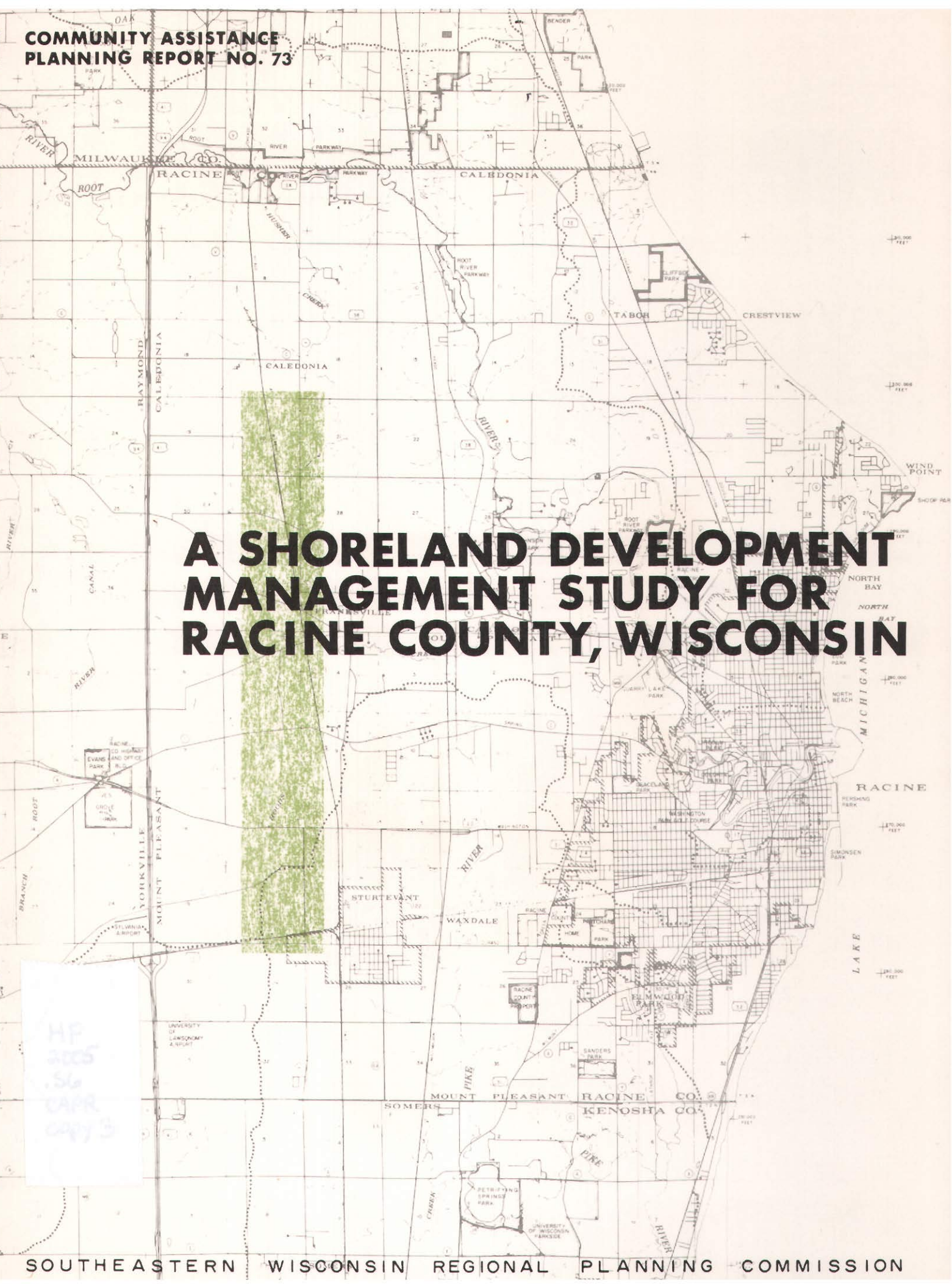
COMMUNITY ASSISTANCE
PLANNING REPORT NO. 73



A SHORELAND DEVELOPMENT MANAGEMENT STUDY FOR RACINE COUNTY, WISCONSIN

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COMMUNITY ASSISTANCE PLANNING REPORT
NUMBER 73

A SHORELAND DEVELOPMENT MANAGEMENT STUDY FOR RACINE COUNTY, WISCONSIN

Prepared by the
Southeastern Wisconsin Regional Planning Commission
P. O. Box 769
Old Courthouse
916 N. East Avenue
Waukesha, Wisconsin 53187-1607

Financial assistance for the preparation of this study has been provided through the Wisconsin Coastal Management Program under the Coastal Zone Management Act of 1972, administered by the Federal Office of Coastal Zone Management, National Oceanic and Atmospheric Administration.

January 1982

Inside Region $2.50
Outside Region $5.00

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SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

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January 20, 1982

Mr. Elwood E. Hoeppner
Chairman
Racine County Board of Supervisors
Racine County Courthouse
730 Wisconsin Avenue
Racine, Wisconsin 53403

Dear Mr. Hoeppner:

The Racine County Board, by Resolution No. 80-225, adopted on December 9, 1980, requested the Regional Planning Commission to assist the County in the conduct of a shoreland development management study. Upon receipt of a grant through the Wisconsin Coastal Management Program in support of this study, work on the study was initiated on May 1, 1981 and completed on December 21, 1981. This report sets forth the findings and recommendations of the Racine County Shoreland Development Management Study.

