be effectively established by manage-

Table 141

SUMMARY OF SITES RECOMMENDED FOR ACQUISITION AND MANAGEMENT BY RACINE COUNTY

Type of Area	Civil Division(s)	Name	Site Area (acres)			Comments
			Already under Protective Ownership[a]	Proposed to Be Acquired[a]	Total[a]	
NA-1 Natural Areas	Town of Dover Town of Yorkville	Kansasville Railroad Prairie	--	14	14	Acquisition recommended in County park plan for a potential trail corridor
	Town of Mt. Pleasant	Sanders Park Hardwoods State Natural Area	56	--	56	Existing County ownership
	Town of Waterford	Elm Island Bog-Island Oak Woods	9	59	68	Acquisition recommended in County park plan
	Subtotal	3 sites	65	73	138	--
NA-2 Natural Areas	Town of Caledonia	Hunts Woods	3	31	34	Acquisition recommended in County park plan
		Cliffside Park Woods and Clay Banks	53	2	55	Acquisition recommended in County park plan
		Root River Wet-Mesic Woods—East[b]	2	--	2	Acquisition recommended in County park plan; site extends into Milwaukee County (see Table 139)
	Town of Dover	Rosewood Railroad Prairie	--	18	18	Acquisition recommended in County park plan
		Schroeder Road Marsh[c]	--	77	77	New recommendation; site extends into Kenosha County (see Table 138)
	Town of Norway	Waubeesee Oak Woods and Tamarack Relict	39	130	169	Acquisition recommended in County park plan
		Wind Lake Shrub-Fen	--	21	21	Acquisition recommended in local plan[d]
	Town of Raymond	County Line Riverine Woods	41	100	141	Acquisition recommended in County park plan
		Root River Canal Woods[e]	--	158	158	An additional 121 acres of this site are located in Milwaukee County (see Table 139)
	Town of Waterford	Norris Marsh and Slough[f]	--	180	180	Acquisition recommended in County park plan; site extends into Waukesha County (see Table 144)
	Town of Yorkville	Union Grove Railroad Prairie	--	32	32	Acquisition recommended in County park plan
	Subtotal	11 sites	138	749	887	--
NA-3 Natural Areas	Town of Burlington	Honey Lake Leatherleaf Bog	--	69	69	Acquisition recommended in County park plan
		Fox River Riverine Forest	19	112	131	Acquisition recommended in County park plan
		Burlington Railroad Prairie[g]	4	--	4	New recommendation; site extends into Walworth County (see Table 142)
	Town of Caledonia	Caledonia Low Woods	61	46	107	Acquisition recommended in County park plan
		Power Plant Ravine Woods	--	32	32	Acquisition recommended in County park plan
		Root River Riverine Forest[b]	183	1	184	Acquisition recommended in County park plan; site extends into Milwaukee County (see Table 139)
	Town of Mt. Pleasant	Sylvania Railroad Prairie	--	7	7	Acquisition recommended in County park plan
	Town of Rochester	Wadewitz Woods	79	125	204	Acquisition recommended in County park plan
		Fox River Prairie	--	2	2	Acquisition recommended in County park plan
	Town of Waterford	Van Valin Woods	--	30	30	Acquisition recommended in County park plan
		Norris Oak Woods and Wetlands[h]	--	6	6	Acquisition recommended in County park plan; site extends into Waukesha County (see Table 144)
	Town of Yorkville	Ives Grove Woods	54	110	164	Acquisition recommended in County park plan
	Subtotal	12 sites	400	540	940	--
--	Subtotal—All Natural Areas	26 sites	603	1,362	1,965	--
Critical Species Habitat Sites	City of Racine	Pritchard Park Woods	9	--	9	Existing County ownership
	Town of Caledonia	River Meadow Woods	--	13	13	Acquisition recommended in County park plan
		Forked Aster Site	--	18	18	Acquisition recommended in County park plan

Table 141 (continued)

Type of Area	Civil Division(s)	Name	Site Area (acres)			Comments
			Already under Protective Ownership[a]	Proposed to Be Acquired[a]	Total[a]	
Critical Species Habitat Sites (continued)	Town of Caledonia (continued)	Caledonia Sanitary Sewer Right-of-Way	13	62	75	Acquisition recommended in County park plan
		Caledonia Site South	--	--	--	Acquisition recommended in County park plan; site is located within the Caledonia Sanitary Sewer Right-of-Way Critical Species Habitat site
		Root River Bluff	18	24	42	Acquisition recommended in County park plan
		Four Mile Road Woods	--	30	30	Acquisition recommended in County park plan
		Caledonia Low Woods	20	9	29	Acquisition recommended in County park plan
		River Bend Upland Woods	13	--	13	Existing County ownership
		Root River Strip Woods	10	--	10	Existing County ownership
		Cliffside Park Old Field	5 (60)	-- --	5 (60)	Fifty-five acres of this site are located within Cliffside Park Woods and Clay Banks Natural Area
	Town of Norway	Patzke Fen	--	50	50	Acquisition recommended in local plan[d]
	Town of Rochester	Ela Park Dry Prairie	16	--	16	Existing County ownership
		Ela Park Woods	58	--	58	Existing County ownership
	Subtotal	14 sites	162	206	388	--
Geological Areas	Town of Caledonia	Cliffside Park Clay Banks	-- (20)	--	-- (20)	Site lies within an existing County park and a Natural Area of countywide or regional significance
		Root River Outcrops	-- (20)	--	-- (20)	Site lies within an existing County parkway and a Critical Species Habitat site
	Town of Mt. Pleasant	Horlickville Bluffs and Quarries	23	7	30	Existing County ownership for 23 acres of this site. It is recommended that a conservation easement be acquired over the remaining seven acres
	Subtotal	3 sites	23	7	30	--
--	Total	43 sites	788	1,575	2,363	--

[a]In applicable cases, the numbers in parentheses denote total site area; that portion of the site not included within another Natural Area, Critical Species Habitat site, or Geological Area is listed above the total site area.

[b]The Root River Wet-Mesic Woods—East Natural Area and the Root River Riverine Forest Natural Area are both located in both Racine and Milwaukee Counties. These sites are therefore listed in both this table and Table 139.

[c]The Schroeder Road Marsh Natural Area is located in both Racine and Kenosha Counties and is therefore listed in both this table and in Table 138.

[d]Site acquisition is recommended in SEWRPC Community Assistance Planning Report No. 215, An Environmentally Sensitive Lands Preservation Plan for the Town of Norway Sanitary District No. 1, Racine County, Wisconsin, June 1996.

[e]The Root River Canal Woods Natural Area is located in both Racine and Milwaukee Counties and is therefore listed in this table and in Table 139.

[f]The Norris Marsh and Slough Natural Area is located in both Racine and Waukesha Counties and is therefore listed in this table and in Table 144.

[g]The Burlington Railroad Prairie Natural Area is within a former railway right-of-way now owned by the Wisconsin Department of Transportation. The right-of-way has been identified as a potential trail corridor, under county jurisdiction, in the regional bicycle-way system plan. One additional acre of this Natural Area is located in Walworth County. This site is therefore listed in both this table and in Table 142.

[h]The Norris Oak Woods and Wetlands Natural Area is located in both Racine and Waukesha Counties and is therefore listed both in this table and in Table 144. This site encompasses six acres in Racine County and 358 acres in Waukesha County. Of the 358 acres in Waukesha County, 346 acres are recommended to be acquired by Waukesha County. The remaining 12 acres, located within an existing golf course, should remain in private ownership and be protected through public land use regulation.

Source: SEWRPC.

Table 142

SUMMARY OF SITES RECOMMENDED FOR ACQUISITION AND MANAGEMENT BY WALWORTH COUNTY

Type of Area	Civil Division(s)	Name	Site Area (acres)			Comments
			Already under Protective Ownership	Proposed to Be Acquired	Total	
NA-2 Natural Areas	Town of Delavan	Delavan Prairie-Fen	--	107	107	New recommendation
	Town of East Troy	Thiede Road Tamarack Swamp	8[a]	40	48	New recommendation
	Town of Spring Prairie	Spring Prairie Fen	--	34	34	New recommendation
	Town of Troy	Adams Lake Fen and Marsh	--	65	65	New recommendation
	Subtotal	4 sites	8	246	254	--
NA-3 Natural Areas	Town of Darien	Darien Oak Woods	--	348	348	Acquisition recommended in County park plan
	Town of LaFayette	Sugar Creek Fens, Springs, and Sedge Meadow	--	36	36	Acquisition recommended in County park plan
		Sugar Creek Wetlands	--	74	74	New recommendation; site is adjacent to Sugar Creek corridor proposed to be acquired in County park plan for trail purposes
	Town of Lyons	Burlington Railroad Prairie[b]	1	--	1	Acquisition of railway right-of-way for trail purposes recommended in regional bicycle-way system plan (see also Table 141)
	Subtotal	4 sites	1	458	459	--
--	Subtotal— All Natural Areas	8 sites	9	704	713	--
Critical Species Habitat Sites	Town of LaFayette	Sugar Creek Woods—North	--	190	190	The County park plan recommends that a portion of this site be acquired as part of a new County park
		Sugar Creek Wet Woods	--	34	34	Acquisition recommended in County park plan
		Sugar Creek Woods—South	--	122	122	Acquisition recommended in County park plan
		Abells Corners Fen	--	2	2	Acquisition recommended in County park plan
	Town of Spring Prairie	Hargraves Road Sedge Meadow	--	45	45	New recommendation; site is adjacent to Sugar Creek corridor proposed to be acquired in County park plan for trail purposes
	Subtotal	5 sites	--	393	393	--
Geological Area	Town of Spring Prairie	Sugar Creek Quarry	--	3	3	Acquisition recommended in County park plan (site is within proposed Sugar Creek Parkway)
	Subtotal	1 site	--	3	3	--
--	Total	14 sites	9	1,100	1,109	--

[a]*Area under protective ownership consists of surface water.*

[b]*The Burlington Railroad Prairie Natural Area is within a former railway right-of-way now owned by the Wisconsin Department of Transportation. The right-of-way has been identified as a potential trail corridor, under county jurisdiction, in the regional bicycle-way system plan. The site also extends into Racine County, and is therefore listed in both this table and in Table 141. Four acres of this five-acre site lie within Racine County.*

Source: SEWRPC.

ment agreements with owners of lands adjacent to the Lulu Lake State Natural Area and the Pickerel Lake Fen State Natural Area. A third grassland reserve site would center on the Bong State Recreation Area in the Town of Brighton, supplemented by management agreements with owners of adjacent lands. Together, these three grassland reserve sites would encompass about 13,645 acres, or 21.3 square miles. Such grasslands are proposed to be as treeless and as open in character as possible in order to provide suitable bird-nesting habitat. The five forest interior reserve sites would be located in the Towns of Addison, Belgium, Rochester, and Trenton and the City of Muskego. Together,

Table 143

SUMMARY OF SITES RECOMMENDED FOR ACQUISITION AND MANAGEMENT BY WASHINGTON COUNTY

Type of Area	Civil Division(s)	Name	Site Area (acres)			Comments
			Already under Protective Ownership	Proposed to Be Acquired	Total	
NA-2 Natural Areas	Town of Addison	St. Anthony Beech Woods	--	68	68	New recommendation
	Town of Erin	Holy Hill Woods	--	256	256	New recommendation
		Toland Swamp	--	193	193	New recommendation
	Town of Farmington	North Branch Woods	--	96	96	New recommendation
	Town of Polk	Big Cedar Lake Bog	--	89	89	New recommendation
		Mud Lake Upland Woods	--	54	54	New recommendation
		Mud Lake Meadow	23[a]	36	59	New recommendation
	Town of Polk Town of West Bend	Mud Lake Swamp	7[b]	179	186	New recommendation
	Town of Richfield	Glacial Hills Park Bogs and Upland Woods	49	11	60	Represents an expansion of an existing project
		Daniel Boone Bogs	13[c]	8	21	New recommendation
	Town of Trenton	Schoenbeck Woods	--	195	195	New recommendation
		Bellin Bog	2[a]	15	17	New recommendation
		Reinartz Cedar Swamp	9[a]	110	119	New recommendation
		Myra Wetlands	--	69	69	New recommendation
	Town of Wayne Town of Kewaskum	Wayne Swamp	--	1,126	1,126	New recommendation
	Subtotal	15 sites	103	2,505	2,608	--
NA-3 Natural Areas	City of Hartford	Rubicon Lowlands	4	26	30	Represents expansion of an existing project (Washington County Golf Course and Family Park)
	City of West Bend	Silver Creek Marsh	10	17	27	Represents expansion of an existing project (Ridge Run County Park)
	Town of Farmington	Lizard Mound Woods	22	6	28	Represents expansion of an existing project (Lizard Mound County Park)
	Town of Polk	Heritage Trails Bog	41	53	94	Represents expansion of an existing project (Heritage Trails County Park)
	Town of Trenton	Fellenz Hardwood Swamp	--	58	58	Acquisition recommended in County park plan
		Sandy Knoll Wetlands	17	30	47	Represents expansion of an existing project (Sandy Knoll County Park)
	Town of Trenton Town of Farmington	Sandy Knoll Swamp	70	269	339	Represents expansion of an existing project (Sandy Knoll County Park)
	Subtotal	7 sites	164	459	623	--
--	Subtotal—All Natural Areas	22 sites	267	2,964	3,231	--
Geological Area	Town of Trenton	Myra Esker	--	16	16	New recommendation
	Subtotal	1 site	--	16	16	--
--	Total	23 sites	267	2,980	3,247	--

[a] *Area under protective ownership consists of surface water.*

[b] *Area under protective ownership is USH 45 right-of-way.*

[c] *Area under protective ownership is owned by the Daniel Boone Hunting Club. It is recommended that Washington County acquire a conservation easement over lands within the Natural Area.*

Source: SEWRPC.

Table 144

SUMMARY OF SITES RECOMMENDED FOR ACQUISITION AND MANAGEMENT BY WAUKESHA COUNTY

Type of Area	Civil Division(s)	Name	Site Area (acres)			Comments
			Already under Protective Ownership	Proposed to Be Acquired	Total	
NA-1 Natural Areas	City of Muskego	Muskego Park Hardwoods State Natural Area	73	--	73	Existing County ownership
	Town of Eagle Town of Mukwonago	Upper Mukwonago River	7	159	166	Acquisition recommended in County park plan
	Town of Merton	Monches Woods State Natural Area	202	120	322	Represents expansion of an existing County project (Monches County Park)
	Town of Mukwonago	Mukwonago Fen, Sedge Meadow, and Tamarack Relict	--	229	229	Acquisition recommended in County park plan
	Subtotal	4 sites	282	508	790	--
NA-2 Natural Areas	Village of Menomonee Falls	Held Maple Woods	--	40	40	Acquisition recommended in County park plan
	Town of Delafield	Pewaukee Lake Access Fen	10	--	10	Existing County ownership
	Town of Mukwonago	Spring Lake Sedge Meadow and Fens	115[a]	104	219	Acquisition recommended in County park plan
		Brown Lake and Sedge Meadow	20[a]	18	38	Acquisition recommended in County park plan
	Town of Oconomowoc	Ashippun River Lowlands	82	162	244	Represents expansion of an existing County project
	Town of Summit	Genesee Lake Road Bog	3[a]	10	13	Acquisition recommended in County park plan
	Town of Vernon	Big Bend Wet-Mesic Woods	219	208	427	Represents expansion of an existing County project
		Norris Marsh and Slough[b]	--	32	32	Acquisition recommended in County park plan; site extends into Racine County (see Table 141)
	Town of Waukesha	Fosters Woods	86	3	89	Represents expansion of an existing County project
		Falk Fen and Woods	114	167	281	Represents expansion of an existing County project
	Subtotal	10 sites	649	744	1,393	--
NA-3 Natural Areas	City of Delafield	Bark River School Sedge Meadow	--	17	17	Acquisition recommended in County park plan
	City of Waukesha Town of Waukesha	Minooka Park Woods	89	--	89	Existing County ownership
	Village of Menomonee Falls	Zuba Woods	11	40	51	Represents expansion of an existing project
		Menomonee River Swamp—North[c]	--	4	4	Acquisition recommended in County park plan; site extends into Milwaukee County (see Table 139)
		Menomonee River Swamp	--	29	29	Acquisition recommended in County park plan
	Village of Menomonee Falls Village of Butler	Clarks Woods	7[d]	16	23	Acquisition recommended in County park plan
	Town of Genesee	Brown's Fen	2	--	2	Existing County ownership
	Town of Lisbon	Lisbon Low Woods	21	246	267	Represents en expansion of an existing County project
	Town of Merton	Chenequa Wetland Complex	11	100	111	Acquisition recommended in County park plan
	Town of Ottawa	Nelson Oak Woods and Lowlands	77[e]	14	91	Acquisition recommended in County park plan
	Town of Summit	Bark River Mersh	4	154	158	Acquisition recommended in County park plan
	Town of Vernon	River Oaks Woods and Wetlands	58	77	135	Represents expansion of an existing County project (Fox River Parkway)

Table 144 (continued)

Type of Area	Civil Division(s)	Name	Site Area (acres)			Comments
			Already under Protective Ownership	Proposed to Be Acquired	Total	
NA-3 Natural Areas (continued)	Town of Vernon (continued)	Porter Low Woods	--	245	245	Acquisition recommended in County park plan
		Norris Oak Woods and Wetlands[f]	--	346	346	Acquisition recommended in County park plan; site extends into Racine County (see Table 141)
	Subtotal	14 sites	280	1,288	1,568	--
--	Subtotal— All Natural Areas	28 sites	1,211	2,540	3,751	--
Critical Species Habitat Sites	Village of Menomonee Falls	Ranch Woods	--	4	4	Acquisition recommended in County park plan
		Fox River Woods	2	20	22	Acquisition recommended in County park plan
	Town of Mukwonago	Mukwonago Park Oak Opening	28	--	28	Existing County ownership
		Romanowski Fen	--	8	8	Acquisition recommended in County park plan
	Town of Ottawa	Utica Lake Tamaracks	--	35	35	Acquisition recommended in County park plan
	Subtotal	5 sites	30	67	97	--
Geological Areas	Village of Menomonee Falls	Menomonee Park Quarry and Domes	68	--	68	Existing County ownership
	Village of Butler Village of Menomonee Falls	Menomonee River Outcrop	--	5	5	Site contains a Natural Area of local significance and is within proposed Menomonee River Parkway
	Village of Lannon	Raasch's Dome	--	7	7	New recommendation; site is adjacent to County Bugline Trail
	Town of Lisbon	Sussex Railroad Cut	2	--	2	Existing County ownership (Bugline Trail right-of-way)
	Subtotal	4 sites	70	12	82	--
--	Total	37 sites	1,311	2,619	3,930	--

[a]*Area under protective ownership consists of surface water.*

[b]*The Norris Marsh and Slough Natural Area is located in both Waukesha and Racine Counties and is therefore listed both in this table and in Table 141.*

[c]*The Menomonee River Swamp—North Natural Area is located in both Milwaukee and Waukesha Counties and is therefore listed both in this table and in Table 139.*

[d]*Area under protective ownership is Village of Butler parkland. It is recommended that Waukesha County acquire the balance of the Natural Area as part of the Menomonee River Parkway, and that the Village and County cooperatively manage the Natural Area.*

[e]*The 77 acres under existing protective ownership are owned by the Waukesha Land Conservancy. The remaining 14 acres are proposed to be acquired by the County as part of the Bark River Parkway.*

[f]*The Norris Oak Woods and Wetlands Natural Area encompasses a total of 358 acres in Waukesha County and six acres in Racine County, and is therefore listed in both this table and in Table 141. Except for 12 acres now located within an existing golf course in Waukesha County and recommended to be protected through public land use regulation, it is recommended that each County involved acquire the respective portions of this Natural Area located within their respective jurisdictions.*

Source: SEWRPC.

these five sites would encompass about 992 acres, or 1.6 square miles, of which about 586 acres, or 0.9 square mile, would meet the criteria for forest interior providing protected suitable habitat for certain species of birds.

5. The regulatory element of the plan includes recommendations for the adjustment of primary environmental corridor boundaries to fully encompass inventoried Natural Area and Critical Species Habitat sites; the reflection of the results of the inventories of Natural Area and Critical Species Habitat sites in the conduct of Federal, State, and local wetland regulatory programs; and the potential modification of State legislation and administrative rules to ensure that State agency actions attendant to the approval of sanitary sewer

Table 145

SUMMARY OF SITES RECOMMENDED FOR ACQUISITION AND MANAGEMENT BY LOCAL GOVERNMENTS, SCHOOL DISTRICTS, AND LAKE DISTRICTS IN KENOSHA COUNTY

Proposed Acquisition Agency	Type of Area[a]	Name	Site Area (acres)			Comments
			Already under Protective Ownership	Proposed to Be Acquired	Total	
Village of Pleasant Prairie	NA-3	Lake Russo Prairie Remnant	--	6	6	Acquisition recommended in local plan[b]
		Des Plaines River Lowlands	268	143	411	Acquisition recommended in local plan[b]
		Bain Station Railroad Prairie	--	5	5	Acquisition recommended in local plan[b]
		Pleasant Railroad Prairie	--	5	5	Acquisition recommended in local plan[b]
	CSH	Piela Property	--	5	5	Acquisition recommended in local plan[b]
		Barnes Creek	5	23	28	Acquisition recommended in local plan[b]
Subtotal	--	6 sites	273	187	460	--
Village of Silver Lake	NA-3	CTH B-CTH AH Sedge Meadow	--	12	12	New recommendation
Subtotal	--	1 site	--	12	12	--
Village of Twin Lakes	CSH	Hamilton Woods	--	17	17	New recommendation
Subtotal	--	1 site	--	17	17	--
Kenosha Unified School District No. 1	CSH	Bradford School Woods	20	--	20	Existing School District ownership
Subtotal	--	1 site	20	--	20	--
Powers Lake Management District	NA-3	Powers Lake Tamarack Relict	--	152	152	--
Subtotal	--	1 site	--	152	152	--
Total	--	10 sites	293	368	661	--

[a]NA-3 identifies Natural Areas of local significance
CSH identifies Critical Species Habitat sites

[b]Acquisition recommended in SEWRPC Community Assistance Planning Report No. 212, A Comprehensive Plan for the Kenosha Urban Planning District, Kenosha County, Wisconsin, December 1995.

Source: SEWRPC.

extensions or private sewage disposal systems do not result in the destruction of those Natural Areas and Critical Species Habitat sites recommended for preservation and protection. In addition, as county and local units of government in the Region carry out detailed planning and regulatory activities, it is recommended that the preservation and protection recommendations attendant to designated Natural Areas and Critical Species Habitat sites be taken into account.

6. The proper management of those Natural Areas and Critical Species Habitat sites that have been acquired for protection and preservation is also recommended. The plan recognizes that management techniques appropriate for one type of site may not be appropriate for others. Accordingly, the plan recommends that the agencies and organizations envisioned to be responsible for site preservation and protection in each case prepare and implement detailed management plans specific for each site.

7. A total of 71 of the 86 identified Geological Area sites found in the regional inventory are recommended to be preserved and protected. In many cases, these sites are either already publicly owned and need to be prop-

Table 146

SUMMARY OF SITES RECOMMENDED FOR ACQUISITION AND MANAGEMENT BY LOCAL GOVERNMENTS IN MILWAUKEE COUNTY

Proposed Acquisition Agency	Type of Area[a]	Name	Site Area (acres)			Comments
			Already under Protective Ownership	Proposed to Be Acquired	Total	
City of Franklin	NA-3	Franklin (Puetz Road) Woods	28	--	28	Existing City ownership
		Fitzsimmons Road Woods	14[b]	28	42	New recommendation
		Oakwood Park Oak Woods	5[b]	17	22	New recommendation
		Elm Road Woods	--	20	20	New recommendation
Subtotal	--	4 sites	47	65	112	--
City of Milwaukee	NA-3	Bradley Woods	16	19	35	Represents an expansion of an existing project
	GA-1	Hartung Quarry	17	--	17	Existing City ownership
Subtotal	--	2 sites	33	19	52	--
City of Oak Creek	NA-3	Wood Creek Woods	--	35	35	New recommendation
		Wedge Woods	--	19	19	New recommendation
	CSH	PPG Woods	--	19	19	New recommendation
Subtotal	--	3 sites	--	73	73	--
Total	--	9 sites	80	157	237	--

[a]*NA-3 identifies Natural Areas of local significance*
GA-1 identifies a Geological Area of statewide or greater significance
CSH identifies a Critical Species Habitat site

[b]*The portion of this Natural Area in existing protective ownership is located within Milwaukee County parklands. It is recommended that the City of Franklin acquire the balance of this Natural Area and work with Milwaukee County to cooperatively manage the Natural Area.*

Source: SEWRPC.

Table 147

SUMMARY OF SITES RECOMMENDED FOR ACQUISITION AND MANAGEMENT BY LOCAL GOVERNMENTS IN OZAUKEE COUNTY

Proposed Acquisition Agency	Type of Area[a]	Name	Site Area (acres)			Comments
			Already under Protective Ownership	Proposed to Be Acquired	Total	
City of Cedarburg	NA-3	Cedar Creek Forest	--	23	23	Acquisition recommended in local plan[b]
	GA-1	Cedar Creek-Anschuetz Quarries	4	1	5	Acquisition recommended in local plan[b]
	GA-2	Groth Quarry	7	--	7	Existing City ownership
Subtotal	--	3 sites	11	24	35	--
City of Mequon	NA-3	Ville du Parc Riverine Forest	49	62	111	Represents an expansion of an existing project
		Highland Road Woods	--	53	53	New recommendation[c]
	CSH	Pecard Sedge Meadow	--	13	13	New recommendation
		Eastbrook Road Woods	--	8	8	New recommendation
Subtotal	--	4 sites	49	136	185	--
Village of Grafton	GA-1	Grafton Outcrops and Lime Kiln Park	47	10	57	Represents an expansion of an existing project
Subtotal	--	1 site	47	10	57	--
Town of Cedarburg	NA-3	Mole Creek Swamp	22	67	89	Represents an expansion of existing Town ownership
Subtotal	--	1 site	22	67	89	--
Total	--	9 sites	129	237	366	--

[a]*NA-3 identifies Natural Areas of local significance*
GA-1 identifies Geological Areas of statewide or greater significance
GA-2 identifies a Geological Area of countywide or regional significance
CSH identifies a Critical Species Habitat site

[b]*Acquisition recommended in SEWRPC Community Assistance Planning Report No. 144, A Development Plan for the City of Cedarburg: 2010, February 1991.*

[c]*A portion of this site was acquired by the City in 1996.*

Source: SEWRPC.

Table 148

SUMMARY OF SITES RECOMMENDED FOR ACQUISITION AND MANAGEMENT BY LOCAL GOVERNMENTS AND LAKE DISTRICTS IN RACINE COUNTY

Proposed Acquisition Agency	Type of Area[a]	Name	Site Area (acres)			Comments
			Already under Protective Ownership	Proposed to Be Acquired	Total	
City of Racine	CSH	Washington Park Woods	12	--	12	Existing City ownership
		Wind Point	4	--	4	Existing City ownership (Shoop Park)
Subtotal	--	2 sites	16	--	16	--
Village of Wind Point	GA-2	Wind Point	-- (4)	1 (1)	1 (5)	New recommendation[b]
Subtotal	--	1 site	--	1	1	--
Town of Burlington	NA-3	Wehmoff Park Upland Woods and Wetlands	67	6	73	Represents an expansion of an existing project
Subtotal	--	1 site	67	6	73	--
Town of Caledonia	NA-2	Caledonia Wildlife Area	133	33	166	Represents an expansion of an existing project
	NA-3	Tabor Woods	--	107	107	Acquisition recommended in Town park plan
	CSH	Hoods Creek Swamp	--	20	20	New recommendation
Subtotal	--	3 sites	133	160	293	--
Town of Mt. Pleasant	NA-3	Campbell Woods	--	72	72	New recommendation
Subtotal	--	1 site	--	72	72	--
Bohner's Lake Sanitary District No. 1	NA-3	Bohner Lake Lowlands	--	33	33	--
Subtotal	--	1 site	--	33	33	--
Wind Lake Management District	NA-3	Wind Lake Wet Meadow	--	12	12	--
	CSH	Erwin Wetlands	--	2	2	--
		Krieser Fen	--	2	2	--
		Landon Wetland	--	11	11	--
		Wind Lake	22[c]	33	55	--
Subtotal	--	5 sites	22	60	82	--
Total	--	14 sites	238	332	570	--

[a]CSH identifies Critical Species Habitat sites
GA-2 identifies a Geological Area of countywide or regional significance
NA-3 identifies Natural Areas of local significance
NA-2 identifies a Natural Area of countywide or regional significance

[b]Four acres of this five-acre Geological Area are within the Wind Point Critical Species Habitat site located within the City of Racine's Shoop Park. The remaining acre is the site of the Wind Point lighthouse, owned by the U. S. Coast Guard. It is recommended that the Village of Wind Point acquire the lighthouse site if it is disposed of by the Coast Guard.

[c]Area under protective ownership is surface water, which is in State public-interest ownership.

Source: SEWRPC.

Table 149

SUMMARY OF SITES RECOMMENDED FOR ACQUISITION AND MANAGEMENT BY LOCAL GOVERNMENTS AND LAKE DISTRICTS IN WALWORTH COUNTY

Proposed Acquisition Agency	Type of Area[a]	Name	Site Area (acres)			Comments
			Already under Protective Ownership	Proposed to Be Acquired	Total	
Village of Fontana-on-Geneva Lake	NA-3	Fontana Prairie and Fen	10	--	10	Existing Village ownership
Subtotal	--	1 site	10	--	10	--
Village of Williams Bay	NA-3	Williams Bay Lowlands	8	--	8	Existing Village ownership
Subtotal	--	1 site	8	--	8	--
Lauderdale Lakes Lake Management District	NA-3	Island Woods	--	46	46	--
	CSH	Lauderdale Lakes Woods	--	45	45	--
Subtotal	--	2 sites	--	91	91	--
North Lake District	NA-3	North Lake Marsh	61[b]	6	67	--
Subtotal	--	1 site	61	6	67	--
Potter Lake District	NA-3	Potter Lake Temaracks	--	22	22	--
Subtotal	--	1 site	--	22	22	--
Total	--	6 sites	79	119	198	--

[a]NA-3 identifies Natural Areas of local significance
CSH identifies a Critical Species Habitat site

[b]Area under protective ownership is surface water, which is in State public-interest ownership.

Source: SEWRPC.

erly managed, or would be brought under appropriate protective ownership upon implementation of existing plans, including the recommended natural areas preservation and protection plan. In some cases, preservation of the Geological Area sites concerned can be accomplished through conservation easements.

8. Of the 14 archaeological sites in the Region of such significance as to have been placed on the National Register of Historic Places, five were found to already be preserved and protected through appropriate existing or planned protective ownership. The plan recommends that the remaining nine archaeological sites, none of which lies within a designated Natural Area, Critical Species Habitat site, or Geological Area, be preserved and protected to the extent that Federal and State laws permit.

9. The total cost of implementing the recommended plan is estimated at $55.9 million, expressed in constant 1994 dollars. State government would be responsible for land acquisitions totaling about $22.6 million, or 40 percent of plan implementation costs. County government would be responsible for $13.9 million in land acquisition costs, or about 25 percent of the total. Local government would be responsible for $5.5 million in land acquisition costs, or about 10 percent of the total. Private conservancy organizations would be responsible for the remaining $13.9 million in land acquisition costs, or 25 percent of the total. Of the $55.9 million in plan implementation costs, about $33.1 million, or 59 percent, is associated with recommendations that have been made in prior State, regional, county, and local plans and which therefore do not represent proposed new expenditures. If the recommended plan were to be implemented over a 20-year period, the average annual plan implementation cost, expressed in constant 1994 dollars, would approximate $2.8 million, or $1.48 per capita.

Table 150

SUMMARY OF SITES RECOMMENDED FOR ACQUISITION AND MANAGEMENT BY LOCAL GOVERNMENTS AND SCHOOL DISTRICTS IN WASHINGTON COUNTY

Proposed Acquisition Agency	Type of Area[a]	Name	Site Area (acres)			Comments
			Already under Protective Ownership	Proposed to Be Acquired	Total	
City of West Bend	NA-2	Blue Hills Woods	105	161	266	Represents an expansion of an existing project
		Lac Lawrann Conservancy Upland Woods and Wetlands	78	23	101	Represents an expansion of an existing City project
		Muth Woods	--	30	30	Acquisition recommended by City park plan
	NA-3	Sunset Park Wetlands	--	85	85	Acquisition recommended by City park plan
		Albecker Park Wetlands	31	60	91	Represents an expansion of an existing City project
		University Fen	1	--	1	Existing City ownership
	GA-3	Lac Lawrann Kame and Esker	--[b] (12)	-- --	--[b] (12)	Existing City ownership
	CSH	Cameron Property	--	12	12	Acquisition recommended by City park plan
		Silver Lake	--	7	7	New recommendation
		Silver Lake Swamp	--	10	10	New recommendation
Subtotal	--	10 sites	215	388	603	--
Village of Germantown	NA-1	Germantown Swamp	190	184	374	Represents an expansion of an existing Village project
	NA-3	Hoelz Swamp	--	109	109	New recommendation
		Lake Park Swamp	9	45	54	Represents an expansion of an existing Village project
		Schoessow Woods	--	51	51	New recommendation
		USH 41 Swamp	--	228	228	New recommendation
Subtotal	--	5 sites	199	617	816	--
Village of Jackson	CSH	Jeckson Woods	3	21	24	Portion of site is recommended to be acquired in Village park plan
Subtotal	--	1 site	3	21	24	--
Village of Kewaskum	GA-2	Kewaskum Kame	--	47	47	New recommendation
Subtotal	--	1 site	--	47	47	--
Village of Slinger	CSH	Unnamed wetland	--	40	40	New recommendation
Subtotal	--	1 site	--	40	40	--
Town of Addison	CSH	Doll Woods	--	22	22	New recommendation
Subtotal	--	1 site	--	40	40	--
Town of Hartford	NA-3	Pike Lake Sedge Meadow	11	3	14	Represents an expansion of an existing project
Subtotal	--	1 site	11	3	14	--
West Bend School District	CSH	High School Woods	7	--	7	Existing School District ownership
Subtotal	--	1 site	7	--	7	--
Total	--	21 sites	435	1,138	1,573	--

[a]NA-2 identifies a Natural Area of countywide or regional significance
NA-3 identifies Natural Areas of local significance
GA-3 identifies a Geological Area of local significance
CSH identifies Critical Species Habitat sites
NA-1 identifies a Natural Area of statewide or greater significance
GA-2 identifies a Geological Area of countywide or regional significance

[b]This Geological Area is located entirely within the Lac Lawrann Conservancy Upland Woods and Wetlands Natural Area listed above, and is in existing City ownership.

Source: SEWRPC.

Table 151

SUMMARY OF SITES RECOMMENDED FOR ACQUISITION AND MANAGEMENT BY LOCAL GOVERNMENTS, LAKE DISTRICTS, AND SANITARY DISTRICTS IN WAUKESHA COUNTY

Proposed Acquisition Agency	Type of Area[a]	Name	Site Area (acres)			Comments
			Already under Protective Ownership	Proposed to Be Acquired	Total	
City of Brookfield	NA-3	Wirth Swamp	23	62	85	Expansion of an existing City project
		Brookfield Swamp	40	163	203	Expansion of an existing City project
		Zion Woods	44	11	55	Expansion of an existing City project
Subtotal	--	3 sites	107	236	343	--
City of Muskego	CSH	Denoon Lake	--	30	30	Acquisition recommended in City park plan
Subtotal	--	1 site	--	30	30	--
City of New Berlin	NA-3	New Berlin Woods	--	35	35	Acquisition recommended in City park plan
	CSH	Delopst Meadow	--	24	24	Acquisition recommended in City park plan
		Kostello Property	--	12	12	Acquisition recommended in City park plan
Subtotal	--	3 sites	--	71	71	--
City of Waukesha	NA-3	Fruits Pond Fen	16	--	16	Existing City ownership
		Pebble Creek Wetlands	12	48	60	Represents an expansion of an existing project
Subtotal	--	2 sites	28	48	76	--
Village of Dousman	CSH	Dousman Mill Pond	--	2	2	New recommendation[b]
Subtotal	--	1 site	--	2	2	--
Village of Hartland	NA-3	Hartland Railroad Prairie	--	4	4	New recommendation[b]
Subtotal	--	1 site	--	4	4	--
Village of Lac La Belle	NA-3	Lac La Belle Lowlands	--	33	33	New recommendation.[b] An additional 16 acres of this site are located in Jefferson County
Subtotal	--	1 site	--	33	33	--
Village of Menomonee Falls	NA-2	Menomonee Falls "Tamarack" Swamp	362	469	831	The Village has established a project boundary for acquisition of this area
	NA-3	Harbinger Woods[c]	--	13	13	Acquisition recommended in County park plan. An additional 34 acres of this site are located in Milwaukee County (see Table 139)
		Theater Swamp	31	60	91	Represents an expansion of an existing project
	GA-1	Menomonee Falls Reef	9	--	9	Existing Village ownership
Subtotal	--	4 sites	402	542	944	--
Village of Mukwonago	NA-2	Phantom Lake Wetlands	167	20	187	Represents an expansion of an existing project
		Lower Mukwonago River	15	8	23	Represents an expansion of an existing project
Subtotal	--	2 sites	182	28	210	--
Village of Pewaukee	NA-3	Pewaukee Park Sedge Meadow	--	42	42	New recommendation; site is adjacent to Village Park[b]

Table 151 (continued)

Proposed Acquisition Agency	Type of Area[a]	Name	Site Area (acres)			Comments
			Already under Protective Ownership	Proposed to Be Acquired	Total	
Village of Pewaukee (continued)	GA-1	Pewaukee Stone Pits, Quarries, and Outcrops	3[d]	4	7	New recommendation site is adjacent to Village Perk and the Pewaukee Park Sedge Meedow Natural Area[b]
Subtotal	--	2 sites	3	46	49	--
Village of Sussex	NA-3	Coolings Sedge Meadow	10	3	13	Acquisition of site recommended in Village stormwater management plan[e]
Subtotal	--	1 site	10	3	13	--
Town of Lisbon	NA-3	Thousand Oaks Tamarack Relict	2	28	30	New recommendation[b]
Subtotal	--	1 site	2	28	30	--
Big Muskego-Bass Bay Lake Management District	NA-3	Muskego Lake Marsh	634[f]	427	1,061	--
Subtotal	--	1 site	634	427	1,061	--
Lake Pewaukee Sanitary District	NA-3	Capitol Drive Sedge Meadow and Wet Prairie	21	70	91	--
		Pewaukee Lake Wetland	--	68	68	--
		Pewaukee Sedge Meadow	--	11	11	--
	CSH	Meadowbrook Prairie	14	--	14	--
Subtotal	--	4 sites	35	149	184	--
Town of Summit Sanitary District No. 1	NA-3	Breens Bay Sedge Meadow	--	16	16	--
Subtotal	--	1 site	--	16	16	--
Total	--	28 sites	1,403	1,663	3,066	--

[a] *NA-3 identifies Natural Areas of local significance*
CSH identifies Critical Species Habitat sites
NA-2 identifies Natural Areas of countywide or regional significance
GA-1 identifies Gaological Areas of statewide or greater significance

[b] *The acquisition of certain Natural Area and Critical Species Habitat sites by this and other concerned local units of government was recommended in the open space preservation element of the Waukesha County development plan; however, local governments may not yet have actad to adopt the plan.*

[c] *The Harbinger Woods Natural Area is located in both Milwaukee and Waukesha Counties and is therefore listed both in this table and in Table 139.*

[d] *The area under protective ownership is within the right-of-way of STH 16 and is owned by the Wisconsin Department of Transportation. It is recommended that the remaining four acres be acquired by the Village of Pewaukee as an expansion of Village Park.*

[e] *Documented in SEWRPC Community Assistance Planning Report No. 89, A Stormwater Management Plan for the Village of Sussex, Village of Sussex, Waukesha County, Wisconsin, October 1983.*

[f] *The area under protective ownership is surface water.*

Source: SEWRPC.

Table 152

SUMMARY OF SITES RECOMMENDED FOR ACQUISITION AND MANAGEMENT BY THE NATURE CONSERVANCY

Type of Area[a]	Civil Division(s)	Name	Site Area (acres)			Comments
			Already under Protective Ownership	Proposed to Be Acquired	Total	
NA-1	City of Mequon Village of Bayside	Fairy Chasm State Natural Area	21	59	80	Represents an expansion of an existing project. This site includes about 47 acres in Ozaukee County and about 33 acres in Milwaukee County
	Village of Pleasant Prairie	Chiwaukee Prairie State Natural Area	242	67	309	Site lies within an established project boundary (Chiwaukee Prairie Preserve)
	Town of Erin	Murphy Lake-McConville Lake Wetland Complex	279	611	890	Represents an expansion of an existing project (Walter and Rose Zinn Preserve)
	Town of Grafton	Kurtz Woods State Natural Area.	31	39	70	Represents an expansion of an existing project
	Town of Mt. Pleasant	Franskville Railroad Prairie	--	4	4	New recommendation
	Town of Salem	Stopa Fen	--	9	9	New recommendation
	Town of Troy	Pickerel Lake Fen State Natural Area	86	187	273	Site lies within an established project boundary (Pickerel Lake Fen)
	Subtotal	7 sites	659	976	1,635	--
NA-2	Town of Richfield	Colgate Fen-Meadow	--	23	23	New recommendation
	Town of Troy	Upper Mukwonago River Wetland Complex	85	253	338	Represents an expansion of an existing project (Lulu Lake State Natural Area)
	Town of Troy Town of East Troy	Swan Lake Wetland Complex	26	141	167	Represents an expansion of an existing project (Pickerel Lake Fen)
	Subtotal	3 sites	111	417	528	--
NA-3	Village of Pleasant Prairie	Carol Beach Estates Prairie	7	3	10	Site lies within an established project boundary (Chiwaukee Prairie State Natural Area)
	Subtotal	1 site	7	3	10	--
--	Total	11 sites	777	1,396	2,173	--

[a]*NA-1 identifies Natural Areas of statewide or greater significance*
NA-2 identifies Natural Areas of countywide or regional significance
NA-3 identifies a Natural Area of local significance

Source: SEWRPC.

10. Full implementation of the recommended plan would protect 96 percent of the 818 reported occurrences in the Region of endangered, threatened, and rare plant species. In addition, full implementation of the plan would protect almost 99 percent of the reported occurrences of endangered, threatened, and rare bird species.

11. The Wisconsin Department of Natural Resources is recommended to take responsibility for protection of 169 individual Natural Area, Critical Species Habitat, Geological Area, grassland, and forest interior sites in the Region. In addition, the University of Wisconsin and the Wisconsin Department of Transportation would have responsibility for a combined total of 11 such sites. The seven individual counties in the Region would be responsible for 178 such sites, with local governments, lake management districts, sanitary districts, and school districts responsible for an additional 97 sites. Finally, private conservancy organizations would be responsible for implementation efforts attendant to 162 sites.

Table 153

SUMMARY OF SITES RECOMMENDED FOR ACQUISITION AND MANAGEMENT BY PRIVATE CONSERVANCY ORGANIZATIONS OTHER THAN THE NATURE CONSERVANCY

Type of Area[a]	County	Civil Division(s)	Name	Site Area (acres)			Comments
				Already under Protective Ownership	Proposed to Be Acquired	Total	
NA-1	Kenosha	Town of Salem	Silver Lake Bog State Natural Area	14	4	18	Represents expansion of Silver Lake Sportsmen's Club ownership
	Ozaukee	Town of Saukville	Riveredge Creek and Ephemeral Pond State Natural Area	75	22	97	Represents expansion of Riveredge Nature Center
	Subtotal	--	2 sites	89	26	115	--
NA-2	Ozaukee	Town of Saukville	Ducks Limited Bog	13	8	21	Represents expansion of Ducks Limited ownership
			Riveredge Mesic Woods	158	54	212	Represents expansion of Riveredge Nature Center
	Washington	Town of West Bend	Gilbert Lake Tamarack Swamp	54	76	130	Represents expansion of Cedar Lakes Conservation Foundation ownership
			Little Cedar Lake Wetlands	126	11	137	Represents expansion of Cedar Lakes Conservation Foundation ownership
	Subtotal	--	4 sites	351	149	500	--
NA-3	Kenosha	Town of Brighton	Section 11 Wetland and Oak Woods	--	130	130	--
		Town of Bristol	Salem Road Marsh	27	--	27	Site is currently owned by the Conservation Club of Kenosha
		Town of Paris	Paris (Ehlen) Prairie Remnant	--	1	1	--
		Town of Salem	Montgomery Lake Marsh	14[b]	29	43	--
		Town of Wheatland	Dyer Lake Sedge Meadow	6[b]	34	40	--
		Town of Wheatland Town of Brighton	Peterson Creek Sedge Meadow	--	69	69	--
	Milwaukee	Village of Bayside	Schlitz Audubon Center Woods and Beach	54	--	54	Site is owned by the Schlitz Audubon Center
	Ozaukee	Town of Belgium	Cedar Grove Swamp	--	177	177	--
		Town of Cedarburg	Sherman Road Woods	--	72	72	--
		Town of Cedarburg Town of Saukville Town of Trenton	Cedar-Sauk Low Woods	--	218	218	Includes 204 acres in Ozaukee County and 14 acres in Washington County
		Town of Fredonia	Spring Lake Marsh	3[b]	16	19	--
			Spring Lake Beech Forest	--	65	65	--
			County Line Low Woods	--	214	214	An additional 58 acres of this site extend into Sheboygan County
			Pioneer Road Lowlands	--	94	94	--
			Cedar Valley Swamp	--	141	141	--
			Evergreen Road Bog	5[b]	39	44	--
			Kohler Road Woods	--	124	124	--
		Town of Grafton	Cedar Heights Gorge	--	9	9	--
			Lions Den Gorge	--	20	20	--
			Ulao Lowland Forest	--	347	347	--
		Town of Saukville	Hansen's Lake Wetland	5[b]	8	13	--
			Knollwood Road Bog	4[b]	5	9	--
	Racine	Town of Caledonia	Seven Mile Road Woods	--	20	20	--
			Zirbes Woods	--	13	13	--
			Foley Road Woods—West	--	19	19	--
			Foley Road Woods—East	--	24	24	--

Table 153 (continued)

Type of Area[a]	County	Civil Division(s)	Name	Site Area (acres)			Comments
				Already under Protective Ownership	Proposed to Be Acquired	Total	
NA-3 (continued)	Racine (continued)	Town of Dover	Vandenboom Road Marsh	7[b]	20	27	--
		Town of Burlington Town of Lyons	Burlington Hills Woods	--	637	637	Includes 557 acres in Racine County and 80 acres in Walworth County. This site is located within the Lyons Glaciel Deposits Geological Area
		Town of Raymond	Kimmel Woods	--	40	40	--
		Town of Rochester	Rountree Road Woods	--	74	74	--
			English Settlement Prairie	--	16	16	--
			Eagle Creek Woods	--	84	84	--
	Walworth	Town of Bloomfield	Hafs Road Marsh	93[b]	13	106	--
			Bloomfield Prairie	--	4	4	--
		Town of East Troy	Army Lake Lowlands	9[b]	83	92	--
		Town of Geneva	Hilburn Sedge Meadow	--	66	66	--
			Lake Como Wetlands	32	18	50	Represents an expansion of existing ownership by the Lake Como Association
		Town of LaFayette	Granzeau Woods	--	78	78	--
			Pallottine Maple Woods	--	153	153	--
			Abells Corners Sedge Meadow and Tamarack Relict	--	42	42	--
		Town of LaGrange Town of Sugar Creek	Baywood Road Sedge Meadow	3[b]	26	29	--
		Town of Linn	Peninsula Woods	--	39	39	--
		Town of Geneva Town of Linn	Wychwood	--	226	226	--
		Town of Lyons	Peterson Fen	--	2	2	--
			Ivanhoe Creek Fen	--	32	32	--
			Cranberry Road Bog	--	46	46	--
		Town of Lyons Town of Burlington	Tri-County Tamarack Swamp	--	40	40	Includes 25 acres in Walworth County and 15 acres in Racine County
		Town of Richmond	Lake Loraine Woods—East	--	75	75	--
			Lake Loraine Mersh	32[b]	3	35	--
			Lake No. 10	40[b]	--	40	--
		Town of Sharon	Salt Box Road Railroad Prairie	--	12	12	--
		Town of Spring Prairie	Spring Prairie Lowlands	--	297	297	--
		Town of Sugar Creek	Lake Wandawega Marsh	50[b]	32	82	--
			Silver Lake	76[b]	10	86	--
		Town of Troy	George Williams Sedge Meadow	27	--	27	Site is currently owned by George Williams College, and is located within the Lulu Lake State Natural Area project boundary
			Doyles Lake Wetlands	27[b]	41	68	--
			Lein's Road Fen	--	22	22	--
	Washington	Town of Erin	Hults Bog and Marsh	--	14	14	--
			Erin Sedge Meadow	--	17	17	--
			Thompson Swamp	--	182	182	--

Table 153 (continued)

Type of Area[a]	County	Civil Division(s)	Name	Site Area (acres)			Comments
				Already under Protective Ownership	Proposed to Be Acquired	Total	
NA-3 (continued)	Washington (continued)	Town of Erin Town of Hartford	CTH E Wetlands	--	28	28	--
		Town of Farmington	Milwaukee River Swamp	72[b]	474	546	--
			Green Lake Bog	--	19	19	It is recommended that this site be acquired by the Green Lake Association
		Town of Hartford	STH 60 Swamp	--	32	32	--
		Town of Kewaskum	STH 28 Woods	--	145	145	--
		Town of Polk	Mueller Woods	4[c]	93	97	--
		Town of Richfield	CTH J Swamp	33	67	100	Represents an expansion of existing ownership by the Kettle Moraine Audubon Society
			Hubertus Road Sedge Meadow	--	7	7	--
			Amy Bell Lake and Lowlands	6[b]	14	20	--
			Colgate Shrub-Carr	--	38	38	--
			Lake Five Woods	--	152	152	--
		Town of Trenton	Poplar Road Lacustrine Forest	--	177	177	--
			Paradise Drive Tamarack Swamp	--	81	81	--
			Camp Wowitan Wetlands	10[b]	99	109	--
		Town of Wayne	Stockcar Swamp	--	240	240	--
		Town of West Bend	CTH Z Upland Woods and Wetlands	41	240	281	Represents an expansion of existing ownership by the Cedar Lakes Conservation Foundation
	Waukesha	City of Brookfield	Bishops Woods	42	--	42	Site currently owned by the Bishops Woods Corporation
		City of Delafield Village of Nashotah	Nashotah House Woods	--	96	96	--
		Village of Menomonee Falls	Peters Woods	--	69	69	--
		Town of Eagle	Road X Railroad Prairie	--	4	4	--
			Jericho Creek Fen	--	8	8	--
			Mailman Road Railroad Prairie	--	6	6	--
			Eagle Centre (Haffner) Oak Opening	--	20	20	Waukesha Land Conservancy[d]
			Malek Wetland	--	94	94	--
		Town of Genesee	CTH D Railroad Prairie	--	5	5	--
		Town of Lisbon	Sussex Swamp	--	147	147	--
		Town of Merton	Camp Whitcomb Lowland	40	8	48	Represents an expansion of existing ownership by Camp Whitcomb
		Town of Mukwonago	North Prairie Railroad Prairie	--	5	5	--
		Town of Mukwonago Town of East Troy	Mukwonago Low Woods	--	322	322	Includes 167 acres in Waukesha County and 165 acres in Walworth County. Of the 167 acres in Waukesha County, 10 acres are located within an existing golf course. It is recommended that those 10 acres remain in private ownership

Table 153 (continued)