The sound management of the Lake Michigan shoreland in the public interest is a complex task, requiring the consideration of many interrelated factors and the close coordination and cooperation of the many other interests concerned. The shoreland development management study was undertaken to determine whether and how the existing management system might be improved to better achieve coastal development objectives. The study has identified major coastal management concerns within the Lake Michigan shoreland area in Racine County; set forth broad goals which public policy within the shoreland area should promote over time; analyzed existing shoreland management practices; and formulated recommendations to improve shoreland management practices, including recommendations for modifications to local land use and regulatory ordinances and recommendations for additional studies that should be undertaken within the coastal area.

The Commission and its staff were materially assisted in the preparation of this report by representatives of the planning office of the County, as well as by a Shoreland Development Management Study Steering Committee, consisting of representatives of Racine County, local units of government in the shoreland study area, the Racine County Conservation League, and the Wisconsin Department of Natural Resources.

It must be emphasized that the success of future management of the Lake Michigan shoreland area in Racine County depends, in a large measure, on the coordination and cooperation of the units and agencies of government concerned. Racine County, the City of Racine, the Villages of North Bay and Wind Point, the Towns of Caledonia and Mt. Pleasant, the Wisconsin Department of Natural Resources, and the U. S. Army Corps of Engineers all have responsibilities within the common Lake Michigan shoreland area. Appropriate coordination among these agencies and units of government—including the coordination of planning activities, regulatory activities, land acquisition, and development and redevelopment activities—can contribute significantly to the attainment of common shoreland management objectives.

The Regional Planning Commission is pleased to have been able to be of assistance to the County in the completion of this very important study. The Commission stands ready, upon request, to assist the County and the constituent local units of government within the County in presenting the information and recommendations contained in this report to the public for its review and evaluation, and in adopting and implementing the recommendations contained in this study.

Sincerely,

Kurt W. Bauer
Executive Director

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INTRODUCTION

BACKGROUND AND NEED FOR THE STUDY

Over the past several years, public officials and citizens in Racine County and the State of Wisconsin have expressed increasing concern for the proper management of land use development in the Lake Michigan shoreland area. This concern stems from an increasing awareness of the unique, but limited, resource which the Lake Michigan shoreland area represents, the many competing and frequently conflicting land uses continually proposed within the Lake Michigan shoreland area, and the problems resulting from mismanagement of the shoreland area in the past. It is these general concerns which prompted Racine County to initiate a shoreland development management study.

More specifically, this study was initiated by Racine County to remedy certain perceived inadequacies in the current management of development along the Lake Michigan shoreline. These inadequacies include: 1) a lack of adequate policies at the county and local level regarding the unique physical development issues, problems, and opportunities existing in the Lake Michigan shoreland area; 2) a lack of coordination among the various levels and units of government as well as private interests in decision-making affecting development in the shoreland area; and 3) the application of outdated shoreland management practices by local units of government in shaping and guiding coastal development.

Lack of County Level Coastal Policy

Decisions regarding development along the Lake Michigan shoreline should be formulated within a clearly defined policy framework which addresses issues, problems, and opportunities that are unique to the shoreland area. These include, among others, shore erosion, recreational use of Lake Michigan and the adjacent shoreland area, and the preservation of unique natural resource amenities along the Lake Michigan shoreline. There is presently no policy structure at the county level which can guide local units of government in Racine County in their efforts to manage and shape development within the shoreland area. Rather, objectives and policies regarding certain coastal development issues must be inferred from individual community plans and various local, state, and federal regulations affecting the shoreland, while policies regarding other coastal development issues are nonexistent.

Lack of Coordination

State and federal shoreland management programs and regulations notwithstanding, the management of development within the Lake Michigan shoreland area is, in large part, the responsibility of city, village, town, and county governments. While management of development in the shoreland area is primarily a local responsibility, the impacts of shoreland development decisions may extend beyond the individual community concerned. There is a concern that decision-making regarding shoreland development in the past has, at times, been short-sighted, with insufficient regard for the effects of development decisions on the balance of the shoreland area. There is, accordingly, a perceived

need for increased coordination among coastal communities so that future development and redevelopment decisions can be better formulated within the context of the needs of the entire coastal area.

Outdated Shoreland Management Mechanisms

There are a variety of mechanisms available to coastal communities to manage growth within the Lake Michigan shoreland area, including comprehensive zoning, shoreland zoning, and subdivision control ordinances. There is a concern that some of these mechanisms are being used in a less than effective manner in managing shoreland development in the public interest. There is a need to evaluate such mechanisms in light of an overall coastal management policy framework to identify what modifications, if any, would make them more effective.