Type of Area[a]	County	Civil Division(s)	Name	Site Area (acres)			Comments
				Already under Protective Ownership	Proposed to Be Acquired	Total	
NA-3 (continued)	Waukesha (continued)	Town of Oconomowoc	Meadow View School Bog	5[e]	6[e]	11	--
			Oconomowoc Sedge Meadow	16[b]	3	19	--
		Town of Ottawa	Casper Creek Sedge Meadow	--	16	16	--
			Ottawa Limestone Outcrop	30	40	70	Represents an expansion of existing ownership by the Ice Age Park & Trail Foundation, Inc.
			Larkin Lake	34[b]	7	41	--
			CTH ZC Lowlands	--	380	380	--
		Town of Ottawa Town of Summit	Perkins Property	394	44	438	Represents an expansion of existing ownership by the Izaak Walton League
		Town of Summit	Crossroads Bog	1[b]	3	4	--
			Laura Lake Swamp	8[b]	266	274	--
			Sawyer Road Sedge Meadow	3[b]	35	38	--
	Subtotal	--	99 sites	1,253	7,822	9,075	--
--	Natural Areas Subtotal	--	105 sites	1,693	7,997	9,690	--
CSH	Kenosha	Town of Brighton	Peterson Creek Wetland	--	100	100	--
		Town of Salem	Wilmot Ski Hill Prairie	--	84	84	--
			Trevor Creek Wet Prairie	--	66	66	--
		Town of Wheatland	Unnamed wetland	--	36	36	--
	Milwaukee	Village of Fox Point	Fox Point Clay Bluffs	--	86	86	--
	Ozaukee	Town of Port Washington	Sauk Creek Nature Preserve	22	--	22	Site is owned by the Ozaukee Land Trust
	Racine	Town of Brighton	Burlington Crevasse Filling	--	23	23	--
		Town of Caledonia	Breakers Woods	--	5	5	--
			Dominican Ravine	--	16	16	--
			North Bay Ravine and Beach	--	4	4	--
		Town of Norway	Waubeesee Lake	--	14	14	It is recommended that this site be acquired by the Waubeesee Lake Association[f]
	Walworth	Town of Bloomfield	Section Five Marsh and Pond	--	18	18	--
			Swift Lake Wetland	--	10	10	--
		Town of Lyons	Radio Station Wetland	--	30	30	--
			Peterson Property	--	50	50	--
		Town of Richmond	Unnamed wetland	20[b]	2	22	--
		Town of Troy	Camp Timberlee	--	65	65	--
			Doyles Lake Prairies	--	200	200	--
			Harmony Hills Savanna	--	70	70	--
	Washington	Town of West Bend	Gilbert Lake	--	10	10	It is recommended that this site be acquired by the Cedar Lakes Conservation Foundation

Table 153 (continued)

Type of Area[a]	County	Civil Division(s)	Name	Site Area (acres)			Comments
				Already under Protective Ownership	Proposed to Be Acquired	Total	
CSH (continued)	Waukesha	City of Delafield	Nagawicka Lake	--	22	22	It is recommended that this site be acquired by the Waukesha Land Conservancy
		Town of Eagle	Holtz Oak Opening	--	94	94	--
		Town of Mukwonago	Spring Lake Woods	--	14	14	--
		Town of Oconomowoc	Stonebank Tamarack Relict	28[b]	138	166	--
		Town of Ottawa	School Section Lake	--	12	12	--
			Unnamed low woods-thicket	12[b]	176	188	--
			Lurvey Tamaracks	--	--	--	This site is within the unnamed low woods-thicket Critical Species Habitat site in the Town of Ottawa
		Town of Summit	Dousman Road Low Woods	--	3	3	--
			Massaro Woods	--	12	12	--
			Genesee Lake Road Tamaracks	--	110	110	--
			Duck Lake	--	30	30	--
		Town of Vernon	Pheasant Hill Woods	--	24	24	--
	Subtotal	--	32 sites	82	1,524	1,606	--
GA-1	Waukesha	City of Waukesha	Carroll College Quarry	1	--	1	--
	Subtotal	--	1 site	1	--	1	--
GA-3	Ozaukee	Town of Saukville	Riveredge Bluff	-- (1)	-- --	-- (1)	This site is within the Riveredge Nature Center and the Riveredge Mesic Woods Natural Area, an NA-2 site
	Racine	Town of Burlington	Burlington Crevasse Filling	-- --	12 (35)	12 (35)	About 23 acres of this site lie within a Critical Species Habitat site of the same name proposed to be acquired for protective ownership
	Walworth	Town of Spring Prairie	Voree Quarry	--	16	16	--
		Town of Lyons Town of Burlington	Lyons Glacial Deposits	-- --	-- (637)	-- (637)	About 637 acres of this 3,888-acre site are within a Natural Area of local significance proposed to be acquired by a private conservancy group. The remaining 3,251 acres are not proposed for protective ownership
	Washington	Town of Kewaskum	Kewaskum Quarry and Lime Kiln	--	5	5	--
		Town of Trenton	Camp Wowitan Esker	-- --	54 (57)	54 (57)	About three acres of this site lie within the Camp Wowitan Wetlands Natural Area, an NA-3 site proposed to be acquired for protective ownership by a private conservancy organization
			Trenton Lime Kilns and Quarry	--	3	3	--
	Waukesha	Village of Menomonee Falls	Derrick Quarry	-- (1)	-- --	-- (1)	The entire area is located within the Peters Woods Natural Area, an NA-3 site, and is proposed to be acquired by a private conservancy organization
		Town of Eagle	Jericho Creek Outcrop	--	8	8	--
		Town of Merton	Merton Esker	--	14	14	--
		Town of Ottawa	Unnamed bluff	--	24	24	--
			Unnamed quarry	--	3	3	--

Table 153 (continued)

Type of Area[a]	County	Civil Division(s)	Name	Site Area (acres)			Comments
				Already under Protective Ownership	Proposed to Be Acquired	Total	
GA-3 (continued)	Waukesha (continued)	Town of Ottawa (continued)	Hunter's Bluff	-- --	-- (18)	-- (18)	The entire site is located within the Ottawa Limestone Outcrop Natural Area, an NA-3 site, and is proposed to be acquired by a private conservancy organization
	Subtotal	--	13 sites	--	139	139	--
--	Total	--	151 sites	1,776	9,660	11,436	--

[a] *NA-1 identifies Natural Areas of statewide or greater significance*
NA-2 identifies Natural Areas of countywide or regional significance
NA-3 identifies Natural Areas of local significance
CSH identifies Critical Species Habitat sites
GA-1 identifies a Geological Area of statewide or greater significance
GA-3 identifies Geological Areas of local significance

[b] *Area under protective ownership is surface water, which is in State public-interest ownership.*

[c] *Area under protective ownership is within State highway right-of-way.*

[d] *The Waukesha Land Conservancy acquired this site since ownership data were collected in 1994.*

[e] *A portion of this site is currently in school-district ownership. It is recommended that the remainder of the site be acquired by a private conservancy organization.*

[f] *Acquisition is recommended in the plan documented in SEWRPC Community Assistance Planning Report No. 215, An Environmentally Sensitive Lands Preservation Plan for the Town of Norway Sanitary District No. 1, Racine County, Wisconsin, June 1996.*

Source: SEWRPC.

Slow-water streams, such as this reach of the Mukwonago River in the Town of Troy, Walworth County, include those undeveloped, unpolluted stream reaches with a stream fall of less than 20 feet per mile. Several rare, threatened, and endangered fish species occur in this reach of the Mukwonago River, including the starhead topminnow (Fundulus dispar), longear sunfish (Lepomis megalotis), and least darter (Etheostoma microperca).

Source: Wisconsin Department of Natural Resources.

Construction of a condominium adjacent to a wooded ravine in Milwaukee County's Jacobus Park has jeopardized the survival of a small patch of forked aster (Aster furcatus), a State-designated threatened species as well as a rare woodland wild flower, shown above.

Source: Donald M. Reed.

Table 154

SUMMARY OF SITES RECOMMENDED FOR ACQUISITION AND MANAGEMENT BY THE UNIVERSITY OF WISCONSIN OR THE WISCONSIN DEPARTMENT OF TRANSPORTATION

Type of Area[a]	County	Civil Division(s)	Name	Site Area (acres)			Comments
				Already under Protective Ownership	Proposed to Be Acquired	Total	
NA-1	Ozaukee	Town of Saukville	Sapa Spruce Bog	22	37	59	Represents an expansion of existing ownership by the University of Wisconsin
	Racine	Town of Caledonia	Renak-Polak Woods State Natural Area	96	42	138	Represents an expansion of existing ownership by the University of Wisconsin
	Subtotal	--	2 sites	118	79	197	--
NA-2	Kenosha	Town of Bristol	Benedict Prairie	6	--	6	Site is owned by the University of Wisconsin
	Ozaukee	Town of Saukville	Cedarburg Beech Woods State Natural Area	87	43	130	Represents an expansion of existing ownership by the University of Wisconsin
	Subtotal	--	2 sites	93	43	136	--
NA-3	Milwaukee	City of Milwaukee	Downer Woods	13	--	13	Site is currently owned by the University of Wisconsin
	Walworth	Town of Delavan	Marsh Road Railroad Prairie	4	--	4	Site is currently owned by the Wisconsin Department of Transportation
	Washington	Town of Erin	Mason Creek Swamp	131	301	432	Represents an expansion of existing ownership by the University of Wisconsin
	Subtotal	--	3 sites	148	301	449	--
--	Natural Areas Subtotal	--	7 sites	359	423	782	--
Critical Species Habitat Sites	Kenosha	Town of Somers	Parkside Woods	14	--	14	Site is owned by the University of Wisconsin-Parkside
	Racine	Town of Burlington	Ranger Mac Fen	26	2	28	Represents an expansion of existing ownership by the University of Wisconsin-Parkside
	Walworth	Town of Geneva	Elkhorn Railroad Prairie Remnant	1	--	1	Site is owned by the Wisconsin Department of Transportation
	Subtotal	--	3 sites	41	2	43	--
Geological Area	Washington	Village of Germantown	Germantown Road Cut	5	--	5	Site is owned by the Wisconsin Department of Transportation
	Subtotal	--	1 site	5	--	5	--
--	Total	--	11 sites	405	425	830	--

[a] *NA-1 identifies Natural Areas of statewide or greater significance*
NA-2 identifies Natural Areas of countywide or regional significance
NA-3 identifies Natural Areas of local significance

Source: SEWRPC.

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Chapter IX

SUMMARY AND CONCLUSIONS

The urbanization of the Southeastern Wisconsin Region combined with historical agricultural activity have greatly diminished the remaining undisturbed, natural areas of the Region. Only remnants of the pre-European-settlement landscape remain intact. Continued urbanization threatens to disturb or destroy the remaining natural areas and the associated—in many cases, unique—plant and animal habitat which they afford.

In 1987, the Milwaukee County Department of Parks, Recreation and Culture requested the assistance of the Commission in identifying the remaining natural areas and other areas of special ecological value within the County park system as the County began to divest itself of what were perceived to be excess parklands. The County's request was intended to ensure that particularly significant natural areas would not be inadvertently disposed of and allowed to be developed for urban use or otherwise disturbed. Subsequent consultations between the Commission staff, officials from the other six counties of the Region, and the Wisconsin Department of Natural Resources staff indicated a need for an areawide study to identify and plan for the protection and management of the best remaining natural areas and critical species habitats in Southeastern Wisconsin. With funding provided by the seven counties and the Wisconsin Department of Natural Resources, the Commission initiated such an effort—the natural areas and critical species habitat protection and management planning program—in 1991.

The natural areas and critical species habitat protection and management study was carried out by the Commission staff with the assistance of the staff of the Wisconsin Department of Natural Resources, Bureau of Endangered Resources. The study was conducted under the guidance of a Technical Advisory Committee including biologists and naturalists familiar with the area, as well as representatives of the Wisconsin Department of Natural Resources, the University of Wisconsin, and private conservancy organizations active within the Region. The full Committee membership is listed on the inside front cover of this report.

SCOPE AND PURPOSE

The primary purpose of the study was to identify and make recommendations for the protection and management of the most significant remaining "natural areas" and "critical species habitats" in the Southeastern Wisconsin Region. For purposes of the study, "natural areas" were defined as those tracts of land or water so little modified by human activity, or which have sufficiently recovered from the effects of such activity, that they contain intact native plant and animal communities believed to be representative of the pre-European-settlement landscape. "Critical species habitats" were defined as those tracts of land or water which support Federally listed or State-listed endangered, threatened, or rare plant or animal species.

In considering the scope of the study, the Technical Advisory Committee determined that, in addition to natural areas and critical species habitats, the study should also address the protection of sites which are of special geological or archaeological significance. These sites, like natural areas and critical species habitats, are subject to inadvertent disturbance or destruction as urbanization continues within the Region, resulting in the loss of the opportunities which these sites afford educational, scientific, and recreational pursuits. For purposes of the study, "geological sites" were defined as tracts of land that include such glacial features as eskers and kames, fossil beds, and rock outcrop and exposed bedrock sites of scientific and educational value. "Archaeological sites" were defined as those tracts of land, streambeds, or lake bottoms that include objects or other evidence of archaeological interest 100 years or more of age including, but not limited to, pottery, tools, structures, human skeletal remains, aboriginal mounds and earthworks, and ancient burial grounds.

The study, then, was intended to identify the most important remaining natural areas and critical species habitats, along with significant geological sites and archaeological sites, and to recommend means for their protection and management. The study was also intended to increase the dissemi-

nation of information regarding such sites to State, County, and local units and agencies of government and to private interests, in order that the preservation of these sites may be properly considered as proposals for development within the Region are advanced.

RELATION TO THE REGIONAL PLAN

The Regional Planning Commission is charged by law with the function and duty of making and adopting a master plan for the physical development of the Region. Because the scope and complexity of areawide development problems prohibit the making and adopting of an entire comprehensive development plan at one time, the Commission has determined to proceed with the preparation of individual plan elements which together form the comprehensive plan. The individual elements—including, among others, a regional transportation system plan, a regional water quality management plan, and a regional park and open space plan—are coordinated by being related to an areawide land use plan. The natural areas and critical species habitat plan presented in this report constitutes an additional element of the evolving comprehensive plan for the Southeastern Wisconsin Region, providing an important supplement to the open space preservation recommendations of the regional land use and park and open space plans.

One of the most important recommendations of the regional plan is the permanent preservation in essentially natural, open uses of "primary environmental corridors." Primary environmental corridors are defined by the Commission as elongated areas in the landscape which contain concentrations of the best remaining elements of the natural resource base—including wetlands, woodlands, surface-water areas and associated undeveloped shorelands and floodplains, and wildlife habitat areas. As defined by the Commission, these areas are at least 400 acres in area, two miles in length, and 200 feet in width. Within the Region, these corridors generally lie along major stream valleys, around major lakes, and in the Kettle Moraine area. In 1990, the primary environmental corridors encompassed about 470 square miles, or about 17 percent of the total area of the Region. The preservation of these corridors is essential to the maintenance of the overall quality of the environment within the Region, to the maintenance of its natural beauty, and to the provision of adequate opportunities for recreational, educational, and scientific pursuits. Because the corridors are generally physically unsuited for urban development, their preservation in essentially natural open uses also helps to avoid the creation of new developmental and environmental problems.

The environmental corridor concept was a major factor in the preparation of the natural areas and critical species habitat protection and management plan. In this respect, location within a primary environmental corridor was a basic consideration in recommending priorities for the protective ownership of individual natural areas and critical species habitat areas under the plan. Conversely, the site-specific inventory information collected under the natural areas and critical species habitat planning effort will permit a more precise delineation of environmental corridors under the continuing regional planning program.

HISTORICAL LOSS OF NATURAL AREAS AND CRITICAL SPECIES HABITAT

Natural area and critical species habitat losses in Southeastern Wisconsin have been profound. The map of pre-European-settlement Southeastern Wisconsin, based upon records of the U. S. Public Land Survey carried out within the Region in 1835 and 1836, reveals that the area of the Region north and east of the vegetation tension zone—a line which runs northwesterly from Milwaukee County through Washington County—was covered predominantly by maple-basswood and beech-maple forest, while the area south and west of the vegetation tension zone was covered predominantly by oak forest, oak savanna, and prairie. It is estimated that about 83 percent of the pre-settlement vegetation had been lost by 1990. The upland woodland areas decreased by about 1,145 square miles, or about 87 percent, from about 1,320 square miles prior to European settlement to about 175 square miles in 1990. Wetlands decreased by about 181 square miles, or about 41 percent, from about 442 square miles prior to European settlement to about 261 square miles in 1990. Once abundant in the Region, prairies and oak savannas have nearly disappeared from the regional landscape. Prairies declined from an estimated 267 square miles prior to European settlement to about two square miles in 1990. Oak savannas declined from an estimated 605 square miles prior to European settlement to about 0.2 square mile in 1990.

The woodlands of Southeastern Wisconsin have suffered disturbances from clear-cutting, selective logging, and grazing by cattle. This has led to loss of forest interior environment, decreases in the numbers and types of native plants and animals, and increases in the numbers and types of exotic

organisms. Cessation of periodic, naturally occurring fire has caused oak savannas to convert to shrubby oak woods and prairies to convert to shrub-thickets.

In recent decades, urbanization has contributed to an accelerated loss and degradation of natural areas. For example, residential development within woodlots has led to a loss of woodlots as functioning communities. Moreover, prairies along railway rights-of-way have been destroyed as herbicide spraying has replaced fire as a management technique.

The vegetation of the Region has been adversely affected by such pathogens and destructive insects as the imported Dutch elm disease, oak wilt, butternut canker, larch sawflies, and, at least potentially, the exotic gypsy moths. Alteration of the Region's hydrology has also been profound. The alterations have resulted in the loss of wetlands through draining and filling, ditching, stream channelization, floodplain development, and destruction of natural vegetated shorelines. These alterations have diminished many of the natural functions wetlands once performed in the Region.

Numerous exotic organisms have been introduced into Southeastern Wisconsin. Some of these have become naturalized pests, including the European and glossy buckthorns, honeysuckles, garlic mustard, multiflora rose, highbush cranberry, Eurasian water milfoil, reed canary grass, purple loosestrife, starling, house sparrow, sea lamprey, and alewife. A number of native plant and animal species have been extirpated—that is, have disappeared as a breeding species—from the Region since 1836. Extirpated plant species include the harbinger-of-spring, dwarf lake iris, wild petunia, prairie bush-clover, eared false foxglove, and beaked hazelnut. Extirpated animal species include the passenger pigeon, Carolina parakeet, bison, gray wolf, cougar, elk, and lynx. A total of 45 native plant and 35 vertebrate animal species that occur in Southeastern Wisconsin are listed by the Wisconsin Department of Natural Resources as endangered or threatened in Wisconsin. In addition, about 70 plant and about 70 vertebrate animal species have been listed as being of "special concern."

INVENTORY FINDINGS

Full use was made in the planning effort of existing data regarding natural areas, critical species habitat, geological sites, and archaeological sites available from the Wisconsin Department of Natural Resources, the University of Wisconsin-Madison and the University of Wisconsin-Milwaukee, the Milwaukee Public Museum, the State Historical Society of Wisconsin, The Nature Conservancy, and area biologists and naturalists, as well as from Regional Planning Commission files. Extensive fieldwork was conducted in order to confirm information from existing sources and to gather information about sites of possible interest for which no data were available. Necessary fieldwork was conducted primarily during the field seasons of 1991, 1992, 1993, and 1994. The methodologies used in the conduct of the inventories and the findings of the inventories are described in Chapter VI of this report. A summary of the inventory findings with respect to the existing designated Natural Areas, Critical Species Habitat sites, significant geological sites, and significant archaeological sites follows.

Natural Areas

As already noted, natural areas were defined as tracts of land or water which were so little modified by human activity, or which have sufficiently recovered from the effects of such activity, that they contain intact native plant and animal communities believed to be representative of the pre-European-settlement landscape. The study identified a total of 447 "Natural Area sites," which together encompassed an area of about 90 square miles, or about 3 percent of the total area of the Region. These sites include examples of all major pre-European-settlement vegetative community types. The designated Natural Area sites are listed and described in Tables 59 through 65 in Chapter VI of this report; the locations of these sites are shown on Maps 26 through 32 in Chapter VI.

Using a classification system developed by the Wisconsin Department of Natural Resources and subsequently refined by the Commission, each of the identified Natural Areas was classified as being either of statewide or greater significance, or an "NA-1" site; of countywide or regional significance, or an "NA-2" site; or of local significance, or an "NA-3" site. NA-1 sites represent excellent examples of nearly complete and relatively undisturbed plant and animal communities which are believed to closely resemble those present during pre-European-settlement times. NA-2 sites represent native biotic communities judged to be of lower than NA-1 significance generally because of evidence of limited human disturbance. NA-3 sites represent native biotic communities judged to have been substantially altered by human activities but which are of local significance, often containing good wildlife habitat or providing refuge for a number of native plant species which no longer exist in the surrounding area. Of the 447 Natural Area sites identified in the inventories, 40 sites, which together encompassed an area of about

14 square miles, were identified as NA-1 sites; 122 sites, which together encompassed an area of about 33 square miles, were identified as NA-2 sites; and 285 sites, which together encompassed an area of about 43 square miles, were identified as NA-3 sites. Thus, the NA-1 sites comprised about 9 percent of the total sites identified, and about 15 percent of the total area of all sites identified; NA-2 sites comprised about 27 percent of the total sites identified, and 37 percent of the total area of all such sites; and NA-3 sites comprised about 64 percent of the total sites identified, and about 48 percent of the total area of all such sites.

Critical Species Habitat

As already noted, critical species habitats were identified as tracts of land or water which support Federally listed or State-listed endangered, threatened, or rare plant or animal species. Many of the critical species habitats identified in the study were wholly or partially located within the Natural Area sites described above. Other areas have been disturbed or altered to the extent that they no longer meet Natural Area criteria but, nevertheless, continue to support endangered, threatened, or rare plants or animals. A summary of the study findings with respect to critical plant and animal species and their habitats within the Region follows.

Critical Plant Species: A total of 86 critical plant species were found growing as natives in the Region during the four-year inventory period of the study, or were known to occur within the Region based upon records dating back to 1970. Of the 86 critical plant species, 16, or about 19 percent, were classified as endangered; 20, or 23 percent, were classified as threatened; and 50, or 58 percent, were classified as rare.

The study identified a total of 818 critical plant species "site occurrences" within the Region. A site occurrence refers to a recorded observation of an endangered, threatened, or rare plant species at a specific location. Of the 818 site occurrences, 689, or 84 percent, were located within Natural Area sites. The remaining 129 occurrences were found at 111 sites which did not meet Natural Area criteria. Under the study, these 111 sites were designated as "Critical Plant Species Habitat sites." The Critical Plant Species Habitat sites are listed in Table 69 in Chapter VI of this report; the locations of these sites are shown on Map 33 in Chapter VI.

Critical Animal Species: Major study findings with respect to the occurrence of critical bird, mammal, herptile, fish, and mussel species and the associated habitat areas are summarized below:

- The study found evidence of six endangered, six threatened, and 32 rare bird species which utilized areas in the Region at some point in their life cycle, whether for breeding, nesting, foraging, or migration. A total of 84 sites in the Region were identified as providing habitat for one or more of these species (see Table 77 and Map 35 in Chapter VI). Of these, 54 sites, or 64 percent, were located entirely within the boundaries of designated Natural Areas. Of the 30 remaining sites, 26 were located wholly outside any identified Natural Area; under the study, these sites were identified as "Critical Bird Species Habitat sites." The other four sites were located partially within and partially outside designated Natural Areas; under the study, the portions of these sites extending beyond designated Natural Areas were also identified as "Critical Bird Species Habitat sites." One of the 30 sites was also a Critical Plant Species Habitat site.

- The study found evidence of the occurrence within the Region of two critical mammal species, the bobcat (Lynx rufus) and Franklin's ground squirrel (Spermophilus franklinii). Both are listed by the Wisconsin Department of Natural Resources as rare species in Wisconsin. Existing records regarding these species are largely based upon informal verbal testimony of sightings within the Region. Under the study, one site—consisting of a portion of Waukesha County's Mukwonago Park and adjacent lands—was identified as a "Critical Mammal Species Habitat site."

- The study found evidence of the occurrence of five endangered, one threatened, and two rare amphibian and reptile species—collectively referred to as "herptile" species—within the Region. Range areas providing suitable habitat for these herptile species and nesting areas for these species, where appropriate, were identified (see Maps 36 through 43 in Chapter VI).

- The study found evidence of three endangered, six threatened, and six rare fish species in the Region's lakes and streams (see Maps 48 and 49 in Chapter VI).

- The study found evidence of one endangered, three threatened, and two rare mussel species

in the Region's streams (see Table 99 in Chapter VI).

Aquatic Habitat Ranking

Under the study, streams and lakes deemed to be of particular importance as natural areas and critical species habitats were identified and ranked. As a first step, "critical" streams and lakes were identified. Critical streams consisted of those perennial streams which supported endangered, threatened, or rare fish or mussel species; supported extensive beds of other mussel species; supported habitat for endangered, threatened, or rare herptile species; or were located adjacent to, or within, a designated Natural Area. Critical lakes generally consisted of those lakes having a water-surface area of 10 acres or more and which supported endangered, threatened, or rare fish species; supported habitat for endangered, threatened, or rare herptile species; or were located adjacent to, or within, a designated Natural Area.

The streams and lakes identified as critical were then ranked based upon the wildlife present, physical characteristics, and water quality. The classifications used in this ranking were similar to those used in the ranking of Natural Areas. In this respect, lakes and streams were ranked as Aquatic Areas of statewide or greater significance, or "AQ-1" areas; Aquatic Areas of countywide or regional significance, or "AQ-2" areas; and Aquatic Areas of local significance, or "AQ-3" areas.

There are about 1,209 miles of perennial streams in the Region. About 737 perennial—stream-miles, or 61 percent of the total, were designated critical streams—including about 103 miles which were assigned a rank of AQ-1, about 188 miles which were assigned a rank of AQ-2, and about 446 miles which were assigned a rank of AQ-3 (see Map 53 and Table 101 in Chapter VI). Thus, among ranked stream reaches, the AQ-1 Aquatic Areas constituted about 14 percent of the critical stream-miles and 8 percent of the total stream-miles; AQ-2 Aquatic Areas constituted about 25 percent of the critical stream-miles and 16 percent of the total stream-miles; and AQ-3 Aquatic Areas constituted about 61 percent of the critical stream-miles and 37 percent of the total stream-miles.