Given these concerns regarding the management of development along the Lake Michigan shoreland area, Racine County, in February of 1980, submitted an application to the Wisconsin Coastal Management Council for funding in the amount of $19,300 for a county shoreland development management study. The Wisconsin Coastal Management Council administers program implementation funds available for such projects under Section 306 of the federal Coastal Zone Management Act of 1972, as amended. In applying for the grant, Racine County agreed to provide $8,300 in local in-kind funds. Upon notification of grant approval, the Racine County Board, by Resolution No. 80-225 adopted on December 9, 1980, accepted the grant, and approved the retention of the Southeastern Wisconsin Regional Planning Commission as a consultant to the County for the project. This study was subsequently carried out by the staff of the Regional Planning Commission working in cooperation with the staff of the County Planning and Zoning Department, and a Steering Committee consisting of representatives from Racine County, the local units of government in the shoreland study area, the Racine County Conservation League, and the Wisconsin Department of Natural Resources. The members of this Steering Committee are listed on the inside front cover of this report.

SCOPE AND CONTENT OF THE STUDY

Major Elements of the Study

The primary purpose of the shoreland development management study is to analyze the existing shoreland management practices within the context of key shoreland development issues and concerns and to determine whether and how those management practices might be improved to better achieve local, regional, state, and federal coastal development objectives. To this end, the following specific work elements were undertaken as part of the shoreland management study: 1) identification of major shoreland development issues and concerns; 2) formulation of general shoreland development management objectives; 3) analysis of existing shoreland development management practices; and 4) formulation of recommendations to improve shoreland development management practices.

Shoreland Development Concerns: The shoreland development management study identifies and describes the major issues and concerns which must be considered in the management of development in the Lake Michigan shoreland area, including bluff failure and shoreline erosion, deterioration and destruction of the natural resource base, and lack of adequate public access to Lake Michigan and associated shoreland recreational areas. Such concerns, unique to the

Lake Michigan shoreland area, were identified from studies conducted under the Wisconsin Coastal Management Program, as well as from studies conducted by the Regional Planning Commission, and through discussion by the Steering Committee.

Shoreland Development Management Objectives: Shoreland development management objectives were subsequently formulated with respect to the major concerns identified within the shoreland area. As previously noted, objectives regarding certain shoreland development concerns have been set forth in, or may be inferred from, individual community plans and various local, state, and federal regulatory programs. Such objectives were examined and reaffirmed, as appropriate, by the Steering Committee. Moreover, certain additional shoreland development objectives were formulated under the guidance of the Steering Committee as part of the study.

Existing Shoreland Development Management Practices: Existing shoreland management practices were analyzed in light of the identified shoreland management concerns and the related objectives formulated under the study. The primary focus of this analysis was on existing local land use controls, including comprehensive zoning ordinances, shoreland zoning regulations, and subdivision control ordinances, although state and federal regulations affecting shoreland development were also analyzed.

Shoreland Development Management Recommendations: The analysis described above led to the formulation of recommendations intended to make existing shoreland development practices more consistent with county shoreland development objectives. Included are recommendations for modifications to comprehensive zoning ordinances, shoreland zoning regulations, and subdivision control regulations, and recommendations for additional studies that should be undertaken to address specific coastal concerns.

Study Area

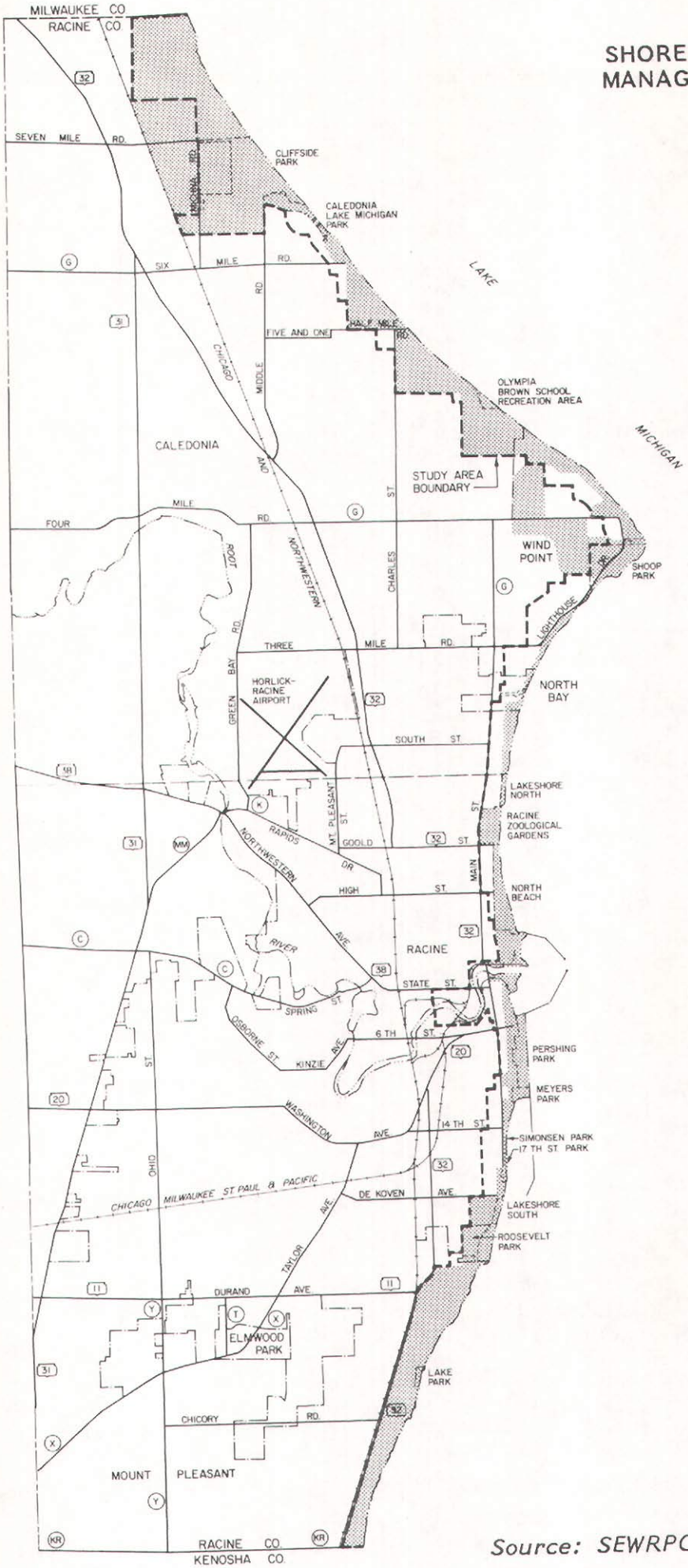
For the purposes of this study, the shoreland area of Lake Michigan was defined as all that area of Racine County lying within approximately 1,000 feet of the ordinary high water mark of Lake Michigan, as well as certain lands along the Root River east of the Marquette Street bridge (see Map 1).[1] The study area thus includes lands subject to county shoreland zoning regulations, one of the most important of all shoreland development management mechanisms. In general, the study area includes those lands which most directly affect, and are most affected by, Lake Michigan resources and processes. For example, virtually all the primary environmental corridor lying along the Lake Michigan coastline of Racine County is contained within the study area.