There are 198 lakes in the Region with surface-water area generally of 10 acres or more each. The combined area of these lakes is about 60 square miles. Lakes encompassing a combined area of about 54 square miles, or 90 percent of this total lake area, were identified as critical lakes. Critical lakes assigned a rank of AQ-1 encompassed about six square miles, or about 11 percent of the critical lake area and 10 percent of the total lake area; those assigned a rank of AQ-2 encompassed 33 square miles, or about 61 percent of the critical lake area and about 54 percent of the total lake area; and those assigned a rank of AQ-3 encompassed 15 square miles, or about 28 percent of the critical lake area and about 26 percent of the total lake area (see Map 53 and Table 103 in Chapter VI).

Specific aquatic habitat plan recommendations were not formulated under the natural areas planning effort since such habitats are under the direct management authority of the Wisconsin Department of Natural Resources. The plan recommends that the Department implement management and regulatory efforts necessary to ensure the long-term viability of the aquatic resource habitats and their critical species. The study findings regarding aquatic habitats and critical aquatic species within the Region are intended to be used by the Department and other concerned agencies for consideration in the development of management plans.

Geological Sites

The study identified a total of 86 significant "Geological Areas," including 57 bedrock geological sites and 29 sites containing glacial features. These sites were also ranked using a classification similar to that used in the ranking of Natural Areas. In this respect, 23 geological sites, or about 27 percent of the 86 sites, were classified as Geological Areas of statewide or greater significance, or "GA-1" sites; 28 sites, or about 32 percent, were classified as Geological Areas of countywide or regional significance, or "GA-2" sites; and 35 sites, or about 41 percent, were classified as Geological Areas of local significance, or "GA-3" sites (see Table 104 and Map 54 in Chapter VI).

Archaeological Sites

Fourteen archaeological sites in the Region have been evaluated and found to be of sufficient significance to be listed on the National Register of Historic Places. Files of the State Historical Society of Wisconsin indicate that more than 2,000 other historic and prehistoric archaeological sites have been identified in the Region. These sites, which range from the occurrence of single arrowheads to campsites and village sites, have not been evaluated.

RELATED GOVERNMENT POLICIES AND REGULATIONS

Existing public policies and regulations pertaining to the protection and management of natural areas, critical species, and critical species habitat are

described in Chapter VII of this report. Major remedies available under Federal and State law generally consist of restrictions or prohibitions on the taking, possession, transport, and sale of designated endangered and threatened plant and animal species. However, no Federal or State regulations have been specifically promulgated to protect natural areas and critical species habitats unless they are located within designated State natural areas which are owned or managed by the State of Wisconsin.

Wetland regulatory programs administered by the Federal and State governments may serve to protect natural areas and critical species habitats which are located in wetlands. In addition, State regulation of the extension of public sanitary sewerage systems may afford protection to natural areas and critical species habitats located within primary environmental corridors. Some Federal and State programs provide funds to public agencies and to private, nonprofit conservation organizations to locate, evaluate, acquire, protect, and manage natural areas and critical species habitats.

Local zoning, including general zoning and State-mandated floodland and shoreland zoning, provides a means to ensure the protection of natural areas and critical species habitats. Local subdivision control ordinances may also be used to protect open space sites which encompass natural areas and critical species habitats. Such ordinances are effective in preserving natural areas and critical species habitats, however, only if the local units of government involved are inclined to enact and properly administer those ordinances with this end in mind.

Government programs provide limited protection of especially significant geological and archaeological sites. The Federal National Natural Landmarks program provides for the designation of particularly significant geological sites; Federal agencies are required to consider potential impacts on designated National Natural Landmark sites in any environmental assessment of agency actions. Archaeological sites listed on the National Register of Historic Places receive limited protection from projects licensed or funded by the State or Federal governments.

OBJECTIVES, PRINCIPLES, AND STANDARDS

The Advisory Committee adopted two objectives to guide the preparation of the regional natural areas and critical species habitat protection and management plan. These objectives were, first, to maintain the integrity of the remaining biodiversity of the Region; and, second, to preserve and protect the remaining significant geological and archaeological sites of the Region. Supporting principles and related standards for the preservation, protection, and management of Natural Areas, Critical Species Habitat sites, and significant geological and archaeological sites are presented in Table 108 in Chapter VIII of this report.

RECOMMENDED PLAN

Within the framework of the objectives, principles, and standards, a protection and management plan consisting of three plan elements—the first dealing with Natural Areas and Critical Species Habitat sites; the second dealing with significant geological sites; and the third dealing with significant archaeological sites—was developed. That plan is described in Chapter VIII of this report. The major recommendations of the plan are summarized below.

Natural Area and Critical Species Habitat Plan Element

As already noted, the inventory phase of the study resulted in the identification of 447 Natural Area sites as well as 141 Critical Species Habitat sites located wholly or partially outside the boundaries of the identified Natural Areas. The plan recommends that each of these 588 sites be protected and reserved to the maximum extent practicable as urban and rural development in the Region proceeds. The plan further recommends that 537 sites, or 91 percent of the total, be placed in public or private protective ownership and that the other 51 sites be protected, insofar as it is possible, through zoning and other regulatory means, without protective ownership. Plan recommendations with respect to each of the identified Natural Area sites and Critical Species Habitat sites are presented by county on Maps 70 through 76. The plan recommends the following priorities for public-interest acquisition, given existing constraints on the financial resources of the public and private agencies proposed to be responsible for such acquisition:

1. That the highest acquisition priority be accorded to Natural Area sites of statewide or greater significance (NA-1 sites). All 40 of the identified NA-1 sites are recommended for protective ownership under the plan. The 40 NA-1 sites encompass 13.6 square miles, or about 0.5 percent of the total area of the Region. Of the 13.6-square-mile area concerned, about 9.1 square miles, or 67 percent, have already been placed under protective public or private ownership. This includes six sites where protective acquisition of the entire site has been

completed. Under the plan, the remaining 4.5 square miles generally would similarly be placed under protective ownership to ensure permanent preservation. This includes the expansion of such ownership for 29 sites where protective acquisition of a part of the site has been completed; and the acquisition of five sites where protective acquisition has not yet been initiated. About 68 percent of the area proposed to be acquired consists of lands previously recommended to be acquired for open space preservation purposes under prior regional or county plans.

2. That the second-highest acquisition priority be accorded those Natural Areas of countywide or regional significance (NA-2 sites) and those Natural Areas of local significance (NA-3 sites) which lie within Commission-delineated primary environmental corridors; which support endangered, threatened, or rare plant, bird, or mammal species; or which have already been at least partially placed in public or private protective ownership. Included in this priority group are all 122 of the identified NA-2 sites, plus 265 of the 285 identified NA-3 sites. The acreage within the 387 sites recommended for acquisition encompasses about 74.3 square miles, or about 2.8 percent of the total area of the Region. Of that total, about 31.2 square miles, or 42 percent, have already been placed under protective public or private ownership. This includes 56 sites where protective acquisition of the entire site has been completed. Under the plan, the remaining 43.1 square miles would similarly be placed under protective ownership to ensure permanent preservation. This includes the expansion of such ownership for 179 sites already partially in protective ownership, plus the acquisition of 152 sites where protective acquisition has not yet been initiated. About 55 percent of the area proposed to be acquired consists of lands previously recommended to be acquired for open space preservation purposes under prior regional or county plans.

3. That the third-highest acquisition priority be accorded to those Critical Species Habitat sites which are not wholly contained within a designated Natural Area, but which either are located within a Commission-delineated primary environmental corridor or are already at least partially in public or private protective ownership. A total of 110 of the identified 141 Critical Species Habitat sites are included in this priority group. These 110 sites encompass about 21.0 square miles, or about 0.8 percent of the total area of the Region. Of that total, about 15.1 square miles, or 72 percent, have already been placed under protective public or private ownership. This includes 33 sites where protective acquisition of the entire site has been completed. Under the plan, the remaining 5.9 square miles would similarly be placed under protective ownership to ensure permanent preservation. This includes the expansion of such ownership for 16 sites already partially in protective ownership, plus the acquisition of 61 sites where protective acquisition has not yet begun. About 55 percent of the area proposed to be acquired consists of lands previously recommended to be acquired for open space preservation purposes under prior regional or county plans.

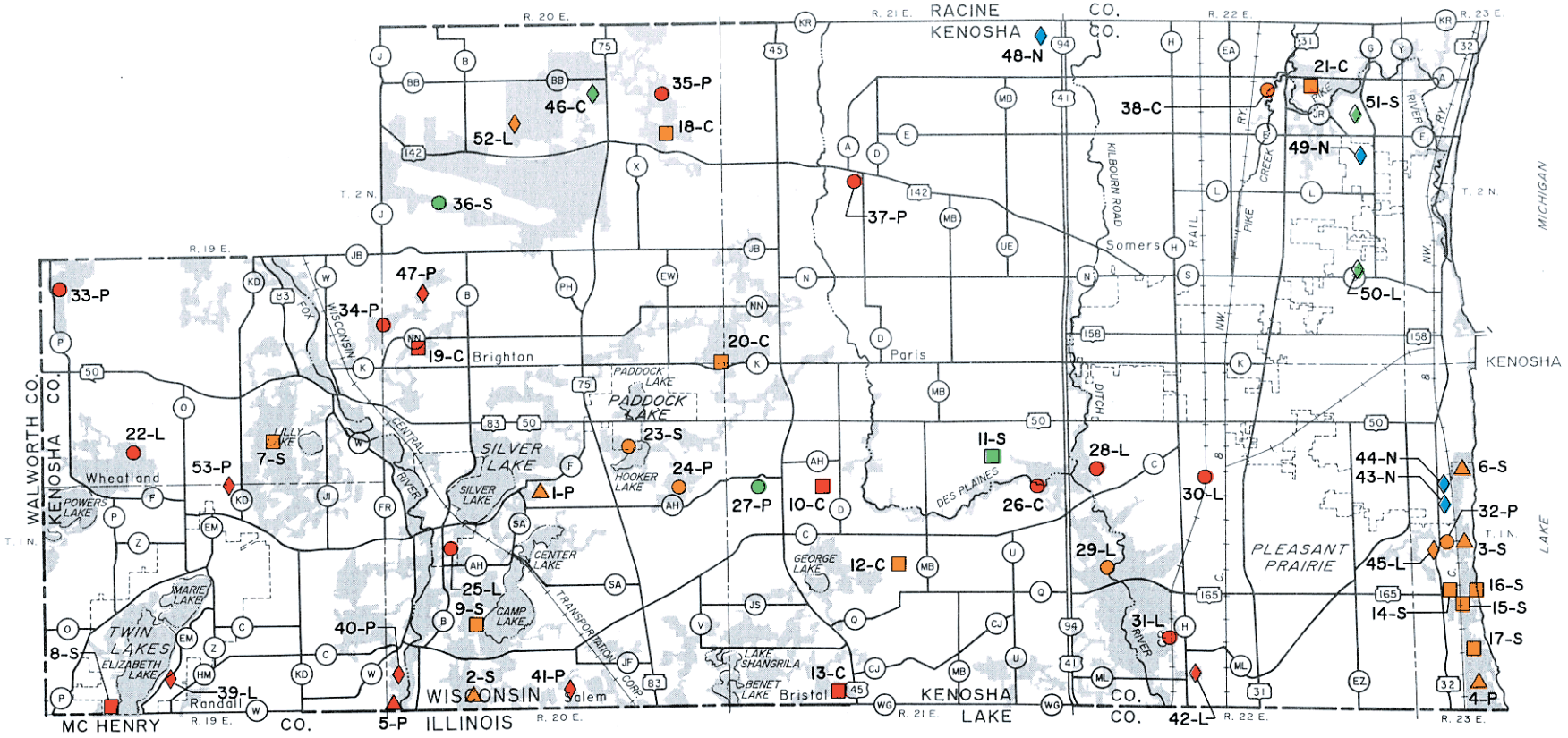
4. That the fourth-highest acquisition priority be accorded to those activities intended to reestablish relatively large tracts of grasslands and forest interiors within the Region for the purpose of enhancing bird populations. Three grassland reserve sites, together encompassing about 21.3 square miles, are recommended. Five forest interior reserve sites, together encompassing about 1.6 square miles, are also recommended (see Map 67 in Chapter VIII).

Upon implementation of these site acquisition recommendations, 427 Natural Area sites, or 96 percent of the 447 Natural Area sites found within the Region, would be in protective public or private ownership. In addition, of the 141 Critical Species Habitat sites not wholly located within a Natural Area, 110 sites, or 78 percent, would be in protective ownership.

The plan also recommends: 1) the adjustment of Commission-delineated primary environmental corridor boundaries to fully encompass inventoried Natural Areas and Critical Species Habitat sites; 2) the reflection of the Natural Area and Critical Species Habitat inventory findings in the administration of Federal, State, and local wetland regulatory programs; 3) the potential modification of State law and administrative rules to ensure that State agency actions attendant to the approval of sanitary sewer extensions or private sewage disposal systems do not result in the destruction of Natural Areas or Critical Species Habitat sites recommended for

Map 70

PLAN RECOMMENDATIONS FOR NATURAL AREAS AND CRITICAL SPECIES HABITATS IN KENOSHA COUNTY



CURRENT STATUS AND PLAN RECOMMENDATION	NA-1 SITE	NA-2 SITE	NA-3 SITE	CRITICAL SPECIES HABITAT
ENTIRELY UNDER PROTECTIVE OWNERSHIP/ PROTECTIVE OWNERSHIP TO BE RETAINED	(NONE)	■	●	◆
PARTIALLY UNDER PROTECTIVE OWNERSHIP/ REMAINDER OF SITE TO BE ACQUIRED	▲	■	●	◆
NOT UNDER PROTECTIVE OWNERSHIP/ ENTIRE SITE TO BE ACQUIRED	▲	■	●	◆
NOT UNDER PROTECTIVE OWNERSHIP/ TO BE PRESERVED, TO EXTENT PRACTICABLE, WITHOUT PROTECTIVE OWNERSHIP	(NONE)	(NONE)	(NONE)	◆

RECOMMENDED OWNERSHIP KEY:

S-STATE GOVERNMENT
C-COUNTY GOVERNMENT
L-LOCAL GOVERNMENT
P-PRIVATE CONSERVANCY ORGANIZATION
N-NO PROTECTIVE OWNERSHIP RECOMMENDED

24-SITE REFERENCE NUMBER

PRIMARY ENVIRONMENTAL CORRIDORS

GRAPHIC SCALE
0 1 2 MILES
0 4000 8000 12000 16000 FEET

All of the 38 Natural Area sites and 11 of the 15 Critical Species Habitat sites located in Kenosha County are recommended for protective ownership. The four remaining Critical Species Habitat sites are recommended to be preserved to the extent practicable without protective ownership.

Source: SEWRPC.

Reference Key to Map 70

Number	Site Name
1	Silver Lake Bog State Natural Area
2	Peat Lake State Natural Area
3	Carol Beach Low Prairie and Panné State Natural Area
4	Chiwaukee Prairie State Natural Area
5	Stopa Fen
6	Kenosha Sand Dunes and Low Prairie
7	New Munster Shrub-Carr and Tamarack Relict
8	Elizabeth Lake Lowlands
9	Camp Lake Marsh
10	Merkt Woods
11	Benedict Prairie
12	Bristol Woods
13	Mud Lake Sedge Meadow
14	104th Street Mesic Prairie
15	Carol Beach Prairie
16	Barnes Creek Dunes and Panné
17	Tobin Road Prairie
18	Friendship Lake Marsh
19	CTH NN Sedge Meadow
20	Harris Marsh and Oak Woods
21	Petrifying Springs Woods
22	Powers Lake Tamarack Relict
23	Hooker Lake Marsh
24	Montgomery Lake Marsh
25	CTH B-CTH AH Sedge Meadow
26	Des Plaines River Wetlands
27	Salem Road Marsh
28	Lake Russo Prairie Remnant
29	Des Plaines River Lowlands
30	Bain Station Railroad Prairie
31	Pleasant Railroad Prairie
32	Carol Beach Estates Prairie
33	Dyer Lake Sedge Meadow
34	Peterson Creek Sedge Meadow
35	Section 11 Wetlands and Oak Woods
36	Bong Low Prairie
37	Paris (Ehlen) Prairie Remnant
38	Pike River Low Woods
39	Hamilton Woods
40	Wilmot Ski Hill Prairie
41	Trevor Creek Wet Prairie
42	Piela Property
43	Martin Band Parcel
44	Nedweski Parcel
45	Barnes Creek
46	Brighton-Dale Woods
47	Peterson Creek Wetland
48	Poisl Woods
49	Thompson Woods
50	Bradford School Woods
51	Parkside Woods
52	Bong Recreation Area
53	Unnamed wetland

Source: Wisconsin Department of Natural Resources and SEWRPC.

preservation and protection; and 4) the proper consideration of Natural Areas and Critical Species Habitat sites in the preparation of land use and other development plans by and in the related regulatory activities of county and local units of government.

The plan recognizes a need to properly manage Natural Areas and Critical Species Habitat sites to ensure that the critical species and natural communities concerned can flourish. Without proper management, such areas may be significantly altered over time and their natural values diminished or lost. The plan further recognizes that management techniques appropriate for one type of natural area or critical species habitat area may not be appropriate for others and that management measures must be developed and applied on a site-by-site basis. Accordingly, the plan recommends that the public agencies and private conservancy organizations proposed to be responsible for site preservation and protection respectively prepare and implement detailed management plans specific to each site.

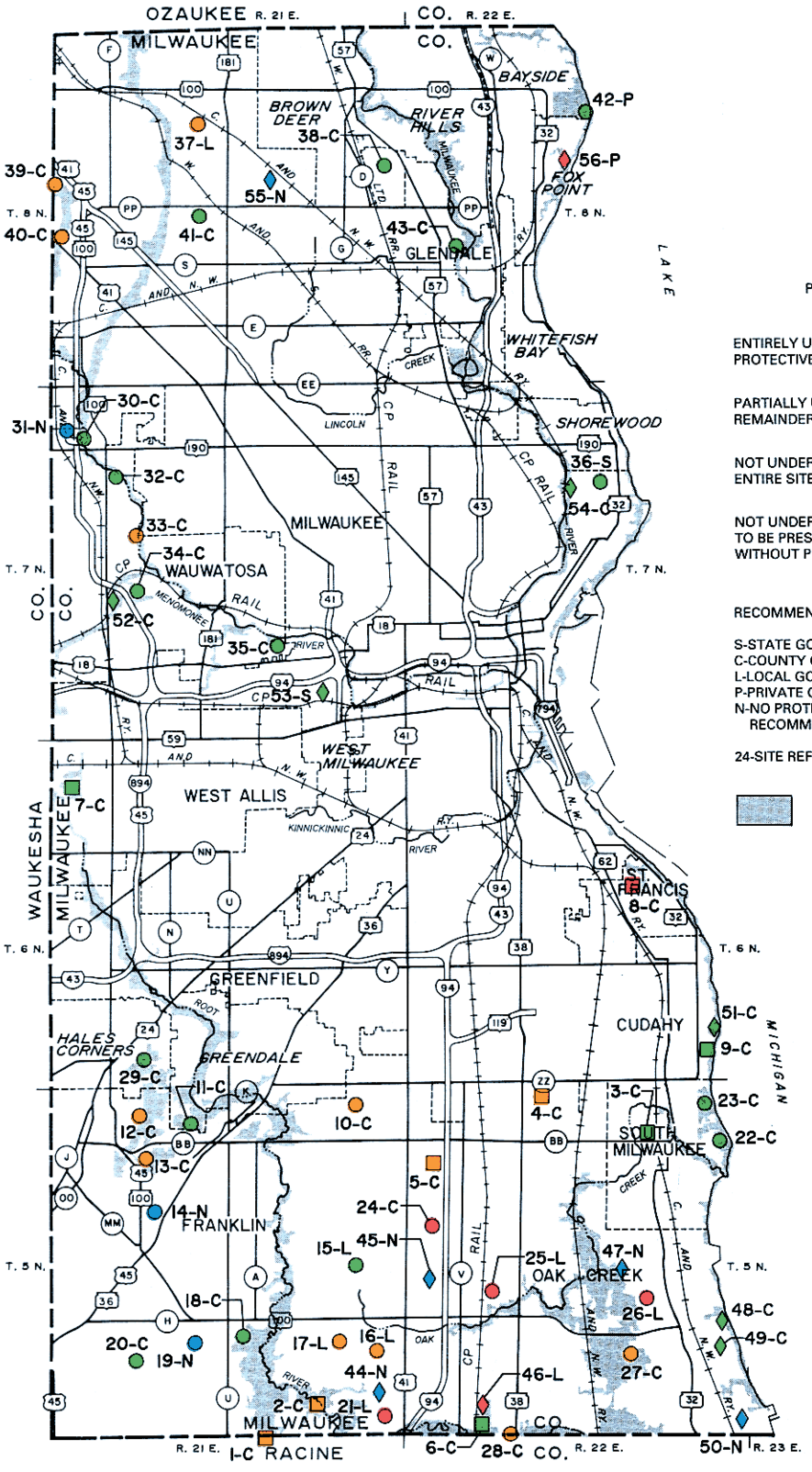
Geological Site Plan Element

Under the plan, all 86 of the designated Geological Areas identified during the inventory phase of the study are recommended to be protected and preserved. More specifically, the plan, as developed by the Advisory Committee, recommends the following:

1. That the highest priority be accorded to the acquisition of Geological Areas whose acquisition has been recommended under prior State, regional, or county plans and Geological Areas which have been recommended for protective ownership as Natural Areas or Critical Species Habitat sites. A total of 48 Geological Areas fall into this priority group (see Map 68 in Chapter VIII). About 32.0 square miles within these 48 sites are located within Natural Areas or Critical Species Habitat sites recommended to be preserved, or within another Geological Area. An additional 35.1 square miles within these 48 sites have been recommended to be acquired for protective ownership under exist-

Map 71

PLAN RECOMMENDATIONS FOR NATURAL AREAS AND CRITICAL SPECIES HABITATS IN MILWAUKEE COUNTY



CURRENT STATUS AND PLAN RECOMMENDATION	NA-1 SITE	NA-2 SITE	NA-3 SITE	CRITICAL SPECIES HABITAT
ENTIRELY UNDER PROTECTIVE OWNERSHIP/ PROTECTIVE OWNERSHIP TO BE RETAINED	(NONE)	■	●	♦
PARTIALLY UNDER PROTECTIVE OWNERSHIP/ REMAINDER OF SITE TO BE ACQUIRED	(NONE)	■	●	(NONE)
NOT UNDER PROTECTIVE OWNERSHIP/ ENTIRE SITE TO BE ACQUIRED	(NONE)	■	●	♦
NOT UNDER PROTECTIVE OWNERSHIP/ TO BE PRESERVED, TO EXTENT PRACTICABLE, WITHOUT PROTECTIVE OWNERSHIP	(NONE)	(NONE)	●	♦

RECOMMENDED OWNERSHIP KEY:

S-STATE GOVERNMENT
C-COUNTY GOVERNMENT
L-LOCAL GOVERNMENT
P-PRIVATE CONSERVANCY ORGANIZATION
N-NO PROTECTIVE OWNERSHIP RECOMMENDED

24-SITE REFERENCE NUMBER

PRIMARY ENVIRONMENTAL CORRIDORS

GRAPHIC SCALE
0 1 2 MILES
0 4000 8000 12000 16000 FEET

Forty of the 43 Natural Area sites and eight of the 13 Critical Species Habitat sites located in Milwaukee County are recommended for protective ownership. The three remaining Natural Area sites and the five remaining Critical Species Habitat sites are recommended to be preserved to the extent practicable without protective ownership.

Source: SEWRPC.

Reference Key to Map 71

Number	Site Name
1	Root River Canal Woods
2	Root River Wet-Mesic Woods—West
3	Rawson Park Woods
4	Cudahy Woods
5	Falk Park Woods
6	Root River Wet-Mesic Woods—East
7	Greenfield Park Woods
8	St. Francis Seminary Woods
9	Warnimont Park Fens
10	Grobschmidt Park Wetlands and Upland Woods
11	Root River Parkway Woods
12	Whitnall Park Woods—South
13	Monastery Lake Wetlands
14	Mission Hills Wetlands
15	Franklin (Puetz Road) Woods
16	Fitzsimmons Road Woods
17	Oakwood Park Oak Woods
18	Root River Parkway Prairie
19	Ryan Creek Woods
20	Franklin Oak Woods and Oak Savanna
21	Elm Road Woods
22	Grant Park Woods—South
23	Grant Park Woods—Old Growth
24	Esch-Honadel Woods
25	Wood Creek Woods
26	Wedge Woods
27	Oak Creek Low Woods
28	Root River Riverine Forest
29	Whitnall Park Woods—North
30	Menomonee River Swamp—South
31	Harley-Davidson Woods
32	Currie Park Low Woods
33	Blue Mound Country Club Woods
34	Wil-O-Way Woods
35	Jacobus Park Woods
36	Downer Woods
37	Bradley Woods
38	Brown Deer Park Woods
39	Harbinger Woods
40	Menomonee River Swamp—North
41	Haskell Noyes Park Woods
42	Schlitz Audubon Center Woods and Beach
43	Kletzsch Park Woods
44	Elm Road Woods—North
45	Meyers Woods
46	PPG Woods
47	Fittshur Wetland
48	Bender Park Woods and Clay Banks
49	Bender Park Woods—South
50	Oak Creek Power Plant Woods
51	Warnimont Park Woods
52	Underwood Parkway Woods
53	Stadium Bluff Woods
54	Cambridge Avenue Woods
55	Brynwood Country Club Woods
56	Fox Point Clay Bluffs

Source: Wisconsin Department of Natural Resources and SEWRPC.

ing plans. Of the 35.1 square miles so proposed to be acquired, about 24.0 square miles, or 68 percent, were in 1994 already under protective public or private ownership.

2. That the second-highest priority be accorded to the acquisition of 23 Geological Areas which have not been recommended for protective acquisition under prior plans but which are classified as GA-1 sites or are located within a primary environmental corridor (see Map 68 in Chapter VIII). A total of 291 acres, or just over 0.4 square mile, is generally recommended for protective ownership at these 23 sites.

3. That the remaining 15 Geological Areas be protected and preserved to the maximum extent practicable, without public-interest acquisition (see Map 69 in Chapter VIII). The preservation of these sites should be taken into account in the preparation of land use plans and other development plans by county and local units of government.

Archaeological Site Plan Element

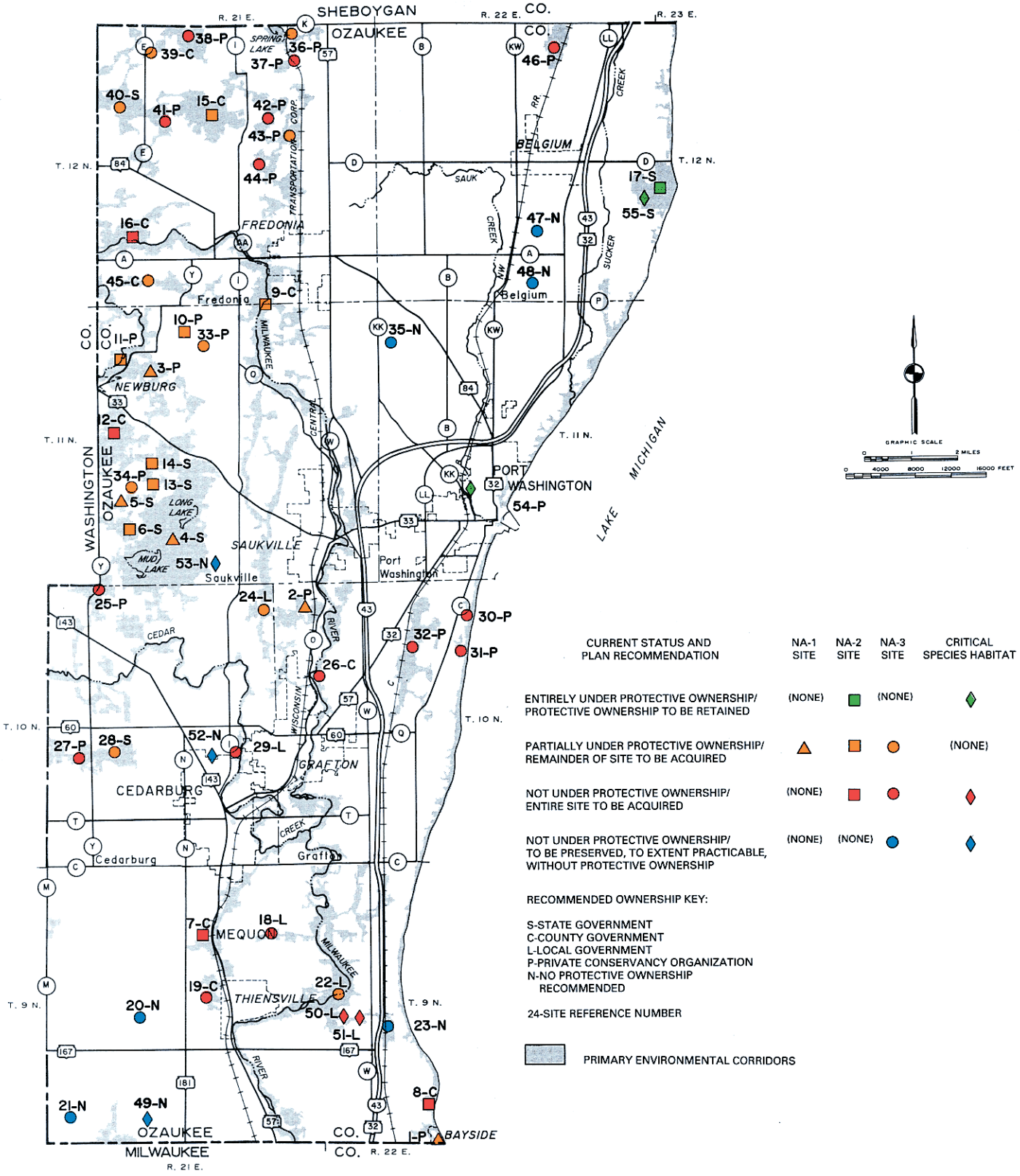
The plan recommends the protection and preservation of the 14 archaeological sites in the Region which have been listed on the National Register of Historic Places (see Map 55 in Chapter VI). Four of these sites are currently held by public or private agencies in protective ownership, and a fifth site is partially held in protective ownership. Under the plan, the remaining nine sites would be protected and preserved to the maximum extent practicable, without public-interest acquisition, relying largely on protection afforded to National Register sites under Federal and State law and on county and local planning and zoning. None of these nine sites lies within a Natural Area, a Critical Species Habitat site, or a designated Geological Area.

PLAN IMPLEMENTATION

Chapter VIII of this report presents recommendations directed toward the concerned Federal, State, county, and local units and agencies of government, as well as private conservancy organizations, to implement

Map 72

PLAN RECOMMENDATIONS FOR NATURAL AREAS AND CRITICAL SPECIES HABITATS IN OZAUKEE COUNTY



CURRENT STATUS AND PLAN RECOMMENDATION	NA-1 SITE	NA-2 SITE	NA-3 SITE	CRITICAL SPECIES HABITAT
ENTIRELY UNDER PROTECTIVE OWNERSHIP/ PROTECTIVE OWNERSHIP TO BE RETAINED	(NONE)	■	(NONE)	◆
PARTIALLY UNDER PROTECTIVE OWNERSHIP/ REMAINDER OF SITE TO BE ACQUIRED	▲	■	●	(NONE)
NOT UNDER PROTECTIVE OWNERSHIP/ ENTIRE SITE TO BE ACQUIRED	(NONE)	■	●	◆
NOT UNDER PROTECTIVE OWNERSHIP/ TO BE PRESERVED, TO EXTENT PRACTICABLE, WITHOUT PROTECTIVE OWNERSHIP	(NONE)	(NONE)	●	◆

RECOMMENDED OWNERSHIP KEY:

S-STATE GOVERNMENT
C-COUNTY GOVERNMENT
L-LOCAL GOVERNMENT
P-PRIVATE CONSERVANCY ORGANIZATION
N-NO PROTECTIVE OWNERSHIP RECOMMENDED

24-SITE REFERENCE NUMBER

PRIMARY ENVIRONMENTAL CORRIDORS

Forty-two of the 48 Natural Area sites and four of the seven Critical Species Habitat sites located in Ozaukee County are recommended for protective ownership. The six remaining Natural Area sites and the three remaining Critical Species Habitat sites are recommended to be preserved to the extent practicable without protective ownership.

Source: SEWRPC.

Reference Key to Map 72

Number	Site Name
1	Fairy Chasm State Natural Area
2	Kurtz Woods State Natural Area
3	Riveredge Creek and Ephemeral Pond State Natural Area
4	Cedarburg Bog State Natural Area
5	Sapa Spruce Bog State Natural Area
6	Cedarburg Beech Woods State Natural Area
7	Pigeon Creek Low and Mesic Woods
8	Donges Bay Gorge
9	Milwaukee River Mesic Woods
10	Ducks Limited Bog
11	Riveredge Mesic Woods
12	Kinnamon Conifer Swamp
13	South Conifer Swamp
14	Max's Bog
15	Huiras Lake Woods and Bog
16	Janik's Woods
17	Harrington Beach Lacustrine Forest
18	Highland Road Woods
19	Pigeon Creek Maple Woods
20	Solar Heights Low Woods
21	Triple Woods
22	Ville du Parc Riverine Forest
23	Mequon Wetland
24	Mole Creek Swamp
25	Cedar-Sauk Low Woods
26	Grafton Woods
27	Sherman Road Woods
28	Five Corners Swamp
29	Cedar Creek Forest
30	Cedar Heights Gorge
31	Lions Den Gorge
32	Ulao Lowland Forest
33	Hansen's Lake Wetland
34	Knollwood Road Bog
35	Hawthorn Drive Forest
36	Spring Lake Marsh
37	Spring Lake Beech Forest
38	County Line Low Woods
39	Beekeeper Bog
40	Department of Natural Resources Lowlands
41	Pioneer Road Lowlands
42	Cedar Valley Swamp
43	Evergreen Road Bog
44	Kohler Road Woods
45	Waubeka Low Woods
46	Cedar Grove Swamp
47	Belgium Swamp—North
48	Belgium Swamp—South
49	Stauss Woods
50	Pecard Sedge Meadow
51	Eastbrook Road Woods
52	Cedarburg Woods—West
53	Cedar-Sauk Upland Woods
54	Sauk Creek Nature Preserve
55	Harrington Beach State Park Old Fields

Source: Wisconsin Department of Natural Resources and SEWRPC.

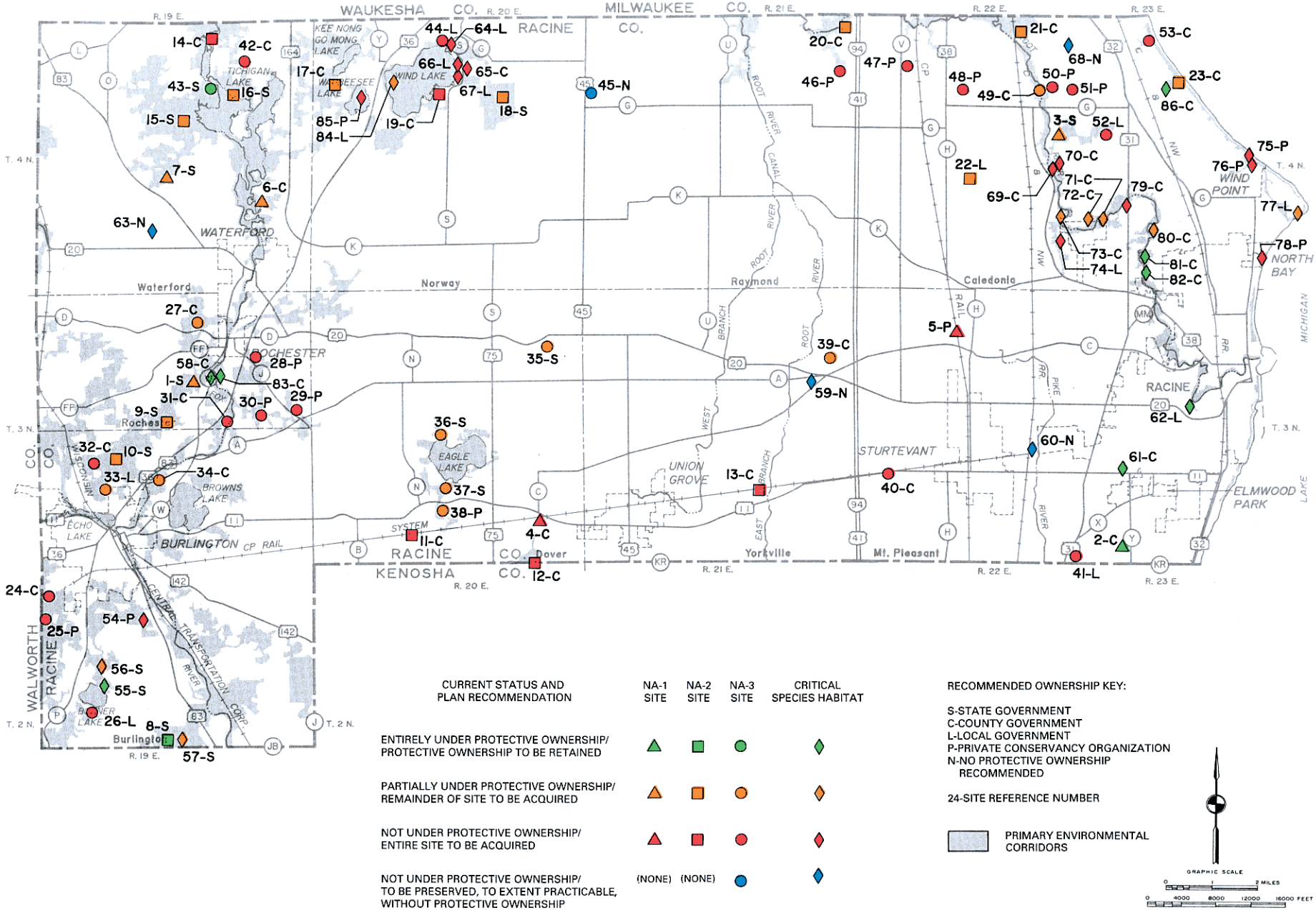
the recommended natural areas and critical species habitat protection and management plan. Recommended actions include formal adoption or endorsement of the plan; integration of the plan findings and recommendations into the work program of each agency—including, at the county and local levels, integration into land use and other development plans; acquisition of Natural Areas, Critical Species Habitat sites, and Geological Areas as recommended in the plan; and proper management of all sites which are placed under protective ownership.

Under the plan, the permanent protection of Natural Areas, Critical Species Habitat sites, and Geological Areas depends in large measure upon site acquisition and management by numerous public and private agencies. Site-specific recommendations directed toward State agencies, counties, local units of government, and private conservation organizations are set forth in Tables 137 through 154 in Chapter VIII. The plan recommends that the Wisconsin Department of Natural Resources assume responsibility for ownership and management of 169 individual Natural Area, Critical Species Habitat, Geological Area, grassland, and forest interior sites in the Region. The plan recommends that the seven counties comprising the Region assume responsibility for the ownership and management of 178 sites; cities, villages, towns, school districts, and other local units of government do so for 97 sites; and private conservancy organizations do so for 162 sites. The Wisconsin Department of Transportation and the University of Wisconsin would be responsible for ownership and management of 11 sites.

The total cost of land acquisition recommended under the plan is estimated at $55.9 million. These costs would be distributed as follows: State government—$22.6 million, or 40 percent; county governments—$13.9 million, or 25 percent; local governments—$5.5 million, or 10 percent; and private conservancy $55.9 million in plan implementation costs, about

Map 73

PLAN RECOMMENDATIONS FOR NATURAL AREAS AND CRITICAL SPECIES HABITATS IN RACINE COUNTY



Fifty-two of the 53 Natural Area sites and 29 of the 33 Critical Species Habitat sites located in Racine County are recommended for protective ownership. The one remaining Natural Area site and the four remaining Critical Species Habitat sites are recommended to be preserved to the extent practicable without protective ownership.

Source: SEWRPC.

Reference Key to Map 73

Number	Site Name
1	Cherry Lake Sedge Meadow State Natural Area
2	Sanders Park Hardwoods State Natural Area
3	Renak-Polak Maple-Beech Woods State Natural Area
4	Kansasville Railroad Prairie
5	Franksville Railroad Prairie
6	Elm Island Bog-Island Oak Woods
7	Tichigan Fen
8	Karcher Springs State Natural Area
9	Brock Lake Fen
10	Leda Lake Fen-Meadow
11	Rosewood Railroad Prairie
12	Schroeder Road Marsh
13	Union Grove Railroad Prairie
14	Norris Marsh and Slough
15	Tichigan Marsh
16	Tichigan Wetlands and Low Woods
17	Waubeesee Oak Woods and Tamarack Relict
18	Wind Lake Tamarack Swamp
19	Wind Lake Shrub-Fen
20	County Line Riverine Woods
21	Hunts Woods
22	Caledonia Wildlife Area
23	Cliffside Park Woods and Clay Banks
24	Burlington Railroad Prairie
25	Burlington Hills Woods
26	Bohner Lake Lowlands
27	Wadewitz Woods
28	Rowntree Road Woods
29	English Settlement Prairie
30	Eagle Creek Woods
31	Fox River Prairie
32	Honey Lake Leatherleaf Bog
33	Wehmhoff Park Upland Woods and Wetlands
34	Fox River Riverine Forest
35	Dover Wildlife Area Wetlands
36	Church Road Lowlands
37	Eagle Lake Wetlands
38	Vandenboom Road Marsh
39	Ives Grove Woods
40	Sylvania Railroad Prairie
41	Campbell Woods
42	Van Valin Woods
43	Tichigan Wet Prairie
44	Wind Lake Wet Meadow
45	Six Mile Road Swamp
46	Kimmel Woods
47	Seven Mile Road Woods
48	Zirbes Woods
49	Caledonia Low Woods
50	Foley Road Woods—West
51	Foley Road Woods—East
52	Tabor Woods
53	Power Plant Ravine Woods
54	Burlington Crevasse Filling
55	Margis Wildlife Area
56	Ranger Mac Fen
57	Karcher Sedge-Carr
58	Ela Park Dry Prairie
59	Ives Grove Prairie Remnant
60	Waxdale Railroad Prairie
61	Pritchard Park Woods
62	Washington Park Woods
63	Maple Road Gravel Pit
64	Erwin Wetlands
65	Patzke Fen
66	Krieser Fen
67	Landon Wetland
68	Sherwood Property
69	River Meadow Woods
70	Forked Aster Site
71	Caledonia Sanitary Sewer Right-of-Way
72	Caledonia Site South
73	Root River Bluff
74	Hoods Creek Swamp
75	Breakers Woods
76	Dominican Ravine
77	Wind Point
78	North Bay Ravine and Beach
79	Four Mile Road Woods
80	Caledonia Low Woods
81	River Bend Upland Woods
82	Root River Strip Woods
83	Ela Park Woods
84	Wind Lake
85	Waubeesee Lake
86	Cliffside Park Old Field

Source: Wisconsin Department of Natural Resources and SEWRPC.

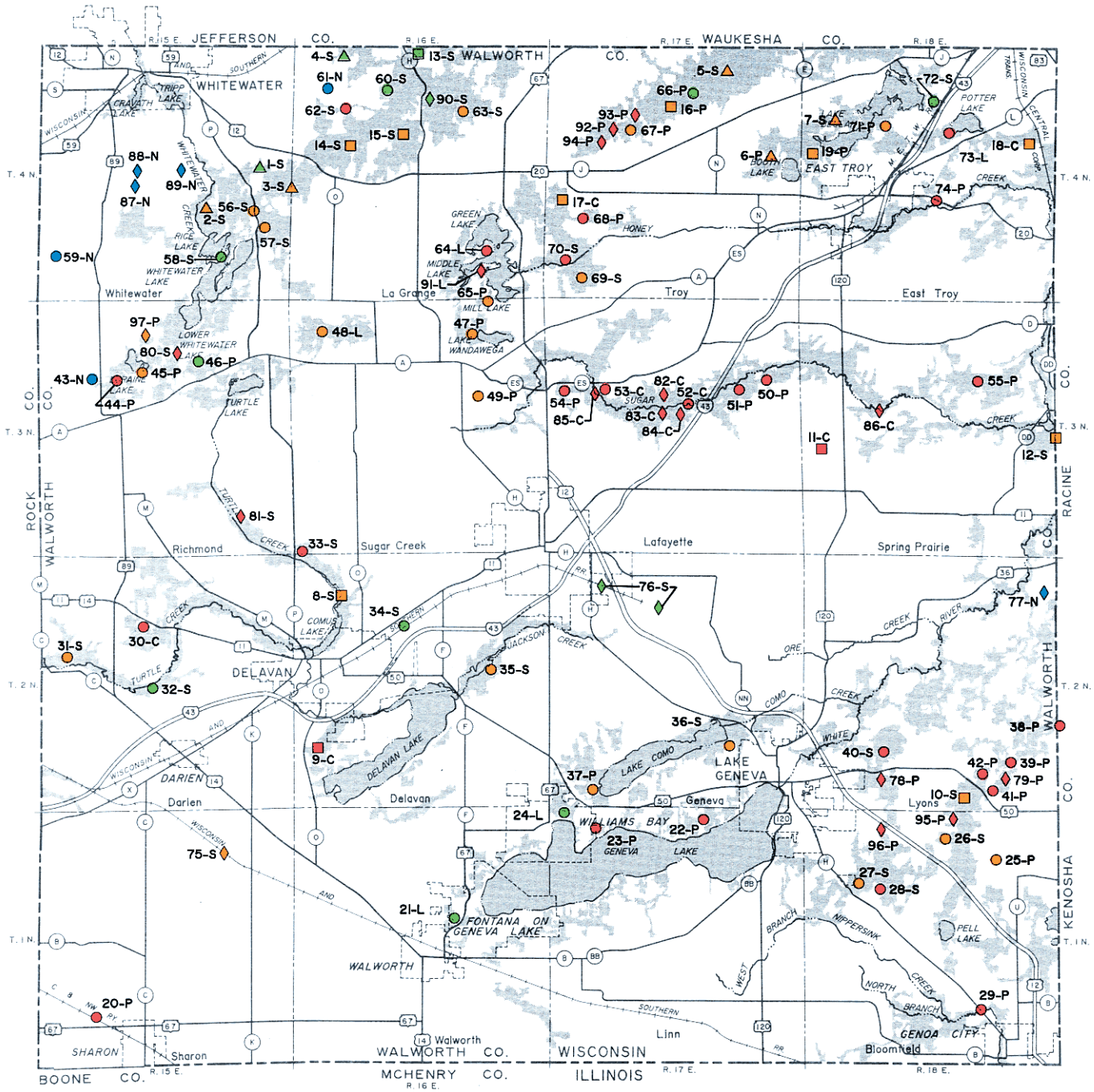
$33.1 million, or 59 percent, would be associated with recommendations that have been made in prior State, regional, county, and local plans, and do not, there fore, represent proposed new expenditures. If the recommended plan were to be implemented over a 20-year period, the average annual cost, expressed in constant 1994 dollars, would approximate $2.8 million, or $1.48 per capita.

PUBLIC REACTION TO THE RECOMMENDED PLAN AND RESPONSE OF THE TECHNICAL ADVISORY COMMITTEE

The preliminary recommended regional natural areas and critical species habitat and management plan went through a public review and comment process.

Map 74

PLAN RECOMMENDATIONS FOR NATURAL AREAS AND CRITICAL SPECIES HABITATS IN WALWORTH COUNTY



CURRENT STATUS AND PLAN RECOMMENDATION	NA-1 SITE	NA-2 SITE	NA-3 SITE	CRITICAL SPECIES HABITAT
ENTIRELY UNDER PROTECTIVE OWNERSHIP/PROTECTIVE OWNERSHIP TO BE RETAINED	▲	■	●	♦
PARTIALLY UNDER PROTECTIVE OWNERSHIP/REMAINDER OF SITE TO BE ACQUIRED	▲	■	●	♦
NOT UNDER PROTECTIVE OWNERSHIP/ ENTIRE SITE TO BE ACQUIRED	(NONE)	■	●	♦
NOT UNDER PROTECTIVE OWNERSHIP/ TO BE PRESERVED, TO EXTENT PRACTICABLE, WITHOUT PROTECTIVE OWNERSHIP	(NONE)	(NONE)	●	♦

RECOMMENDED OWNERSHIP KEY:

S-STATE GOVERNMENT
C-COUNTY GOVERNMENT
L-LOCAL GOVERNMENT
P-PRIVATE CONSERVANCY ORGANIZATION
N-NO PROTECTIVE OWNERSHIP RECOMMENDED

24-SITE REFERENCE NUMBER

PRIMARY ENVIRONMENTAL CORRIDORS

Seventy-one of the 74 Natural Area sites and 19 of the 23 Critical Species Habitat sites located in Walworth County are recommended for protective ownership. The three remaining Natural Area sites and the four remaining Critical Species Habitat sites are recommended to be preserved to the extent practicable without protective ownership.

Source: SEWRPC.