In 1981, Racine County completed a multi-purpose cadastre for that portion of Racine County perceived to have special Lake Michigan shoreland management needs. The area for which the cadastre was developed includes all real properties in Racine County abutting Lake Michigan, as well as properties between Lake Michigan and the first major man-made or natural feature lying west of Lake Michigan. This area ranges in width from about 200 feet to 4,800 feet, and approximates the shoreland area as defined for this study.

[1]The actual study area boundary is the man-made or natural physical feature lying closest to a line 1,000 feet from the ordinary high water mark of Lake Michigan. Along several reaches of the study area in the northern portion of the County, real property lines had to be used as the study area boundary, owing to absence of major physical features near the shoreline in this area.

Map 1

SHORELAND DEVELOPMENT MANAGEMENT STUDY AREA



LEGEND

RACINE COUNTY CADASTRE MAPPING PROGRAM AREA

Source: SEWRPC.

While this study focuses on a relatively narrow strip of land along the Lake Michigan shoreline, it must be recognized that the study area is set within the broader framework of comprehensive regional county and local plans. Accordingly the study recognizes, for example, the extent of existing and proposed sanitary sewerage and public water supply service areas located in the study area. In addition, it is recognized that the Lake Michigan shoreland provides unique recreational opportunities which attract users from well inland. It is also recognized that the remaining natural areas along the Lake Michigan shoreline facilitate the movement of wildlife within and through the County. Due consideration will be given in the study to these and similar important linkages between the study area and the balance of the County and the Southeastern Wisconsin Region.

SCHEME OF PRESENTATION

The findings and recommendations of the Racine County shoreland management study are documented in this report. Following this introductory chapter, Chapter II "Shoreland Development Concerns and Objectives," presents information on the major concerns which must be addressed in managing development within the Lake Michigan shoreland area, including bluff failure and shoreline erosion, the provision of adequate recreational access, the preservation and protection of the natural resource base, and certain land use-related concerns. Chapter II also sets forth general shoreland management objectives with respect to the major shoreland development concerns. Chapter III, "Shoreland Development Management Framework: Analysis and Recommendations," presents an analysis of existing shoreland development practices within the context of the identified shoreland management concerns and the related management objectives, and presents recommendations which are intended to improve the management of development in the Lake Michigan shoreland area of Racine County. Chapter IV, "Summary and Conclusion," summarizes the major findings and recommendations of the study.

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Chapter II

SHORELAND DEVELOPMENT CONCERNS AND OBJECTIVES

INTRODUCTION

The shoreland study area is a unique area which both conditions, and is conditioned by, Lake Michigan. A number of issues and concerns have arisen in the study area owing to its proximity to the lake. These concerns include erosion of the Lake Michigan shoreline, the provision of public access to the Lake Michigan shoreland, the preservation of the natural resource base of the Lake Michigan shoreland area, and various land use-related concerns. Shoreline erosion and the provision of public access to the Lake Michigan shoreland area are commonly cited as major issues and concerns along the Lake Michigan shoreline in southeastern Wisconsin.[1] The Racine County Shoreland Development Management Study Steering Committee indicated, further, that the preservation of the natural resource base and the proper use of land are also key issues in the Racine County coastal area.

This chapter, presented in five sections, provides background information on each of the four major concerns identified by the Steering Committee. Each section contains a broad set of related objectives formulated by the Steering Committee after consideration of the issue concerned. The information on major shoreland area concerns and the related objectives presented herein provide the basis for the analysis of existing and for the formulation and evaluation of proposed shoreland development management practices, as presented in the next chapter of this report.