Reference Key to Map 74

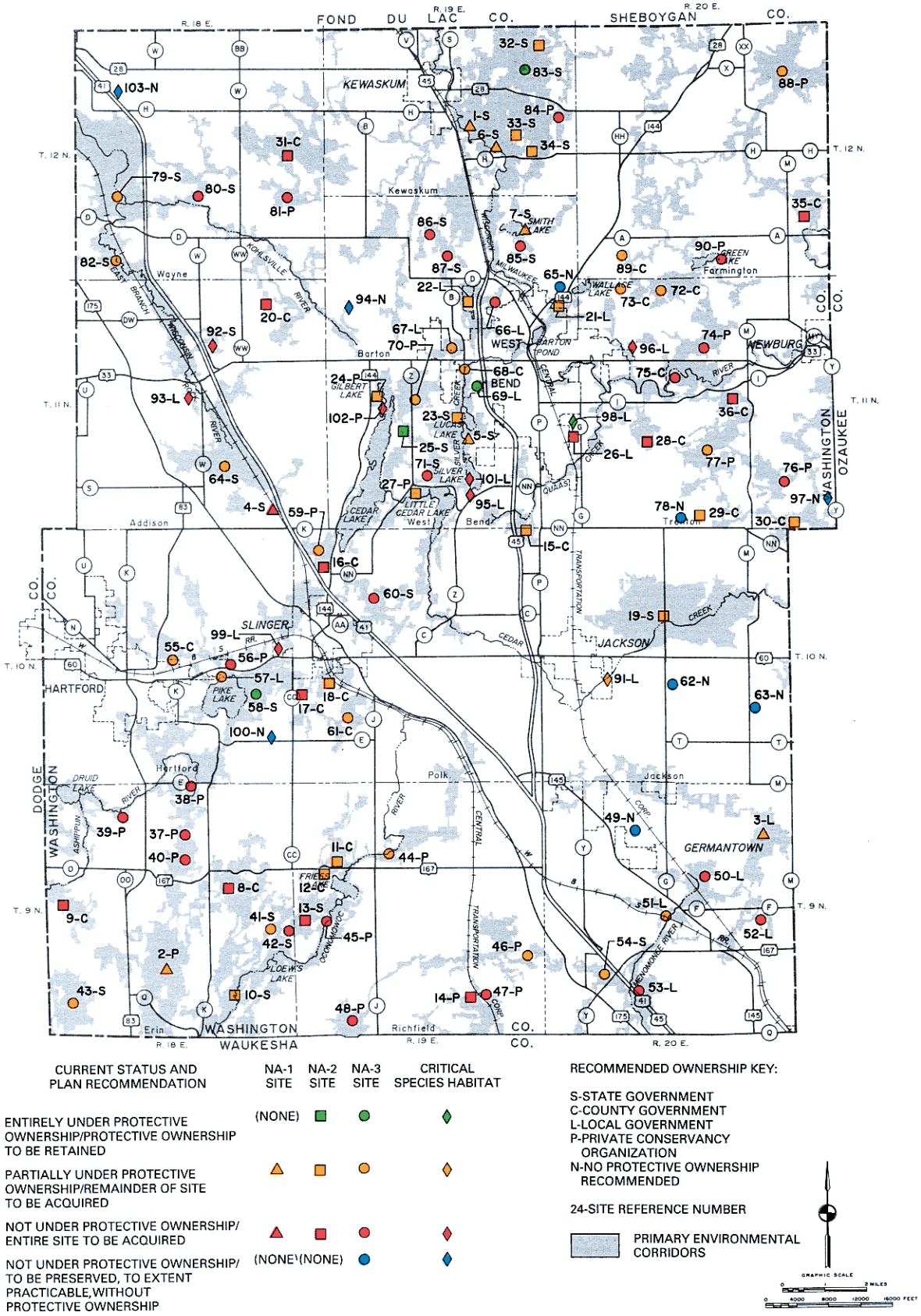
Number	Site Name
1	Bluff Creek Fens
2	Clover Valley Fen State Natural Area
3	Bluff Creek Woods
4	Young Prairie State Natural Area
5	Lulu Lake and Eagle Spring Lake Wetland Complex and Adjacent Uplands
6	Pickerel Lake Fen State Natural Area
7	Beulah Bog State Natural Area
8	Comus Lake Wetland Complex
9	Delavan Prairie-Fen
10	Lake Ivanhoe Fen and Sedge Meadow
11	Spring Prairie Fen
12	Honey Lake Marsh and Sedge Meadow
13	Kestol Dry Prairie
14	LaGrange Oak Woods
15	Muir Oak Woods and Duffin Road Fen
16	Upper Mukwonago River Wetland Complex
17	Adams Lake Fen and Marsh
18	Thiede Road Tamarack Swamp
19	Swan Lake Wetland Complex
20	Salt Box Road Railroad Prairie
21	Fontana Prairie and Fen
22	Wychwood
23	Peninsula Woods
24	Williams Bay Lowlands
25	Hafs Road Marsh
26	Lake Ivanhoe Sedge Meadow
27	Bloomfield Sedge Meadow and Tamarack Relict
28	Pell Lake Railroad Prairie
29	Bloomfield Prairie
30	Darien Oak Woods
31	Turtle Creek Sedge Meadow and Fen
32	Creek Road Fen
33	CTH P Sedge Meadow
34	Marsh Road Railroad Prairie
35	Lake Lawn Wetland Complex
36	Warbler Trail Wetlands
37	Lake Como Wetlands
38	Tri-County Tamarack Swamp
39	Peterson Fen
40	Lake Geneva Tamarack Relict
41	Ivanhoe Creek Fen
42	Cranberry Road Bog
43	Lake Loraine Woods—West
44	Lake Loraine Woods—East
45	Lake Loraine Marsh
46	Lake No. 10
47	Lake Wandawega Marsh
48	North Lake Marsh
49	Silver Lake

Number	Site Name
50	Granzeau Woods
51	Pallottine Maple Woods
52	Sugar Creek Fens, Springs, and Sedge Meadow
53	Sugar Creek Wetlands
54	Abells Corners Sedge Meadow and Tamarack Relict
55	Spring Prairie Lowlands
56	Lone Tree Trail Oak Woods
57	Whitewater Oak Woods
58	Rice Lake Dry Prairie
59	Rock Shrub-Fen
60	Duffin Road Prairie
61	Big Spring Road Prairie
62	Connelly Fen
63	Nordic Trail Oak Woods
64	Island Woods
65	Baywood Road Sedge Meadow
66	George Williams Sedge Meadow
67	Doyles Lake Wetlands
68	Lein's Road Fen
69	Troy Fen
70	Honey Creek Fen
71	Army Lake Lowlands
72	East Troy Tamaracks
73	Potter Lake Tamaracks
74	Hilburn Sedge Meadow
75	Railroad Lowland
76	Elkhorn Railroad Prairie Remnant
77	White River Railroad Prairie
78	Radio Station Wetland
79	Peterson Property
80	Lake Number 10 Open Woods
81	Island Road Shrub-Carr
82	Sugar Creek Woods—North
83	Sugar Creek Wet Woods
84	Sugar Creek Woods—South
85	Abells Corners Fen
86	Hargraves Road Sedge Meadow
87	Mills Road Prairie
88	Anderson Road
89	Island Road Prairie
90	LaGrange Campground
91	Lauderdale Lakes Woods
92	Harmony Hills Savanna
93	Doyles Lake Prairies
94	Camp Timberlee
95	Swift Lake Wetland
96	Section Five Marsh and Pond
97	Unnamed wetland

Source: Wisconsin Department of Natural Resources and SEWRPC.

Map 75

PLAN RECOMMENDATIONS FOR NATURAL AREAS AND CRITICAL SPECIES HABITATS IN WASHINGTON COUNTY



CURRENT STATUS AND PLAN RECOMMENDATION	NA-1 SITE	NA-2 SITE	NA-3 SITE	CRITICAL SPECIES HABITAT
ENTIRELY UNDER PROTECTIVE OWNERSHIP/PROTECTIVE OWNERSHIP TO BE RETAINED	(NONE)	■	●	♦
PARTIALLY UNDER PROTECTIVE OWNERSHIP/REMAINDER OF SITE TO BE ACQUIRED	▲	■	●	♦
NOT UNDER PROTECTIVE OWNERSHIP/ ENTIRE SITE TO BE ACQUIRED	▲	■	●	♦
NOT UNDER PROTECTIVE OWNERSHIP/ TO BE PRESERVED, TO EXTENT PRACTICABLE, WITHOUT PROTECTIVE OWNERSHIP	(NONE)	(NONE)	●	♦

RECOMMENDED OWNERSHIP KEY:

S-STATE GOVERNMENT
C-COUNTY GOVERNMENT
L-LOCAL GOVERNMENT
P-PRIVATE CONSERVANCY ORGANIZATION
N-NO PROTECTIVE OWNERSHIP RECOMMENDED

24-SITE REFERENCE NUMBER

PRIMARY ENVIRONMENTAL CORRIDORS

GRAPHIC SCALE
0 1 2 MILES
0 4000 8000 12000 16000 FEET

Eighty-five of the 90 Natural Area sites and nine of the 13 Critical Species Habitat sites located in Washington County are recommended for protective ownership. The five remaining Natural Area sites and the four remaining Critical Species Habitat sites are recommended to be preserved to the extent practicable without protective ownership.

Source: SEWRPC.

Reference Key to Map 75

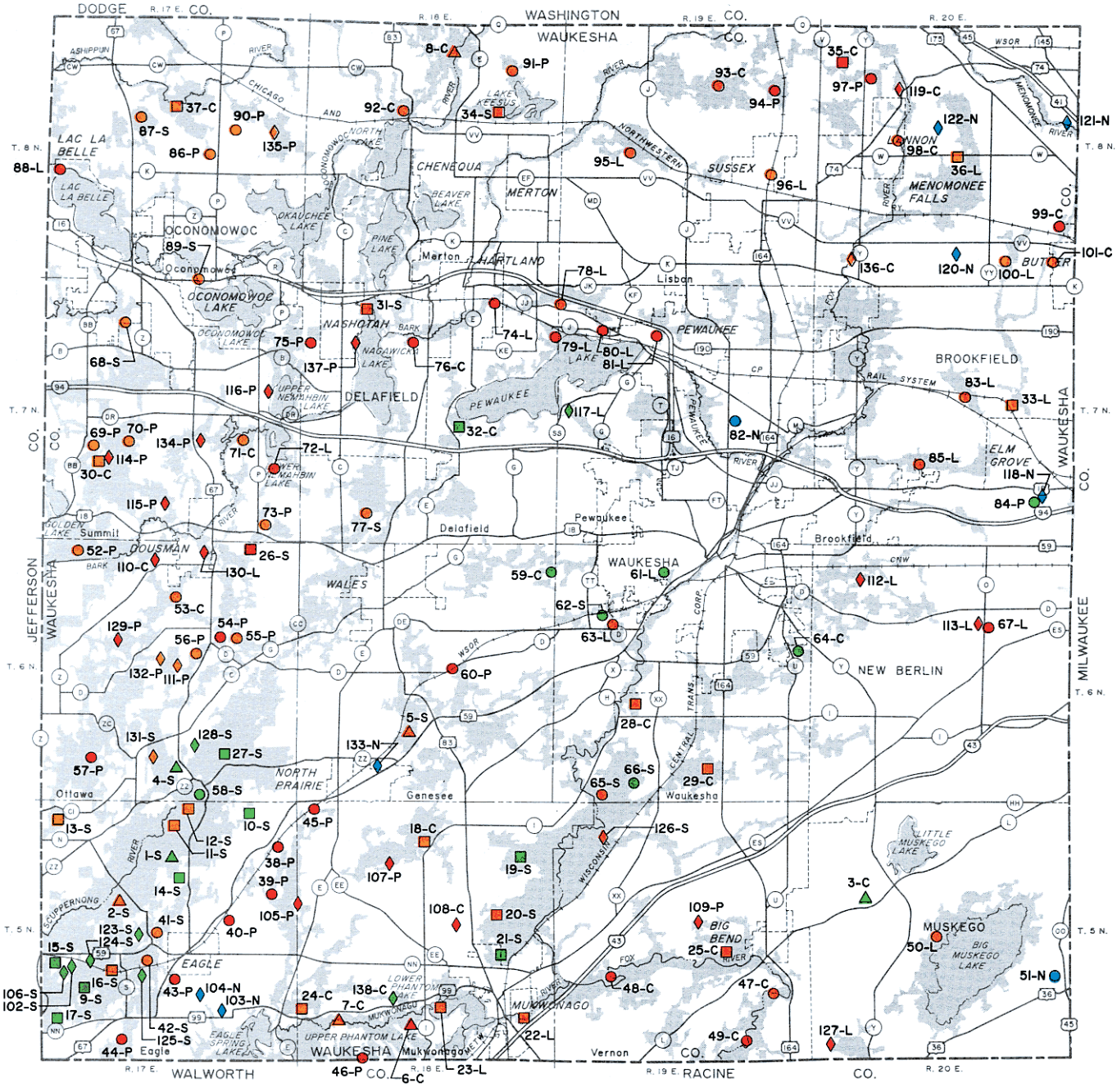
Number	Site Name
1	Kewaskum Maple-Oak Woods State Natural Area
2	Murphy Lake-McConville Lake Wetland Complex
3	Germantown Swamp
4	Aurora Road Fen
5	Paradise Lake Fen
6	Milwaukee River Floodplain Forest State Natural Area
7	Smith Lake and Wetlands
8	Holy Hill Woods
9	Toland Swamp
10	Loew's Lake Wetland Complex
11	Daniel Boone Bogs
12	Glacier Hills Park Bogs and Upland Woods
13	Friess Lake Tamarack Swamp
14	Colgate Fen-Meadow
15	Mud Lake Swamp
16	Big Cedar Lake Bog
17	Mud Lake Upland Woods
18	Mud Lake Meadow
19	Jackson Swamp
20	St. Anthony Beech Woods
21	Lac Lawrann Conservancy Upland Woods and Wetlands
22	Blue Hills Woods
23	Silverbrook Lake Woods
24	Gilbert Lake Tamarack Swamp
25	Hacker Road Bog
26	Muth Woods
27	Little Cedar Lake Wetlands
28	Schoenbeck Woods
29	Bellin Bog
30	Reinartz Cedar Swamp
31	Wayne Swamp
32	Kettle Moraine Drive Bog
33	Glacial Trail Forest
34	St. Michael's Woods
35	North Branch Woods
36	Myra Wetlands
37	Hults Bog and Marsh
38	CTH E Wetlands
39	Erin Sedge Meadow
40	Thompson Swamp
41	Donegal Road Woods
42	St. Augustine Road Sedge Meadow
43	Mason Creek Swamp
44	CTH J Swamp
45	Hubertus Road Sedge Meadow
46	Amy Bell Lake and Lowlands
47	Colgate Shrub-Carr
48	Lake Five Woods
49	Faber-Pribyl Woods
50	Hoelz Swamp
51	Lake Park Swamp

Number	Site Name
52	Schoessow Woods
53	USH 41 Swamp
54	Kleinman Swamp
55	Rubicon Lowlands
56	STH 60 Swamp
57	Pike Lake Sedge Meadow
58	Pike Lake Woods
59	Mueller Woods
60	Slinger Upland Woods
61	Heritage Trails Bog
62	Kowalske Swamp
63	Sherman Road Swamp
64	Allenton Swamp
65	Newark Road Wetland
66	Sunset Park Wetlands
67	Albecker Park Wetlands
68	Silver Creek Marsh
69	University Fen
70	CTH Z Upland Woods and Wetlands
71	Ziegler Woods
72	Sandy Knoll Swamp
73	Sandy Knoll Wetlands
74	Poplar Road Lacustrine Forest
75	Fellenz Hardwood Swamp
76	Paradise Drive Tamarack Swamp
77	Camp Wowitan Wetlands
78	Schalla Tamarack Swamp
79	Theresa Swamp
80	Wayne Creek Swamp
81	Stockcar Swamp
82	Rock River Marsh
83	Kettle Moraine Drive Woods
84	STH 28 Woods
85	Smith Lake Swamp
86	Lange Hardwoods
87	Wildwood Hardwood Swamp
88	Milwaukee River Swamp
89	Lizard Mound Woods
90	Green Lake Bog
91	Jackson Woods
92	St. Anthony Maple Woods
93	Doll Woods
94	Riesch Woods
95	Silver Lake Swamp
96	Cameron Property
97	Fechters Woods
98	High School Woods
99	Unnamed wetland
100	Unnamed wetland
101	Silver Lake
102	Gilbert Lake
103	Unnamed wetland

Source: Wisconsin Department of Natural Resources and SEWRPC.

Map 76

PLAN RECOMMENDATIONS FOR NATURAL AREAS AND CRITICAL SPECIES HABITATS IN WAUKESHA COUNTY



CURRENT STATUS AND PLAN RECOMMENDATION	NA-1 SITE	NA-2 SITE	NA-3 SITE	CRITICAL SPECIES HABITAT
ENTIRELY UNDER PROTECTIVE OWNERSHIP/PROTECTIVE OWNERSHIP TO BE RETAINED	▲	■	●	◆
PARTIALLY UNDER PROTECTIVE OWNERSHIP/REMAINDER OF SITE TO BE ACQUIRED	▲	■	●	◆
NOT UNDER PROTECTIVE OWNERSHIP/ ENTIRE SITE TO BE ACQUIRED	▲	■	●	◆
NOT UNDER PROTECTIVE OWNERSHIP/ TO BE PRESERVED, TO EXTENT PRACTICABLE, WITHOUT PROTECTIVE OWNERSHIP	(NONE)	(NONE)	●	◆

RECOMMENDED OWNERSHIP KEY:

S-STATE GOVERNMENT
C-COUNTY GOVERNMENT
L-LOCAL GOVERNMENT
P-PRIVATE CONSERVANCY ORGANIZATION
N-NO PROTECTIVE OWNERSHIP RECOMMENDED

24-SITE REFERENCE NUMBER

PRIMARY ENVIRONMENTAL CORRIDORS

GRAPHIC SCALE

Ninety-nine of the 101 Natural Area sites and 30 of the 37 Critical Species Habitat sites located in Waukesha County are recommended for protective ownership. The two remaining Natural Area sites and the seven remaining Critical Species Habitat sites are recommended to be preserved to the extent practicable without protective ownership.

Source: SEWRPC.

Reference Key to Map 76

Number	Site Name
1	Kettle Moraine Fen and Low Prairie State Natural Area
2	Scuppernong Prairie State Natural Area
3	Muskego Park Hardwoods State Natural Area
4	Ottawa Lake Fen State Natural Area
5	Genesee Oak Opening and Yatzeck's Fen State Natural Area
6	Mukwonago Fen, Sedge Meadow, and Tamarack Relict
7	Upper Mukwonago River
8	Monches Woods
9	Eagle Oak Opening and Dry Prairies
10	Ulrickson Road Cedar Glade
11	Eagle Shrub-Fen
12	Eagle Fen and Spring
13	Beever Dam Lake
14	Kettle Moraine Limestone Outcrop
15	Eagle Railroad Prairie
16	Eagle Dry Prairie and Grotjans Fen
17	Fur Farm Pond
18	Spring Lake Sedge Meadow and Fens
19	Vernon Tamarack-Fen
20	Vernon Prairie-Fen
21	Vernon Fen
22	Lower Mukwonago River
23	Phantom Lake Wetlands
24	Brown Lake and Sedge Meadow
25	Big Bend Wet-Mesic Woods
26	Henrietta Lake Bog
27	Ottawa Oak Woods and Dry Prairies
28	Fosters Woods
29	Falk Fen and Woods
30	Genesee Lake Road Bog
31	Nagawicka Lake Bog and Oak Woods
32	Pewaukee Lake Access Fen
33	Zion Woods
34	Lake Keesus Fen-Meadow
35	Held Maple Woods
36	Menomonee Falls "Tamareck" Swamp
37	Ashippun River Lowlands
38	Road X Railroad Prairie
39	Jericho Creek Fen
40	Mailman Road Railroad Prairie
41	Paradise Springs Woods
42	STH 59 Oak Woods and Prairies
43	Eagle Centre (Haffner) Oak Opening
44	Malek Wetland
45	North Prairie Railroad Prairie
46	Mukwonago Low Woods
47	River Oaks Woods and Wetlands
48	Porter Low Woods
49	Norris Oak Woods and Wetlands
50	Muskego Lake Marsh
51	Luther Parker Cemetery Prairie
52	Perkins Property
53	Nelson Oak Woods and Lowlands
54	Casper Creek Sedge Meadow
55	Ottawa Limestone Outcrop
56	Larkin Lake
57	CTH ZC Lowlands
58	Scuppernong Springs Dry Prairie
59	Brown's Fen
60	CTH D Railroad Prairie
61	Fruits Pond Fen
62	Pebble Creek Railroad Prairie
63	Pebble Creek Wetlands
64	Minooka Park Woods
65	Fox River Woods
66	Vernon Mesic Prairie
67	New Berlin Woods
68	Oconomowoc Swamp
69	Crossroads Bog
70	Laura Lake Swamp
71	Bark River Marsh
72	Breens Bay Sedge Meadow
73	Sawyer Road Sedge Meedow
74	Hartland Railroad Preirie
75	Nashotah House Woods
76	Bark River School Sedge Meadow
77	Lapham Peak Woods
78	Capitol Drive Sedge Meadow and Wet Prairie
79	Pewaukee Lake Wetland
80	Pewaukee Sedge Meadow
81	Pewaukee Park Sedge Meadow
82	Busse Woods
83	Wirth Swamp
84	Bishops Woods
85	Brookfield Swamp
86	Meadow View School Bog
87	Raasch Tamarack Swamp
88	Lac La Belle Lowlands
89	Oconomowoc River Marsh
90	Oconomowoc Sedge Meadow
91	Camp Whitcomb Lowland
92	Chenequa Wetland Complex
93	Lisbon Low Woods
94	Sussex Swamp
95	Thousand Oaks Tamarack Relict
96	Coolings Sedge Meadow
97	Peters Woods
98	Zuba Woods
99	Menomonee River Swamp
100	Theater Swamp
101	Clarks Woods
102	Shelter Two Ridge
103	Eagle Dump Oak Opening
104	Domon Prairie Remnant
105	Holtz Oak Opening
106	Mounded Fen
107	Spring Lake Woods
108	Romanowski Fen
109	Pheasant Hill Woods
110	Utica Lake Tamaracks
111	Lurvey Tamaracks
112	Delopst Meadow
113	Kostello Property
114	Genesee Lake Road Tamaracks
115	Dousman Road Low Woods
116	Massaro Woods
117	Meadowbrook Prairie
118	Elm Grove Road Pond
119	Ranch Woods
120	Glass-Glick Woods
121	Heritage Woods
122	Rozik Woods
123	Paradise Springs Brook
124	Headquarters Grasslands
125	Old World Wisconsin Marsh
126	Vernon Marsh
127	Denoon Lake
128	Dog Trial Area
129	School Section Lake
130	Dousman Mill Pond
131	Unnamed shrub-grassland
132	Unnamed low woods–thicket
133	Unnamed wetland
134	Duck Lake
135	Stonebank Tamerack Relict
136	Fox River Woods
137	Nagewicka Lake
138	Mukwonago Park Oak Opening

Source: Wisconsin Department of Natural Resources and SEWRPC.

The following efforts were made to secure effective public participation in the review of, and comment on, the preliminary plan:

1. The plan was summarized in an issue of the Commission Newsletter distributed to over 2,300 interested officials and citizens.

2. An announcement inviting comment on the preliminary plan was distributed to each of the 154 county and local governments in the Region, together with a copy of the SEWRPC Newsletter summarizing the preliminary plan. The announcement also set forth a schedule of public informational meetings and public hearings on the plan.

3. A news release was issued to news media throughout the Region announcing the public informational meetings and public hearings.

4. Four formal public hearings were held on the preliminary plan: one at the Riveredge Nature Center in Newburg on May 12, 1997; one at the Zoofari Conference Center in Milwaukee on May 13, 1997; one at the Racine County Ives Grove Office Complex Auditorium in Sturtevant on May 20, 1997; and one at the Walworth County Courthouse Annex Auditorium in Elkhorn on May 22, 1997. Each public hearing was preceded by a staffed "open house" at which individuals could examine and discuss the preliminary recommended plan with Commission staff and submit comments without attending the formal hearings. The public hearings were attended by 137 registered individuals. Full documentation of the public participation process was provided in a published Commission record. That record was provided to both the Technical Advisory Committee and the Regional Planning Commission for review and consideration prior to the selection and adoption of the final recommended plan.[1] The record contains transcripts of the public hearings including all comments made at the hearings. In addition, the document includes written comments submitted before, at, and after each public hearing, as well as pertinent newspaper articles.

Review of the public hearing record indicated that the positions of the individuals and organizations submitting comments generally can be grouped into 12 categories (see Table 155). The first category consisted of those who clearly supported the plan as presented at the hearings. As shown in Table 155, the Commission received a total of 33 comments at the public hearings and during the open-record period in support of the preliminary plan. In addition, 60 petitions were received by the Commission containing a total of 929 signatures in favor of the preliminary plan. The geographic locations of the residences of those petitioners are summarized in Table 156. Those individuals clearly in support of the plan as presented cited many reasons for such support, with some expressing regret that so many natural areas and critical species habitat sites have been lost in the Region, and others citing the contributions that preservation of the natural area sites would make in terms of adding to the overall quality of life in the Region.

The second category included those individuals and organizations whose comments indicate that, while they generally supported the plan, they believed that additional, lower-quality sites should be added to the plan and recommended for preservation. As shown in Table 155, a total of 11 comments in support of this position were received.

With respect to the suggestion that natural area sites of a lower quality be included in the plan, it should be noted that the purpose of the plan was to identify the best remaining habitats representative of the pre-settlement landscape in Southeastern Wisconsin. Standard practice by professional biologists has been to rank areas on the basis of how closely they resemble the pre-settlement landscape—an ecological ideal—or if they contain habitat that supports critical species. In a rigorous sense, many of the Critical Species Habitat sites that are not located within a designated Natural Area identified in the plan likely would be candidates for consideration as NA-4- or NA-5-quality Natural Areas if applicable criteria were to be developed. In addition, such areas are most likely located within the Commission's delineated primary and secondary environmental corridors and isolated natural resource areas. These areas are all recommended to be protected under the Commission's land use and open space plans.

With respect to one specific such site mentioned at the public hearings—the Grand Trunk wetland site in the Milwaukee Harbor area—the Commission staff conducted a second field inspection of the site on July 2, 1997. Over one-half of the plant species

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[1]*See Record of Public Informational Meetings and Public Hearings, Preliminary Regional Natural Areas and Critical Species Habitat Protection and Management Plan for Southeastern Wisconsin, May 12, 1997, to June 13, 1997.*

Table 155

CATEGORIZATION OF PUBLIC COMMENTS ON THE PRELIMINARY REGIONAL NATURAL AREAS AND CRITICAL SPECIES HABITAT PROTECTION AND MANAGEMENT PLAN

Category of Comments	Number of Public Hearing Oral Comments Received	Number of Letters and Other Written Comments Received	Total Number of Comments
Supported the plan as presented	18	15	33
Supported the plan, but should add lower-quality (NA-4 and NA-5) areas	7	4	11
Supported the plan, but should consider additional methods of site protection, i.e. zoning, conservation easements	2	2	4
Supported the plan, but should place a higher priority on the protection of NA-2 and NA-3 sites	0	2	2
Suggested development of a voluntary stewardship program to protect sites	0	1	1
Suggested development of corporate sponsorship and expansion of mitigation programs for Natural Area site purchase	0	1	1
Expressed concern for better Natural Area site management	5	2	7
Expressed concern that plan costs are too low	1	1	2
Expressed concern about loss of tax base	3	0	3
Expressed concern that enough land was already in State ownership	1	0	1
Expressed concern for landowners who do not wish to sell	1	0	1
Delivered comments not relevant to the plan	1	0	1
Total	39	28	67

Source: SEWRPC.

observed on the site were found to be exotic in nature. The remainder of the plant species were common, widespread natives. Nearly the entire site has been severely disturbed by various industrial activities; only small remnants remain in a "natural" state. Based upon that field inspection, the Technical Advisory Committee recommended that the Grand Trunk wetland site not be included in the final plan.

Another specific suggestion offered at the hearing was that the New Munster Wildlife Area in Kenosha County be included as a proposed reforestation site for the support of forest interior birds. The Commission staff reviewed this site for its suitability for reforestation, finding approximately 120 acres of the site to be in agricultural use. The Wisconsin Department of Natural Resources staff subsequently indicated that these lands likely will not continue to be used for cropland and could be made available for hardwood reforestation. With the reforestation of these 120 acres of agricultural land, a total of 683 acres of forest, with 300 acres of forest interior, would be available for forest interior nesting bird habitat at the New Munster Wildlife Area. Because these lands are presently in State ownership and would be available for habitat management, the Technical Advisory Committee recommended the addition of this reforestation site to the plan.

A third specific suggestion involved inclusion in the plan of the Hilltop Farm Woods located in the City of Milwaukee. It was noted that this site supported critical species habitat and is proposed to be managed under a conservation easement by a private conservation organization. The Commission staff field-inspected the site on May 30, 1997, and found a mature southern mesic hardwoods with a diverse ground flora which includes a single State-designated endangered plant species and a single rare plant species. However, the woodland is small in size, contains residences and a research center, and is bisected by a roadway. Based upon these findings, the Technical Advisory Committee recommended that this site be added to the plan

Table 156

THE GEOGRAPHIC LOCATION OF RESIDENCE OF PETITIONERS SUPPORTING THE PRELIMINARY REGIONAL NATURAL AREAS PLAN[a]

Location	Number of Signatures
Kenosha County	
City of Kenosha	97
Town of Bristol	2
Total	99
Milwaukee County	
City of Cudahy	1
City of Franklin	1
City of Glendale	2
City of Greenfield	2
City of Milwaukee	60
City of Oak Creek	3
City of South Milwaukee	2
City of Wauwatosa	3
City of West Allis	1
Village of Bayside	4
Village of Brown Deer	3
Village of Fox Point	2
Village of Greendale	2
Village of Hales Corners	1
Village of Shorewood	11
Village of Whitefish Bay	15
Total	113
Ozaukee County	
City of Cedarburg	4
City of Mequon	5
City of Port Washington	2
Village of Fredonia	1
Village of Grafton	3
Village of Thiensville	1
Total	16
Racine County	
City of Burlington	4
City of Racine	351
Village of Rochester	1
Village of Sturtevant	3
Village of Union Grove	4
Village of Waterford	3
Town of Caledonia	60
Town of Mt. Pleasant	28
Town of Raymond	2
Town of Waterford	1
Franksville	7
Total	464
Walworth County	
City of Delavan	5
City of Elkhorn	5
City of Lake Geneva	2
City of Whitewater	126
Village of East Troy	3
Village of Sharon	1
Village of Walworth	1
Total	143
Washington County	
City of Hartford	3
City of West Bend	1
Village of Jackson	1
Village of Slinger	2
Hubertus	1
Total	8
Waukesha County	
City of Brookfield	16
City of New Berlin	4
City of Oconomowoc	8
City of Waukesha	24
Village of Big Bend	1
Village of Dousman	7
Village of Eagle	2
Village of Elm Grove	3
Village of Lannon	1
Village of Menomonee Falls	2
Village of Mukwonago	2
Village of Nashotah	2
Village of Wales	4
Town of Brookfield	1
Town of Ottawa	1
Total	78
Region Total	921
Out-of-Region Signatures	
Fort Atkinson, Wisconsin	1
Hancock, Wisconsin	3
Janesville, Wisconsin	1
Sheboygan, Wisconsin	2
Ingleside, Illinois	1
Out-of-Region Total	8
Total Signatures	929

[a] *The total number of petitions received was 60.*

Source: SEWRPC.

as a Critical Species Habitat site to be retained in private ownership under a conservation-easement agreement.

The third category included those individuals whose comments indicate a concern that the plan does not recommend the creation of sufficient regulatory authority to protect Natural Areas and Critical Species Habitat sites until they can be acquired. A total of four comments in support of this position were received by the Commission (see Table 155).

In response to this position, the Technical Advisory Committee noted that existing public regulations at best provide limited protection of natural areas, critical species, and critical species habitats. The Committee noted that local zoning, including general zoning and State-mandated floodland and shoreland zoning, provides a means of ensuring the protection of certain natural areas and critical species habitats. Cluster zoning, in particular, can be helpful in preserving such sites. Local subdivision control ordinances may also be used to protect open space sites which encompass natural areas and critical species habitats. However, such ordinances are effective in preserving natural areas and critical species habitats only if the local units of government involved are inclined to enact and properly administer the ordinances for such purposes. Examples of such local ordinances are set forth in Figures 14 and 15 in Chapter VII. The Committee concluded that any more stringent authority likely would lead to legal problems involving inverse condemnation.

The fourth category included those individuals whose comments indicate that they also generally support the plan. However, they recommend that a higher priority be placed upon the protection of NA-2 and NA-3 sites. As shown on Table 155, a total of two written comments in support of this position were received by the Commission.

In response to this position, the Committee noted that it is necessary within the context of the plan to identify the natural areas that are of the highest quality so that the implementing public agencies and private conservation organizations can prioritize their efforts, over time, in order to yield the greatest benefits from their limited resources. Clearly, the most effective method of halting habitat fragmentation in the Region is to immediately acquire all of the natural areas, critical species habitats, and the primary and secondary environmental corridors. However, the cost involved, the needed coordination and management efforts, and the political cooperation necessary work against such an effort. The goal of the regional natural areas and critical species habitat protection and management plan is to protect, manage, and even enhance the biodiversity of the region. The Committee was of the opinion that the plan, as described herein, can and will accomplish this goal if fully implemented.

The fifth category included comments received from the Walworth County Department of Planning, Zoning & Sanitation recommending that a voluntary stewardship program be developed to protect Natural Areas and Critical Species Habitat sites. More specifically, the Department suggested that plan implementation efforts include the development of a voluntary stewardship program with private Natural Area or Critical Species Habitat site landowners in which the Commission staff would help landowners prepare site management plans. It was further suggested that landowner recognition awards be given to participants by county boards.

In response to these suggestions, the Technical Advisory Committee recommended that the Commission staff assist in the preparation of such management plans upon the adoption of the plan by the local unit of government concerned, the development of a local voluntary stewardship program, and participation in that stewardship program by a private landowner.

The sixth category included comments also received from the Walworth County Department of Planning, Zoning & Sanitation recommending that a corporate sponsorship program for the purchase of Natural Area sites be developed. More specifically, the Department suggested that plan implementation include the development of a corporate sponsorship program attendant to the purchase of Natural Areas and, perhaps, the naming of the Natural Area concerned after the corporation which purchases that site or provides funds to be used toward such purchase.

The Technical Advisory Committee noted that the suggested method of fund raising for protective acquisition is commonly used by private conservation organizations. Corporate sponsorships have been used in the past to protect several natural areas, including some in Southeastern Wisconsin, and is certainly a viable means of plan implementation at the disposal of public agencies and units of government. The Committee indicated that the plan should encourage the use of such sponsorships in the protection of the remaining regional Natural Areas and Critical Species Habitat sites.

The Walworth County staff also recommended that compensatory mitigation efforts required by concerned Federal agencies to offset the loss of wetland types, acreages, and functional values be expanded to include the purchase of Natural Areas by a particular entity required to perform such mitigation. The Federal guidelines followed by the U. S. Department of the Army, Corps of Engineers and the U. S. Environmental Protection Agency with respect to compensatory mitigation include a "no-net-loss-of-wetlands" policy. Specifically, this no-net-loss policy means that approved compensatory mitigation efforts must replace the wetland type(s), acreage, and functional value(s) lost. Typically, these agencies discourage the use of protective acquisitions as compensatory mitigation since such acquisitions do not contribute to the Federal policy of no net loss of wetlands.

The seventh category included comments expressing concern for better Natural Area site management. As shown in Table 155, a total of seven comments in support of this position were received by the Commission.

The preliminary plan contains specific recommendations for the general management of each type of habitat area. The plan further recommends that specific management plans be developed and adopted for the management of each Natural Area and Critical Species Habitat site. Each such management plan should be developed using appropriate techniques designed to maintain the habitat conditions desired in order to maintain the long-term viability of the site involved and its target animal and plant species.

The eighth category included comments expressing concern that the plan costs are too low. As shown on Table 155, a total of two comments in support of this position were received by the Commission.

In response, the Technical Advisory Committee noted that the data base used to determine plan costs was prepared using actual sales of similar lands reported to the Wisconsin Department of Revenue in 1994. Most of the sites recommended to be acquired wholly or partially consist of wetlands. More specifically, 58.9 square miles, or 67 percent of the areal extent of the Region's Natural Areas recommended for protection, and 10.1 square miles, or 48 percent of the areal extent of the Critical Species Habitat sites recommended to be acquired under the plan, are wetlands. As such, these lands are not typically developable, and as such, should not entail excessive acquisition costs.

The ninth category included those individuals whose comments indicate a concern that the protection of Natural Areas and Critical Species Habitat sites would result in a significant loss of tax base to local units of government, become a burden to the local landowners, or both, if funds were not available to immediately purchase such areas when the landowner wished to sell. This position was taken by three persons (see Table 155).

More specifically, these three comments were concerned about the loss of revenue to support rural town governments. In response, the Technical Advisory Committee recognized that the acquisition of the Natural Area and Critical Species Habitat lands by public agencies and private nonprofit conservation organizations would result in a net loss of property-tax base. The amount of land so recommended, however, does not represent a significant increase over what has been recommended in prior plans for public protective acquisition. Further, the acquisition of such lands should represent only minor increments in the public services provided to such lands, as compared to residential, commercial, or industrial land use development. While one comment received noted an increase in the rescue services provided to certain recreational lands located in the Kettle Moraine State Forest and related to such activities as cross-country skiing and "mountain biking," such intensive recreational uses are not recommended for the protection and management of the remaining regional Natural Areas and Critical Species Habitat sites. Finally, certain nonprofit private conservation organizations may elect to pay local property taxes or service fees in lieu of property taxes in order to maintain a positive relationship with the local unit of government concerned.

The tenth category included a single comment indicating a concern that the protection of Natural Areas and Critical Species Habitats represents a significant increase in the amount of land placed in State ownership (see Table 155). Moreover, this comment noted that the Wisconsin Department of Natural Resources does not have sufficient funds to manage the land already owned by the Department.

As noted above, the amount of land recommended for acquisition under the preliminary regional plan does not represent a significant increase from what has already been recommended for public protective acquisition. Much of the proposed land ownership involves sites lying within already established State acquisition boundaries. The Technical Advisory Committee noted that it would be the responsibility

of the Wisconsin Natural Resources Board, the Wisconsin Legislature, and the Governor to ensure that adequate funds are available so that the public interest is appropriately protected and managed.

The eleventh category includes a single comment indicating a concern for landowners who do not wish to sell their land to a government agency or to a conservation organization (see Table 155). The acquisition recommendations set forth under the regional natural areas and critical species habitat protection and management plan clearly envision a willing-seller, willing-buyer arrangement. The plan does not recommend the use of the eminent domain power to compel the sale of those lands recommended for acquisition under the plan. In addition, the plan recognizes the good land stewardship practices used by many landowners in the management of their land and encourages, as well as supports, those private stewardship efforts.

The twelfth category includes a single comment not relevant to the regional natural areas and critical species habitat protection and management plan, and as such, does not require response by the Technical Advisory Committee.

Given the foregoing response, the recommended regional natural area and critical species habitat protection and management plan remains as set forth in Chapter VIII with the following additions:

1. The number of Critical Species Habitat sites recommended to be protected is increased by one, from 110 sites to 111 sites (see Map 77). This would involve the addition of the 24-acre Hilltop Farm Woods site located in the City of Milwaukee. This site supports critical habitat for a single State-designated endangered plant species and a single rare plant species. The site is recommended to be retained in private ownership under a conservation-easement agreement. Under the final plan, a total of 13,494 acres of Critical Species Habitat sites would be protected.

2. The number of forest-interior-nesting bird habitat restoration sites recommended to be established is increased by one, from five sites to six sites (see Table 157 and Map 78). This would be accomplished by the addition of 120 acres of the New Munster Wildlife Area as a reforestation site. The envisioned reforestation effort at the New Munster Wildlife Area would result in a total increase of about 683 acres of forest, with 300 acres of forest interior. Under the final plan, a total of about 2.6 square miles of forest, with 1.4 square miles of forest interior suitable for forest-interior-nesting birds, would be made available in Southeastern Wisconsin in addition to those forest interior lands protected as Natural Areas or Critical Species Habitat sites.

3. The Commission will assist in the preparation of Natural Area and Critical Species Habitat site management plans for both public and private lands upon the request of the particular unit of government having jurisdictional authority over the lands in question. With respect to the development of management plans for private lands, the assistance would be provided upon the adoption of the regional natural areas and critical species habitat protection and management plan by the concerned local unit of government, the development of a local voluntary stewardship program by that local government, and the participation in the stewardship program by the private landowner desiring management assistance.

4. The Commission will assist the units and agencies of government concerned in identifying, delineating, and staking in the field the areal extent of a Natural Area, Critical Species Habitat site, or Geological Area upon the request of any such unit of government. The assistance would be conditioned upon the agreement of the requesting unit of government to have the staked boundaries surveyed by a registered land surveyor, which boundaries would then be placed upon a proper plat of survey.

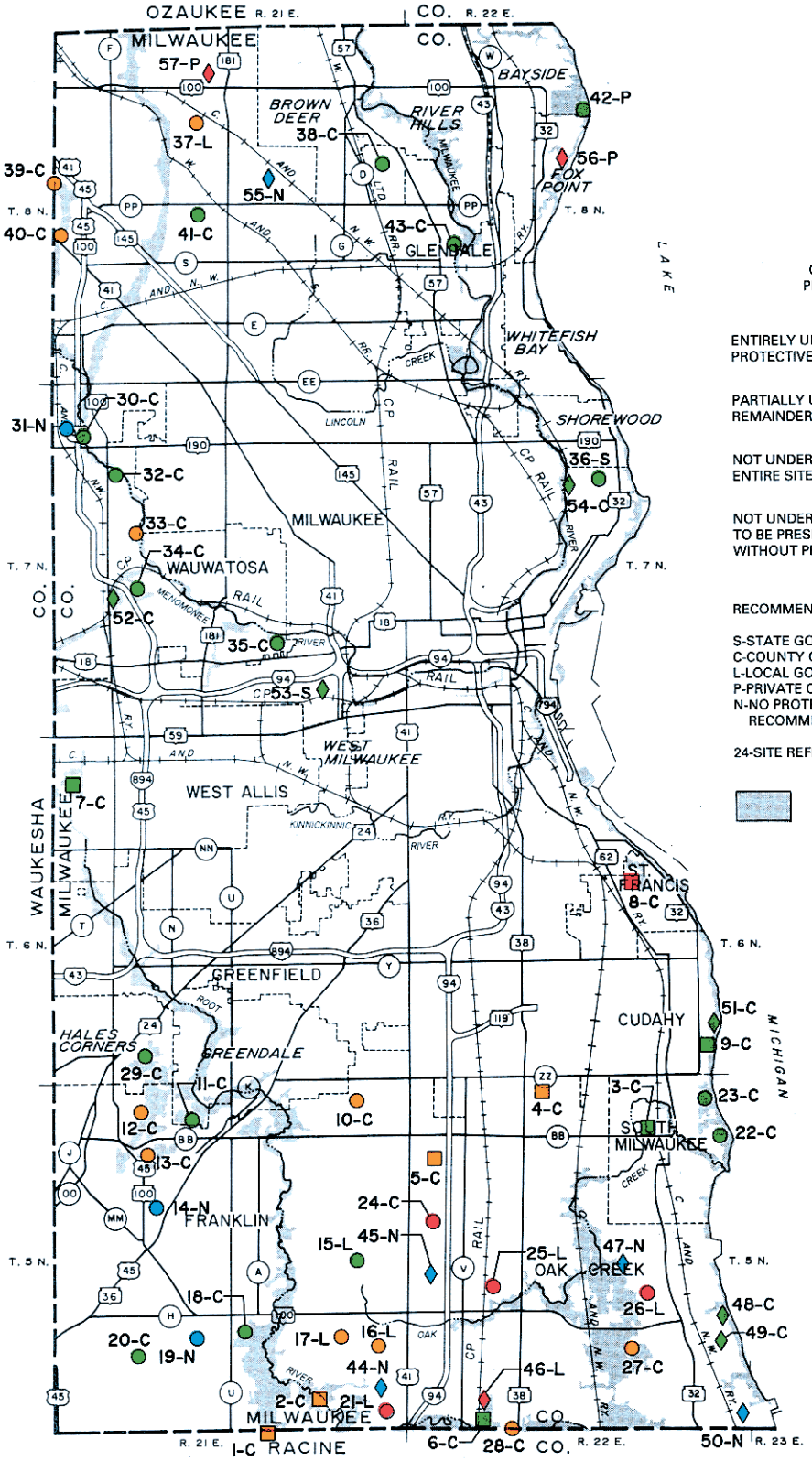
Moreover, as the Technical Advisory Committee completed its work, it also made the following two additional recommendations:

1. The Wisconsin Department of Natural Resources should establish a special aquatic habitat task force to address the appropriate management of AQ-1, AQ-2, and AQ-3 areas, as well as endangered and threatened aquatic species habitat areas in the Region.

2. The Commission's Technical Advisory Committee for the Protection and Management of Natural Areas in Southeastern Wisconsin should be reconstituted and remain available to assist the Commission with monitoring the

Map 77

FINAL PLAN RECOMMENDATIONS FOR NATURAL AREAS AND CRITICAL SPECIES HABITATS IN MILWAUKEE COUNTY



CURRENT STATUS AND PLAN RECOMMENDATION	NA-1 SITE	NA-2 SITE	NA-3 SITE	CRITICAL SPECIES HABITAT
ENTIRELY UNDER PROTECTIVE OWNERSHIP/ PROTECTIVE OWNERSHIP TO BE RETAINED	(NONE)	■	●	◆
PARTIALLY UNDER PROTECTIVE OWNERSHIP/ REMAINDER OF SITE TO BE ACQUIRED	(NONE)	■	●	(NONE)
NOT UNDER PROTECTIVE OWNERSHIP/ ENTIRE SITE TO BE ACQUIRED	(NONE)	■	●	◆
NOT UNDER PROTECTIVE OWNERSHIP/ TO BE PRESERVED, TO EXTENT PRACTICABLE, WITHOUT PROTECTIVE OWNERSHIP	(NONE)	(NONE)	●	◆

RECOMMENDED OWNERSHIP KEY:

S-STATE GOVERNMENT
C-COUNTY GOVERNMENT
L-LOCAL GOVERNMENT
P-PRIVATE CONSERVANCY ORGANIZATION
N-NO PROTECTIVE OWNERSHIP RECOMMENDED

24-SITE REFERENCE NUMBER

PRIMARY ENVIRONMENTAL CORRIDORS

GRAPHIC SCALE
0 1 2 MILES
0 4000 8000 12000 16000 FEET

Forty of the 43 Natural Area sites and eight of the 14 Critical Species Habitat sites located in Milwaukee County are recommended for protective ownership in the final plan. The three remaining Natural Area sites and the six remaining Critical Species Habitat sites are recommended to be preserved to the extent practicable without protective ownership.

Source: SEWRPC.

Reference Key to Map 77

Number	Site Name
1	Root River Canal Woods
2	Root River Wet-Mesic Woods—West
3	Rawson Park Woods
4	Cudahy Woods
5	Falk Park Woods
6	Root River Wet-Mesic Woods—East
7	Greenfield Park Woods
8	St. Francis Seminary Woods
9	Warnimont Park Fens
10	Grobschmidt Park Wetlands and Upland Woods
11	Root River Parkway Woods
12	Whitnall Park Woods—South
13	Monastery Lake Wetlands
14	Mission Hills Wetlands
15	Franklin (Puetz Road) Woods
16	Fitzsimmons Road Woods
17	Oakwood Park Oak Woods
18	Root River Parkway Prairie
19	Ryan Creek Woods
20	Franklin Oak Woods and Oak Savanna
21	Elm Road Woods
22	Grant Park Woods—South
23	Grant Park Woods—Old Growth
24	Esch-Honadel Woods
25	Wood Creek Woods
26	Wedge Woods
27	Oak Creek Low Woods
28	Root River Riverine Forest
29	Whitnall Park Woods—North
30	Menomonee River Swamp—South
31	Harley-Davidson Woods
32	Currie Park Low Woods
33	Blue Mound Country Club Woods
34	Wil-O-Way Woods
35	Jacobus Park Woods
36	Downer Woods
37	Bradley Woods
38	Brown Deer Park Woods
39	Harbinger Woods
40	Menomonee River Swamp—North
41	Haskell Noyes Park Woods
42	Schlitz Audubon Center Woods and Beach
43	Kletzsch Park Woods
44	Elm Road Woods—North
45	Meyers Woods
46	PPG Woods
47	Fittshur Wetland
48	Bender Park Woods and Clay Banks
49	Bender Park Woods—South
50	Oak Creek Power Plant Woods
51	Warnimont Park Woods
52	Underwood Parkway Woods
53	Stadium Bluff Woods
54	Cambridge Avenue Woods
55	Brynwood Country Club Woods
56	Fox Point Clay Bluffs
57	Hilltop Farm Woods

Source: Wisconsin Department of Natural Resources and SEWRPC.

implementation of the plan and plan implementation activities, such as the review of local site-specific Natural Area and Critical Species Habitat site management plans.

CONCLUDING REMARKS

Due largely to urbanization and widespread agricultural activity, only remnants of the pre-European-settlement landscape in Southeastern Wisconsin exist. The continued urbanization of the Region may be expected to further disturb or destroy many of the remaining natural areas and associated critical plant and animal habitats unless a concerted effort is made to ensure their protection and permanent preservation.

The plan presented in this report is intended to guide State, county, and local units of government, private conservancy organizations, and other private interests in efforts to protect and manage the remaining natural areas and other areas vital to the maintenance of endangered, threatened, and rare plant and animal species in the Region. Implementation of the plan would result in the protective ownership of 427 Natural Area sites, or 96 percent of all such sites which have been identified within the Region. Under the plan, lands encompassing 96 percent of all reported occurrences of endangered, threatened, and rare plant species in the Region would be placed in protective ownership, as would lands encompassing 99 percent of all reported regional occurrences of endangered, threatened, and rare bird species. In addition, 71 Geological Areas, representing 83 percent of the significant geological sites found within the Region, would be placed in protective ownership.