General Description of the Study Area

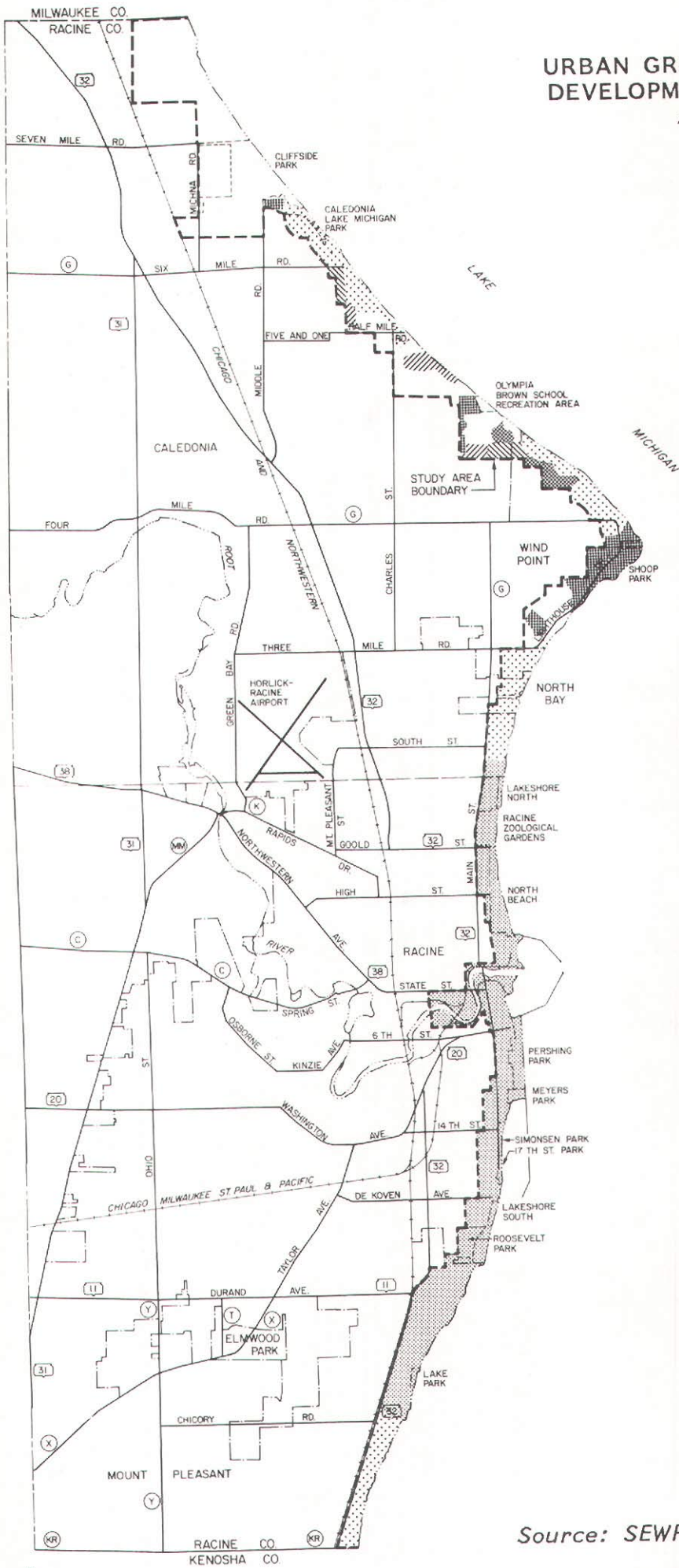
The shoreland development management study area encompasses 2,358 acres, or about 1.1 percent of the total area of Racine County. The study area includes 14.4 miles of Lake Michigan shoreline. The resident population of the study area in 1980 totaled 9,240 persons, or 5.3 percent of the county population.

As shown on Map 2, much of the study area has already been committed to intensive urban uses, and remaining undeveloped open lands in the study area are relatively scarce. By 1950, urban development in the study area extended south to Chicory Road and north to Lombard Avenue. By 1963, urban development extended to County Line Road on the south and to Three Mile Road on the north. Also between 1950 and 1963, large tracts of residential lands were developed along Lake Michigan in the Village of Wind Point and in the Town of Caledonia, including the Crestview Subdivision and the shoreland area immediately south of Crestview. Since 1963, open space lands along the Lake Michigan shoreline have continued to be converted to urban use. Remaining undeveloped lands are

[1]See "Status Report of the Coastal Issues, Concerns, and Appropriate Uses in Southeastern Wisconsin," prepared by SEWRPC and published in Wisconsin Coastal Management Program Proposal-Appendices--Draft for Public Review, 1977; and SEWRPC, Lake Michigan Estuary and Direct Drainage Area Subwatersheds Planning Program Prospectus, 1978.

Map 2

URBAN GROWTH IN THE SHORELAND DEVELOPMENT MANAGEMENT STUDY AREA: 1950-1980



LEGEND

- 1950
- 1963
- 1970
- 1975
- 1980

Source: SEWRPC.

presently found in the northern portion of the study area. It is important to note that although much of the study area is already intensively developed, redevelopment of the older urban portions of the study area, particularly the central portion of the City of Racine, could provide additional opportunities for public shoreland access and lakefront beautification.

To a large extent, the shoreland issues and concerns have been, and may be expected to continue to be, a direct consequence of the urbanization of the shoreland area. With respect to shoreland erosion, for example, lake levels, wave and wind action, and surface and subsurface drainage--while commonly considered to be the cause of environmental and developmental problems along the Lake Michigan shoreline--are, and always will be, natural phenomena active in the coastal system. The damage experienced as a result of bluff erosion is, in fact, largely attributable to placing structures on the shoreland and in the lake in locations not suitable for such use. Deterioration of the natural resource base and the scarcity of open lands for additional public access to Lake Michigan are also directly related to urbanization of the coastal area.

SHORELINE EROSION

Shoreline erosion is a major problem for portions of the Lake Michigan shoreline in Racine County and the balance of the Southeastern Wisconsin Region. This section provides background information on shoreline erosion processes, as well as historic trends in shoreline recession in Racine County and erosion hazard abatement objectives.

Shoreline Erosion Processes

Beach Erosion and Accretion: A beach is an area consisting of unconsolidated materials which extends landward from the ordinary low water line to the place where there is a distinct change in physiographic form or to the line marking the start of permanent terrestrial vegetation.[2] Figure 1 illustrates the various features of a beach, including the relatively steep beach face or foreshore; the backshore on the landward side of the beach face, consisting of one or more relatively level berms; and the lake bottom immediately lakeward of the beach face exhibiting a slope of less than that of the beach face.

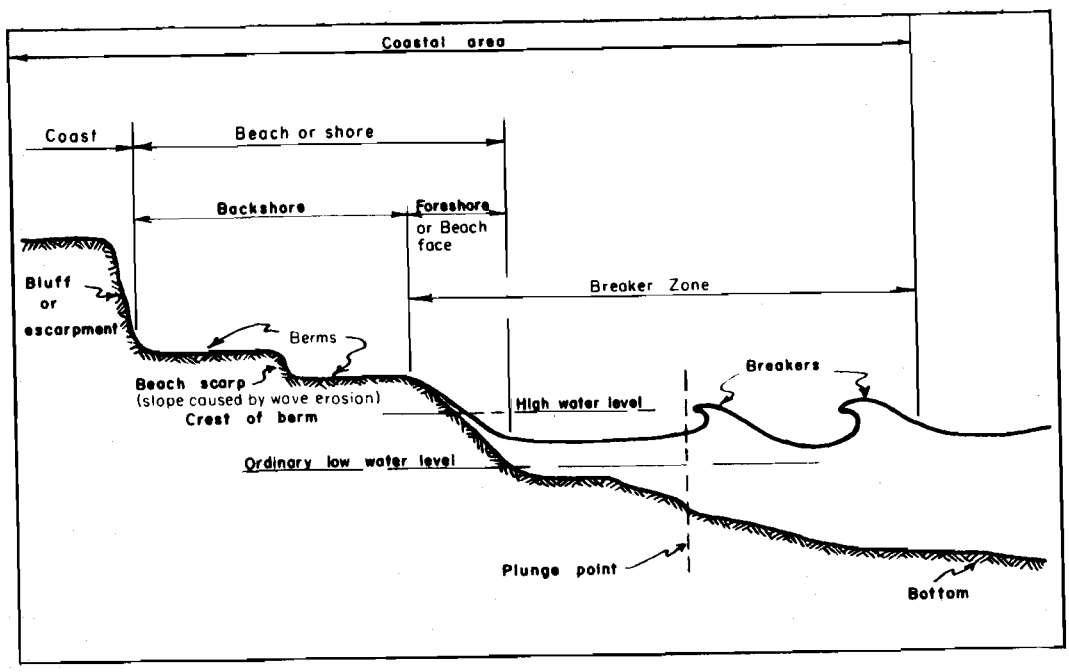
Beaches in Racine County generally consist of sand and gravel, and in some places are covered with artificial fill. They generally range in width from 0 to 40 feet, although beaches are much wider in certain reaches.[3] The widest beach--approximately 300 feet--is located north of the northern breakwater of the City of Racine harbor. Conversely, beaches are nonexistent along many reaches of the shoreline, either as a result of water action and bathymetry or as a result of man's activity--particularly, the construction of shoreline structures, such as bulkheads or shoreline revetments.

[2]U. S. Army Coastal Engineering Research Center, Shore Protection Manual, Vols. I, II, and III, 1977.

[3]J. Philip Keillor and Robert DeGroot, Recent Recession of Lake Michigan Shorelines in Racine County, Wisconsin, University of Wisconsin Sea Grant Institute, 1978. This study was conducted under the sponsorship of the Racine County Coastal Management Technical Advisory Committee.

Figure 1

BEACH PROFILE



Source: U. S. Army Corps of Engineers.