Implementation of the plan would contribute immeasurably to the maintenance of the overall quality of the environment of the Region, including maintenance of its biodiversity, and would help

Table 157

FINAL SUMMARY OF SITES RECOMMENDED TO HELP REESTABLISH RELATIVELY LARGE TRACTS OF GRASSLANDS AND FOREST INTERIORS IN THE SOUTHEASTERN WISCONSIN REGION

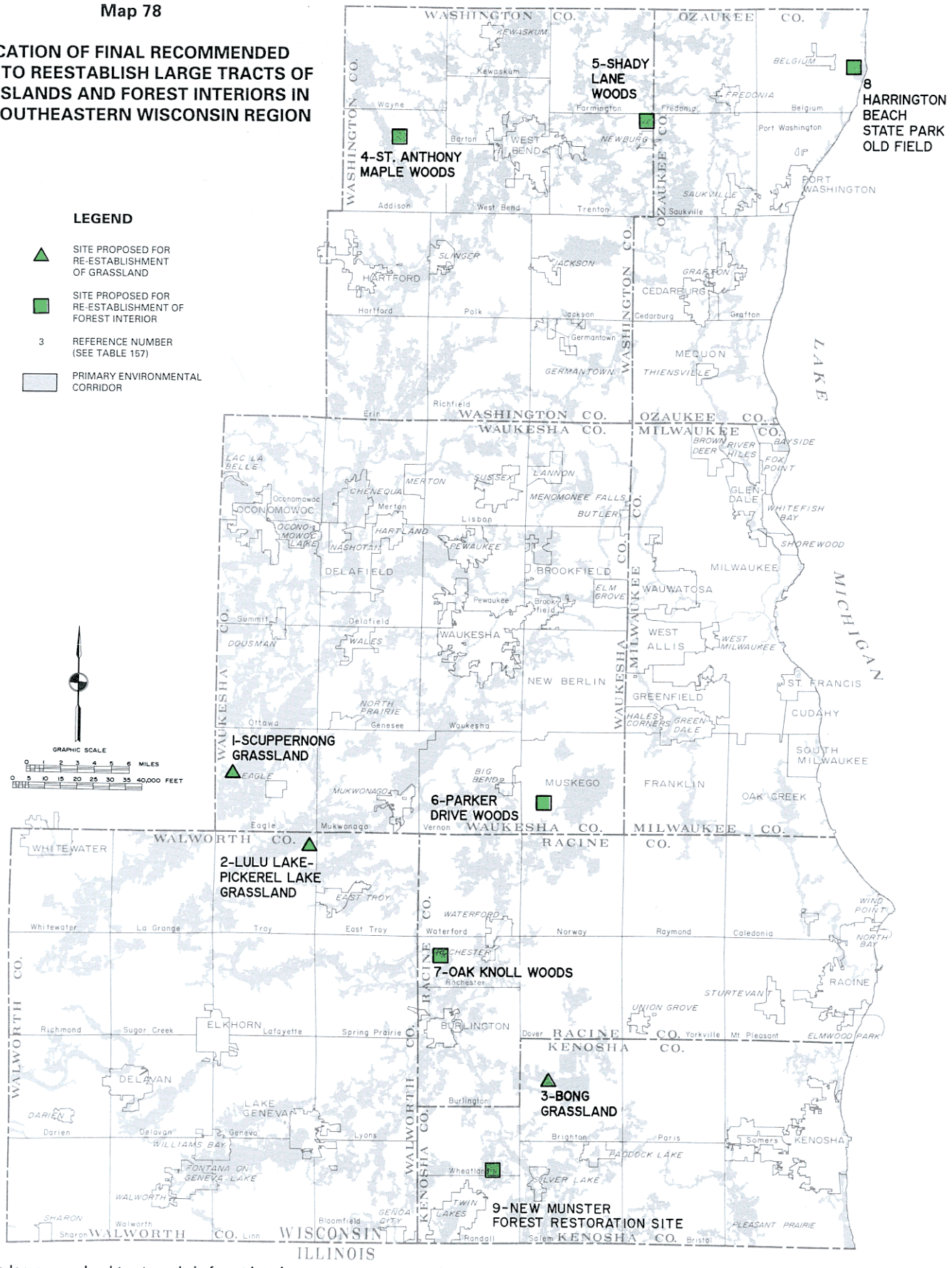
Site Category	Site Identification			Site Area (acres)	Relationship of Site to Inventoried Natural Areas or Critical Species Habitat Sites	Relationship of Site to Already Protectively Owned Lands or Already Established Project Boundaries	Proposed Acquisition Agency	Acquisition Cost[a]
	Reference Number on Map 78	Civil Division	Name					
Grasslands	1	Town of Eagle	Scuppernong	2,115	This site encompasses the entirety of three previously inventoried sites: 1) the Scuppernong Prairie State Natural Area site of statewide significance (572 acres); 2) the Paradise Springs Brook Critical Species Habitat site (24 acres); and 3) the Headquarters Grasslands Critical Species Habitat site (28 acres). Thus, a total of 624 acres, or about 30 percent, of this proposed large grassland site has already been recommended for preservation and protection. The remaining 1,491 acres of this site represent additional lands either already acquired or proposed to be acquired	This entire site lies within the established project boundary for the Southern Unit of the Kettle Moraine State Forest. The Wisconsin Department of Natural Resources already owns 1,532 acres, or 72 percent, of the entire site	Wisconsin Department of Natural Resources	$1,784,000
	2	Town of Troy	Lulu Lake-Pickerel Lake	1,530	This site is adjacent to, but does not contain, inventoried Natural Areas or Critical Species Habitat sites	About 455 acres, or 30 percent, of this site lies within either the Lulu Lake State Natural Area project boundary established by the Wisconsin Department of Natural Resources, or within the Lulu Lake Natural Area-Pickerel Lake Fen project boundary established by The Nature Conservancy. The Wisconsin Department of Natural Resources and The Nature Conservancy together now own a total of 265 acres, or 17 percent of the entire site	Wisconsin Department of Natural Resources	$2,277,000
	3	Town of Brighton	Bong	10,000	Nearly 50 percent of this site, or 4,780 acres, consists of the great majority of the previously inventoried Bong State Recreation Area Critical Species Habitat site	About one-half of this site is publicly owned, lying within the Bong State Recreation Area and the Kenosha and Salem School Forest properties. The remaining acreage would be protected through management agreements with private landowners	Wisconsin Department of Natural Resources	--
Forest Interiors	4	Town of Addison	St. Anthony Maple Woods	160	This site encompasses the entirety of the St. Anthony Maple Woods Critical Species Habitat site (90 acres). These 80 acres have already been recommended for preservation and protection. The remaining 70 acres of this site represent additional lands proposed to be acquired	This site is not in existing protective ownership or located within an established project boundary; however, this site is located approximately 0.25 mile from the Theresa Marsh State Wildlife Area	Wisconsin Department of Natural Resources	$124,000
	5	Town of Trenton	Shady Lane Woods	147	This site does not contain inventoried Natural Areas or Critical Species Habitat sites	This site is not in existing protective ownership or located within an established project boundary	Wisconsin Department of Natural Resources	$276,800
	6	City of Muskego	Parker Drive Woods	123	This site does not contain inventoried Natural Areas or Critical Species Habitat sites	This site is not in existing protective ownership or located within an established project boundary	Wisconsin Department of Natural Resources	$312,000
	7	Town of Rochester	Oak Knoll Woods	162	This site does not contain inventoried Natural Areas or Critical Species Habitat sites	About 40 acres, or 25 percent, of this site is currently owned by the Wisconsin Department of Natural Resources. This site is adjacent to the Honey Creek State Wildlife Area, but is not located within an established project boundary	Wisconsin Department of Natural Resources	$183,000
	8	Town of Belgium	Harrington Beach State Park Old Fields	400	This site does not contain inventoried Natural Areas. However, critical bird species have been identified as using this site	This site is located entirely within Harrington Beach State Park	Wisconsin Department of Natural Resources	--
	9	Town of Wheatland	New Munster Forest Restoration Site	683	The site includes a portion of the 384 acre New Munster shrub-carr and tamarack relict	The entire 683 acres are presently in State ownership as part of the New Munster Wildlife Area	Wisconsin Department of Natural Resources	--

[a] *All cost figures are expressed in constant 1994 dollars.*

Source: SEWRPC.

Map 78

LOCATION OF FINAL RECOMMENDED SITES TO REESTABLISH LARGE TRACTS OF GRASSLANDS AND FOREST INTERIORS IN THE SOUTHEASTERN WISCONSIN REGION



Three large grassland tracts and six forest interior areas are recommended in the final plan to be established in order to increase habitat for native grassland-nesting and forest-interior-nesting bird species in the Region. These areas are intended to enhance the grassland and forest interior habitat recommended for protection as Natural Areas or Critical Species Habitat sites.

Source: SEWRPC.

ensure opportunities for recreational, educational, and scientific pursuits for future generations. Implementation of the plan would also yield certain economic benefits. In a broad sense, it would enhance the quality of life in the Region and thereby help maintain the attractiveness of the Region as a place to live and work. The plan would, moreover, enable public and private land development to proceed more efficiently, with greater assurance of conformity with environmental regulation, by clearly identifying the most sensitive environmental lands prior to the preparation of development plans. Development activity could then proceed with greater confidence and in a potentially less costly manner because of the reduced possibility of conflicts with existing environmental regulations.

APPENDICES

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Appendix A

SCIENTIFIC AND COMMON NAMES OF ORGANISMS REFERRED TO IN THIS REPORT[1]

PLANTS

Scientific Name	Common Name
Abies balsamea	balsam fir
Acer negundo	boxelder
Acer rubrum	red maple
Acer saccharinum	silver maple
Acer saccharum	sugar maple
Acer spicatum	mountain maple
Acorus calamus	sweet flag
Agalinis skinneriana	pale false foxglove
Agrimonia parviflora	swamp agrimony
Alliaria petiolata	garlic mustard
Allium cernuum	nodding wild onion
Alnus rugosa	tag alder
Amorpha canescens	lead plant
Andromeda glaucophylla	bog rosemary
Andropogon gerardi	big bluestem grass
Andropogon scoparius	little bluestem grass
Anemone patens	pasqueflower
Arenaria stricta	rock sandwort
Arisaema triphyllum	jack-in-the-pulpit
Artemisia caudata	wormwood
Asclepias sullivantii	Sullivant's milkweed
Aster spp.	asters
Aster azureus	azure aster
Aster furcatus	forked aster
Aster novae-angliae	New England aster
Aster sericeus	silky aster
Astragalus neglectus	Cooper's milkvetch
Baptisia leucophaea	cream wild indigo
Berberis thunbergii	Japanese barberry
Besseya bullii	kittentails
Betula alleghaniensis	yellow birch
Betula papyrifera	paper birch
Bouteloua curtipendula	side-oats grama
Cacalia tuberosa	prairie Indian plantain
Cakile edentula	sea rocket
Calamagrostis canadensis	Canada bluejoint
Calamovilfa longifolia	sand reed grass

[1]*For organisms not specifically noted in this appendix, refer to Tables 40 through 48 in Chapter V of this report (see pages 145, 150, and 156-165) and Tables 71 through 74 in Chapter VI of this report (see pages 264-270).*

Calopogon pulchellus	grass-pink orchid
Camassia scilloides	wild hyacinth
Camptosorus rhizophyllus	walking fern
Carex spp.	sedges
Carex crawei	early fen sedge
Carex crus-corvi	crow-spur sedge
Carex formosa	handsome sedge
Carex lacustris	lake sedge
Carex lasiocarpa	wiregrass sedge
Carex lupuliformis	hoplike sedge
Carex stricta	tussock sedge
Carex torreyi	Torrey's sedge
Carya cordiformis	yellowbud hickory
Carya ovata	shagbark hickory
Castilleja coccinea	Indian paintbrush
Centaurea maculosa	spotted knapweed
Ceratocystis fagacearum	oak wilt fungus
Ceratocystis ulmi	Dutch elm disease fungus
Chamaedaphne calyculata	leatherleaf
Cirsium hillii	Hill's thistle
Cladonia spp.	British soldiers
Clintonia borealis	blue beadlily
Convallaria majalis	lily-of-the-valley
Coptis groenlandica	goldthread
Corallorhiza odontorhiza	late coral-root
Corispermum hyssopifolium	common bugseed
Cornus canadensis	bunchberry
Cornus racemosa	gray dogwood
Cornus stolonifera	red-osier dogwood
Corylus americana	hazelnut
Corylus cornuta	beaked hazelnut
Crataegus spp.	hawthorns
Cypripedium spp.	lady's-slippers
Cypripedium arietinum	ram's-head lady's-slipper
Cypripedium candidum	white lady's-slipper
Cypripedium parviflorum	small yellow lady's-slipper
Cypripedium reginae	showy lady's-slipper
Cystopteris bulbifera	bulblet fern
Daucus carota	Queen Anne's lace
Diervilla lonicera	bush honeysuckle
Digitalis purpurea	foxglove
Drosera spp.	sundews
Drosera rotundifolia	round-leaved sundew
Echinacea pallida	pale purple coneflower
Eleocharis spp.	spike-rushes
Eleocharis rostellata	beaked spike-rush
Elymus canadensis	Canada wild rye
Epilobium palustre	marsh willow-herb
Equisetum variegatum	variegated scouring-rush
Erigenia bulbosa	harbinger-of-spring

Erigeron spp.	daisy fleabane
Eryngium yuccifolium	rattlesnake-master
Eupatorium sessilifolium	upland boneset
Euphorbia corollata	flowering spurge
Euphorbia esula	leafy spurge
Euphorbia polygonifolia	seaside spurge
Fagus grandifolia	American beech
Fraxinus spp.	ashes
Fraxinus americana	white ash
Fraxinus nigra	black ash
Fraxinus pennsylvanica	green ash
Fraxinus quadrangulata	blue ash
Gaultheria procumbens	wintergreen
Geastrum spp.	earthstars
Gentiana alba (= G. flavida)	yellowish gentian
Gentiana andrewsii	bottle gentian
Gentiana procera	small fringed gentian
Gentiana quinquefolia	stiff gentian
Geum triflorum	prairie smoke
Glycine max	soybean
Gymnocladus dioicus	Kentucky coffeetree
Helianthemum canadense	frostweed
Helianthus giganteus	giant sunflower
Helianthus grosseserratus	sawtooth sunflower
Hibiscus moscheutos	swamp rose mallow
Houstonia longifolia	bluets
Hydrastis canadensis	goldenseal
Ilex verticillata	winterberry
Impatiens spp.	jewelweed
Iris lacustris	dwarf lake iris
Jeffersonia diphylla	twinleaf
Juglans cinerea	butternut
Juglans nigra	black walnut
Juniperus virginiana	eastern redcedar
Kalmia polifolia	bog laurel
Koeleria cristata	Junegrass
Laportea canadensis	wood nettle
Larix laricina	tamarack
Lathyrus venosus	veiny wild pea
Lechea spp.	pinweed
Ledum groenlandicum	Labrador-tea
Lespedeza capitata	round-headed bushclover
Lespedeza leptostachya	prairie bushclover
Liatris spp.	blazing-stars
Liatris aspera	rough blazing-star

Liatris pycnostachya	prairie blazing-star (gay-feather)
Liatris spicata	marsh blazing-star
Linum sulcatum	yellow flax
Lithospermum canescens	hoary puccoon
Lithospermum latifolium	American gromwell
Lobelia kalmii	Kalm's lobelia
Lonicera spp.	honeysuckles
Lonicera x bella	Eurasian honeysuckle
Lonicera maackii	Amur honeysuckle
Lonicera morrowii	Eurasian honeysuckle
Lonicera tatarica	Tatarian honeysuckle
Lupinus perennis	lupine
Lythrum salicaria	purple loosestrife
Medeola virginiana	Indian cucumber root
Medicago sativa	alfalfa
Melanconis juglandis	butternut canker fungus
Menyanthes trifoliata	bog buckbean
Mitchella repens	partridgeberry
Mitella diphylla	mitrewort (bishop's cap)
Muhlenbergia racemosa (= M. mexicana)	fen muhly grass
Myriophyllum exalbescens (= M. spicatum)	Eurasian water-milfoil
Nuphar spp.	water lilies
Nymphaea spp.	water lilies
Opuntia compressa	western prickly-pear cactus
Ostrya virginiana	ironwood
Panax quinquefolius	ginseng
Parnassia glauca	grass-of-parnassus
Parthenium integrifolium	wild quinine
Pellaea glabella	smooth cliffbrake
Penstemon grandiflorus	beardtongue
Penstemon hirsutus	hairy beardtongue
Petalostemum purpureum	purple prairie clover
Phalaris arundinacea	reed canary grass
Phlox glaberrima	smooth phlox
Phlox pilosa	downy phlox
Picea mariana	black spruce
Pilea pumila	clearweed
Pinus strobus	eastern white pine
Plantago cordata	heart-leaved plantain
Platanthera leucophaea	prairie white-fringed orchid
Poa spp.	bluegrass
Podophyllum peltatum	mayapple
Pogonia ophioglossoides	snake-mouth orchid
Polygala incarnata	pink milkwort
Polygonum spp.	smartweeds
Polytrichium spp.	hairycap moss
Populus deltoides	cottonwood
Populus grandidentata	bigtooth aspen

Populus tremuloides	quaking aspen
Potamogeton spp.	pondweeds
Potamogeton pulcher	spotted pondweed
Potentilla anserina	silverweed
Potentilla fruticosa	shrubby cinquefoil
Prunus pumila	sand cherry
Prunus serotina	black cherry
Ptelea trifoliata	hoptree
Pterospora andromedea	pine-drops
Pycnanthemum virginianum	mountain-mint
Quercus alba	white oak
Quercus bicolor	swamp white oak
Quercus ellipsoidalis	Hill's oak
Quercus macrocarpa	bur oak
Quercus muehlenbergii	chinkapin oak
Quercus rubra	red oak
Quercus velutina	black oak
Ratibida pinnata	gray-headed coneflower
Rhamnus spp.	buckthorn
Rhamnus cathartica	European buckthorn
Rhamnus frangula	glossy buckthorn
Rhus radicans	poison ivy
Ribes spp.	currants or gooseberries
Rosa multiflora	multiflora rose
Rubus spp.	brambles
Rubus pubescens	dwarf raspberry
Ruellia humilis	wild petunia
Ruppia maritima	ditchgrass
Sagittaria spp.	arrowheads
Salix spp.	willows
Salix nigra	black willow
Sarracenia purpurea	pitcher plant
Scirpus spp.	bulrushes
Scirpus cespitosus	tussock bulrush
Scirpus validus	softstem bulrush
Scutellaria ovata	heart-leaved skullcap
Scutellaria parvula	small skullcap
Shepherdia canadensis	buffaloberry
Silphium integrifolium	rosinweed
Silphium laciniatum	compass plant
Silphium terebinthinaceum	prairie dock
Solidago spp.	goldenrods
Solidago caesia	blue-stemmed goldenrod
Solidago nemoralis	gray goldenrod
Solidago ohioensis	Ohio goldenrod
Solidago rigida	stiff goldenrod
Sorghastrum nutans	Indian grass
Sparganium eurycarpum	bur-reed
Spartina pectinata	prairie cord grass

Sphagnum spp.	sphagnum moss
Spiranthes cernua	slender ladies'-tresses
Sporobolus heterolepis	prairie dropseed
Stipa spartea	needlegrass
Symphoricarpos albus	white snowberry
Taraxacum officinale	dandelion
Taxus brevifolia	western yew
Taxus canadensis	Canada yew
Thalictrum dasycarpum	tall meadow-rue
Thalictrum revolutum	waxy meadow-rue
Thuja occidentalis	white cedar
Tilia americana	basswood
Tofieldia glutinosa	false asphodel
Tomanthera auriculata	eared false foxglove
Trientalis borealis	starflower
Triglochin maritimum	common bog arrow-grass
Triglochin palustre	slender bog arrow-grass
Trillium nivale	snow trillium
Trillium recurvatum	red trillium
Triodanus perfoliata	Venus's looking-glass
Trisetum melicoides	purple false oats
Tsuga canadensis	hemlock
Typha spp.	cattails
Ulmus spp.	elms
Ulmus americana	American elm
Ulmus rubra	slippery elm
Utricularia purpurea	purple bladderwort
Vaccinium angustifolium and V. myrtilloides	blueberry
Vaccinium macrocarpon and V. oxycoccos	cranberry
Vallisneria americana	wild celery
Veronicastrum virginicum	Culver's-root
Viburnum spp.	viburnums
Viburnum opulus	European highbush cranberry
Viburnum prunifolium	black haw
Vinca minor	periwinkle
Viola pedata	birdsfoot violet
Vitis riparia	riverbank grape
Zanthoxylum americanum	prickly-ash
Zea mays	corn
Zizania aquatica	wild rice
Zizia aptera	heart-leaved golden Alexanders
Zizia aurea	golden Alexanders
Zygadenus elegans	white camas

BIRDS

Scientific Name	Common Name
Accipiter cooperii	Cooper's hawk
Agelaius phoeniceus	red-winged blackbird
Aix sponsa	wood duck
Ammodramus henslowii	Henslow's sparrow
Ammodramus savannarum	grasshopper sparrow
Anas discors	blue-winged teal
Anas platyrhychos	mallard
Aquila chrysaetes	golden eagle
Ardea herodias	great blue heron
Bartramia longicauda	upland sandpiper
Bonasa umbellus	grouse
Botaurus lentiginosus	American bittern
Branta canadensis	Canada goose
Buteo jamaicensis	red-tailed hawk
Buteo lineatus	red-shouldered hawk
Carpodacus mexicanus	house finch
Casmerodius albus	great egret
Catoptrophorus semipalmatus	willet
Charadrius melodus	piping plover
Chen hyperborea	snow goose
Chlidonias niger	black tern
Circus cyaneus	northern harrier
Columba livia	pigeon
Conuropsis carolinensis	Carolina parakeet
Corvus brachyrhynchos	crow
Dendroica cerulea	cerulean warbler
Dendroica dominica	yellow-throated warbler
Dolichonyx oryzivorus	bobolink
Ectopistes migratorius	passenger pigeon
Elanoides forficatus	swallow-tailed kite
Empidonax virescens	Acadian flycatcher
Falco peregrinus	peregrine falcon
Grus americana	whooping crane
Grus canadensis	sandhill crane
Haliaeetus leucocephalus	bald eagle
Helmintheros vermivorous	worm-eating warbler
Lanius ludovicianus	loggerhead shrike
Meleagris gallopavo	turkey
Molothrus ater	cowbird

Numenius americanus	long-billed curlew
Olor buccinator	trumpeter swan
Olor columbianus	whistling swan
Oporornis formosus	Kentucky warbler
Pandion haliaetus	osprey
Passer domesticus	English (house) sparrow
Pelecanus erythrorhychos	white pelican
Phasianus colchicus	ring-necked pheasant
Pluvialis dominica	golden plover
Podilymbus podiceps	pied-billed grebe
Quiscalus quiscala	grackle
Sialia sialia	eastern bluebird
Spiza americana	dickcissel
Sterna forsteri	Forster's tern
Sterna hirundo	common tern
Sturnella neglecta	western meadowlark
Sturnus vulgaris	starling
Turdus migratorius	American robin
Wilsonia citrina	hooded warbler
Xanthocephalus xanthocephalus	yellow-headed blackbird

FISH

Scientific Name	Common Name
Alosa pseudoharengus	alewife
Anguilla rostrata	American eel
Aphredoderus sayanus	pirate perch
Carassius auratus	goldfish
Clinostomus elongatus	redside dace
Coregonus alpenae	longjaw cisco
Coregonus artedi	lake herring
Coregonus johannae	deepwater cisco
Coregonus nigripinnis	blackfin cisco
Cyprinus carpi	common carp
Erimyzon oblongus	creek chubsucker
Erimyzon sucetta	lake chubsucker
Esox lucius	northern pike
Esox masquinongy	muskellunge
Etheostoma microperca	least darter
Fundulus dispar	starhead topminnow

Lepomis macrochirus	bluegill
Lepomis megalotis	longear sunfish
Luxilis chrysocephalus	striped shiner
Lythrurus umbratilis	redfin shiner
Micropterus salmoides	largemouth bass (black bass)
Moxostoma carinatum	river redhorse
Moxostoma duquesnei	black redhorse
Moxostoma valenciennesi	greater redhorse
Notropis anogenus	pugnose shiner
Notropis nubilis	Ozark minnow
Notropis texanus	weed shiner
Noturus exilis	slender madtom
Oncorhynchus kisutch	coho salmon
Oncorhynchus tshawytscha	Chinook salmon
Opsopoeodus emiliae	pugnose minnow
Osmerus mordax	rainbow smelt
Petromyzon marinus	sea lamprey
Salmo gairdneri	rainbow trout
Salmo trutta	brown trout
Salverlinus fontinalis	brook trout
Stizostedion vitreum	walleye

HERPTILES

Scientific Name	Common Name
Acris crepitans blanchardi	Blanchard's cricket frog
Ambystoma maculatum	spotted salamander
Bufo americanus	toad
Emydoidea blandingii	Blanding's turtle
Hemidactylium scutatum	four-toed salamander
Heterodon platirhinos	hognose snake
Rana catesbeiana	bullfrog
Rana palustris	pickerel frog
Regina septemvittata	queen snake
Sistrurus catenatus catenatus	eastern massasauga
Thamnophis butleri	Butler's garter snake
Thamnophis proximus	western ribbon snake
Thamnophis sauritus	northern ribbon snake

INSECTS

Scientific Name	Common Name
Calephelis muticum	swamp metalmark
Oarisma powesheik	Powesheik skipperling
Parthetria dispar	gypsy moth
Pristophora ericksonii	larch sawfly

MAMMALS

Scientific Name	Common Name
Bison bison	bison
Canis lupis	gray wolf
Cervus canadensis	elk
Dasypus novemcinctus	armadillo
Didelphia marsupialis	opossum
Felix concolor	cougar
Lynx canadensis	lynx
Lynx rufus	bobcat
Martes pennanti	fisher
Mephitis mephitis	skunk
Microtus spp.	voles
Myotis sodalis	Indiana bat
Odocoileus virginiana	white-tailed deer
Procyon lotor	raccoon
Spermophilus franklinii	Franklin's ground squirrel
Vulpes fulva	fox

MUSSELS

Scientific Name	Common Name
Actinonaias carinata	mucket
Alasmidonta marginata	elktoe
Alasmidonta viridis	slippershell
Amblema plicata	three-ridge
Anodonta grandis	floater

Anodontoides ferussacianus	cylindrical paper shell
Carunculina parva	liliput
Driessena polymorpha	zebra mussel
Elliptio dilatatus	spike
Fusconaia flava	Wabash pig toe
Lampsilis radiata siliquoidea	fat mucket
Lampsilis ventricosa	pocketbook
Lasmigona complanata	white heelsplitter
Lasmigona compressa	creek heelsplitter
Lasmigona costata	fluted shell
Pleurobema cordatum	Ohio River pig toe
Quadrula pustulosa	pimple back
Simpsonaias ambigua	salamander mussel
Strophitis undulatus	squaw foot
Venustaconcha ellipsiformis ellipsiformis	ellipse
Villosa iris iris	rainbow shell

FOSSIL ORGANISMS

Scientific Name	**Common Name**
Calymene celebra	a trilobite
Rhynchodus excavatus	a Devonian fish

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Appendix B

WILDLIFE HABITAT EVALUATION CRITERIA

Wildlife habitat areas remaining in the Southeastern Wisconsin Region were identified by the Southeastern Wisconsin Regional Planning Commission and the Wisconsin Department of Natural Resources in 1988 and were categorized as either Class I (high-value), Class II (medium-value), or Class III (good-value) habitat areas. The following five major considerations were used to help classify the value of these wildlife habitats:

1. Diversity: An area must maintain a high but balanced diversity of species for a temperate climate, balanced in the sense that the proper predator-prey relationships occur; in addition, a reproductive interdependence must exist.

2. Territorial Requirements: The territorial requirements of the major species within a particular habitat must be met so as to provide for a minimum population level.

3. Vegetation: The vegetal composition and structure must be such that the required levels for provision of nesting sites, travel routes, concealment, and weather-impact modifications are met.

4. Location: Close proximity to other wildlife habitat areas is highly desirable.

5. Disturbance: Minimal levels of disturbance from human activities, other than those activities of a wildlife-management nature, are necessary.

Additional criteria used in evaluating and ranking specific types of wildlife habitat areas are as follows:

1. Upland and lowland forests: The criteria for these areas involve consideration of distances to other forest blocks; association with other wildlife habitat; forest edge; openings; canopy closure; diversity of forest types; number and distribution of mast trees; and past disturbances, including logging, grazing, and development.

2. Emergent marshes, fresh (wet) meadows, sedge meadows, fens, bogs, shrub-carrs, and alder thickets: The criteria for these areas involve consideration of position relative to other wetlands; interspersion of wetland types; distance to forageable cropland (winter food); association with upland habitat; and disturbances, including grazing, agricultural activities, and ditching, draining, or filling.

3. Grasslands and upland brush areas: The criteria for these areas involve consideration of distances to other habitat types; and disturbances, including grazing, past agricultural activity, and development.

Class I wildlife habitat areas are the highest-value habitats in the Region in that they contain a good diversity of wildlife, are adequate in size to meet all habitat requirements for the species concerned, and are generally located in proximity to other wildlife habitat areas. Class II wildlife habitat areas generally lack optimal conditions with respect to one of the three aforementioned criteria for a Class I area. However, Class II areas do retain a good plant and animal diversity. Class III wildlife habitat areas are remnant in nature in that they generally lack optimal conditions with respect to at least two of the three aforementioned criteria for Class I wildlife habitat areas. Class III areas, nevertheless, are important if they are located in close proximity to other wildlife habitat areas, if they provide travel corridors linking other habitat areas, if they provide important foraging habitat, or if they provide the only available range in an area. It is in this respect that Class III wildlife habitat areas may also serve as regionally significant habitat in Southeastern Wisconsin.

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