The features of a beach and the materials composing the beach are continuously in a state of flux as a result of the on-shore and off-shore transport of sand and gravel primarily in response to wave action. There is a constantly changing interplay between the forces that bring sand ashore and those that move it seaward, with the position and configuration of the main mass of sand at anytime serving as an index of the dominant forces. High, steep waves typical of storm events within the coastal area of southeastern Wisconsin tend to tear beaches down by removing material from them and transporting it in a lakeward direction. In contrast, the small waves characteristic of periods between storm events tend to build beaches up through a net landward transport of sediment. Thus, the beaches exhibit a continuous cyclic pattern of erosion and accretion in response to the nature of the waves impinging on the beach.[4]

Sediment is also transported parallel to the shoreline by longshore currents. Longshore currents are currents in the breaker zone running generally parallel to the shoreline and usually caused by waves breaking at an angle to the shoreline.[5] Longshore currents transport sediment and other particulate matter--which is suspended in the current or bounced and rolled along the lake bottom--parallel to the shore. While the longshore currents within the coastal zone of southeastern Wisconsin may move in either a northerly or southerly direction in response to the direction of the incident waves, the net sediment transport is to the south. Evidence of this fact is the tendency for beaches to exhibit accretion on the north side of groins, piers, and other structures while erosion occurs on the southerly side of such structures.[6] Accretion of the extensive sand beach north of the northern breakwater of the City of Racine is a prime example of the effect of the net southerly transport of sediment associated with longshore currents. The beach which has developed in this area is reshaped by strong northeasterly storm winds each spring; consequently, extensive regrading is required each year to maintain the viability of the site for recreational use.

The natural sloping beach face and adjacent relatively horizontal beach berms serve to absorb the energy of waves impinging on the coast. Structures such as groins can sometimes be used to develop beaches where they would otherwise be absent, thereby protecting the adjacent bluffs from wave attack. A problem with such structures is that they tend to block the supply of sediment downdrift of the structure, frequently resulting in a narrowing or elimination of the beach and potentially exposing the bluffs in the downdrift region to wave attack.

Bluff Erosion: Much of the Racine County coastline consists of bluffs generally comprised of glacial deposits of silty clay overlain by lakebed deposits of fine sand, silts, and clays, with a second layer of glacial till covering these deposits in certain locations.[7] South of the City of Racine, coastal

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[4]SEWRPC, Lake Michigan Estuary and Direct Drainage Area Subwatersheds Planning Program Prospectus, 1978.

[5]U. S. Army Coastal Engineering Research Center, Shore Protection Manual, Vols. I, II, and III, 1977.

[6]SEWRPC, op. cit.

[7]J. PHilip Keillor and Robert DeGroot, Recent Recession of Lake Michigan Shorelines in Racine County, Wisconsin, University of Wisconsin Sea Grant Institute, 1978.

bluffs rise to a height of 30 to 40 feet. Bluff heights are 20 to 30 feet along the coast in the northern portion of the City of Racine, the Village of North Bay, and the southern portion of the Village of Wind Point. North of Wind Point, bluff heights increase to a maximum of approximately 70 feet near the Milwaukee County line.[8]

Past and potential bluff failure is a serious problem in portions of the coastal system of Racine County. Bluff erosion and instability are the processes by which natural forces, sometimes accelerated or decelerated by man's activities, cause the intermittent, sometimes massive, recession of the top of the bluff. The principal force tending to cause bluff failure is gravity, which is opposed by the shearing resistance, or strength, of the soil within the bluff. A bluff is stable as long as the strength of the bluff soils is greater than the stresses in the soil due to gravity. As discussed below, many factors influence bluff stability either by altering the gravity-induced stresses which tend to cause bluff failure or by affecting bluff strength which maintains bluff stability.

Wave erosion at the base of the bluff is a major factor contributing to bluff recession. As waves undercut the toe of the bluff, the bluff loses the lateral support which the toe provided, and shear stress increases. The energy of the wave attack on the base of the bluff depends on many factors, including the directional orientation of the shoreline to large storm waves, the characteristics of the beach, the near-shore bottom slope, and the fetch--that is, the uninterrupted line of water over which the wind can blow.[9] The energy of the wave attack on the bluff toe is also related to lake water levels. Thus, when water levels are low, the energy of waves is dissipated by beaches, whereas when water levels are high, the waves may be directed against the base of the bluff.

An increase in the amount of groundwater and a change in its location in a bluff can affect bluff stability in several ways. First, groundwater can decrease the grain-to-grain contact forces of materials comprising the bluff face, thereby reducing frictional resistance along bluff surfaces and lowering bluff strength. Moving groundwater can create seepage pressures in the direction of flow and can increase the bluff stresses and even wash material from the bluff face--a process referred to as sapping. These groundwater effects can lead to localized erosion and contribute to abrupt, large-scale slope failure.

Ice formation influences bluff erosion and tends to contribute to a seasonal cycle in erosion. Stationary ice that develops along the shore in the winter serves as a natural protective barrier against wave action associated with winter storms, thereby reducing the bluff erosion during the winter period. However, during the late winter breakup period, flating ice blocks and fragments can scour the beaches and the bluff toe, thereby reducing the ability of the beach to dissipate wave energy and contributing to toe erosion. During breakup, the ice can also damage structures provided to protect the beach and bluff. Moreoever, repeated freezing and thawing and wetting and drying can

[8]D. M. Mickelson, et al., Shore Erosion Study: Technical Report--Shoreline Erosion and Bluff Stability Along Lake Michigan and Lake Superior Shorelines of Wisconsin, 1977.

[9]Ibid.

adversely affect rock used as protective revetment--particularly sedimentary forms of rock that are susceptible to cracking, splitting, and spalling owing to alternate freezing and thawing. The stability of the surface of the bluff face can also be reduced as a result of repeated freezing and thawing or wetting and drying which tends to break down the soil structure and reduce the strength of bluff surface layers.

Vegetation can have a beneficial effect on bluff stability and erosion. The above-ground portion of the vegetation physically intercepts raindrops, thereby reducing their potential to loosen soil particles comprising the bluff face; reduces the impact of wind; and traps windblown sediment. The roots of vegetation bind the unconsolidated soil in place to prevent slippage between soil layers parallel to the bluff face. Transpiration through vegetation can help to remove groundwater from the bluff and thereby contribute to its stability.

Finally, bluff stability can be affected by buildings such as houses and commercial or industrial buildings or by facilities such as roads and parking areas on the bluff. Such buildings or facilities cause increased stress within the bluff and may contribute to bluff failure.

Remedial and Preventive Measures[10]

Bluff erosion problems involving structures and facilities may be mitigated using either structural or nonstructural approaches. The choice or balance between the two basic approaches and the selection of specific measures within each approach are determined by technical, economic, and environmental factors.

The Structural Approach: Structural measures include various means of protecting a bluff toe against wave action and various bluff stabilization techniques.

On-shore protective works include bulkheads, revetments, and seawalls constructed at or near the base of a bluff. Bulkheads serve primarily as bluff-retaining structures and support a bluff against gravity forces. Seawalls, on the other hand, serve to support a bluff as well as effectively absorb the force of impinging waves. The most common type of on-shore protective structure is the revetment--a flattened slope surface armored with erosion-resistive materials such as concrete or natural rock riprap.

A type of on-shore and near-shore protective structure is the groin, which is connected to and built perpendicular from the beach and is intended to obstruct the longshore current which results in the accumulation of transported sand on the beach up-current of a structure. A similar but temporary result may be able to be achieved with artificial beach nourishment, although this approach is still under study--and not generally permitted--by the Wisconsin Department of Natural Resources. The resulting beach absorbs wave energy and reduces toe erosion along the adjacent bluffs. It should be noted that the installation of groins in the coastal system of southeastern Wisconsin is likely to lead to erosion of the beach and bluff immediately downdrift of groins or groups of groins because of the blocking of the littoral drift.

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[10]SEWRPC, Lake Michigan Estuary and Direct Drainage Area Subwatersheds Planning Program Prospectus, 1978.

Breakwaters are protective structures built some distance from and approximately parallel to the shore. They provide dissipation of wave energy, thus reducing bluff toe erosion while reducing the strength of the longshore current immediately landward of the structures. Like groins, however, breakwaters may accelerate beach and bluff erosion downdrift of the protected areas, as sediments settle in the sheltered water behind the breakwater.

Slope stabilization can be accomplished by using earth-moving equipment to regrade the face of the slope to a flatter, more stable profile, thus accelerating the natural stabilization process. This approach is practical only if sufficient vacant land is available at the top of the bluff. Another slope stabilization procedure involves the installation of internal drains to maintain a lowered water table within the bluff face and thus reduce the likelihood of slippage along bluff surfaces. Slope stabilization can also be accomplished through maintenance of a protective cover of vegetation. Slope stabilization measures usually include some combination of these methods.

A variety of shoreline protection structures have been installed by public units and agencies of government and by private property owners, thereby reducing shoreline erosion in the Racine County coastal area. For example, the Racine harbor breakwater and the breakwater south of the harbor serve to minimize erosion problems relating to existing development in the Racine central business district and the portion of the City of Racine to the south. Many structures protecting individual properties have also been installed. For example, about 85 structures, including a number of groins, have been constructed along the coastal reach between the Racine Zoological Gardens and Shoop Park. In contrast, with the exception of the Wisconsin Electric Power Company bulkhead, shoreline protection structures are virtually nonexistent in the northernmost portion of the Racine County coastal area--from Cliffside Park to the Milwaukee County line--the reach which experienced the highest shoreline recession rate in the County in the recent past.[11]

The quality and effectiveness of shoreline protection structures varies considerably. An inventory involving the description and evaluation of the shoreline protection structures along Lake Michigan, including the Racine County coastal area, was conducted as part of the shoreline erosion study sponsored by the Wisconsin Coastal Management Program. The results are presented in summary form for Racine County in Shore Erosion Study: Technical Report, Appendix 2. More detailed findings of this inventory are on file with the Wisconsin Department of Natural Resources.[12]

The Nonstructural Approach: Nonstructural approaches are designed to reduce the physical and economic impacts of bluff failure and erosion, and include land use controls such as development setbacks and public acquisition of shoreline hazard area. Such nonstructural approaches are described in Chapter III of this report.

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[11]D. M. Mickelson, et al., Shore Erosion Study: Technical Report--Shoreline Erosion and Bluff Stability Along Lake Michigan and Lake Superior Shorelines of Wisconsin, 1977.

[12]The shore erosion study, completed in 1977, was conducted through the cooperative efforts of the Wisconsin Geological and Natural History Survey, the University of Wisconsin (Madison, Milwaukee, Parkside, and Extension), and the Wisconsin Department of Natural Resources under the sponsorship of the Wisconsin Coastal Management Program.

Shoreline Recession Rates

The rate of shoreline recession in Racine County has been documented in several studies. In particular, a recent study conducted by J. Philip Keillor and Robert DeGroot of the University of Wisconsin Sea Grant Institute for the Racine County Coastal Management Technical Advisory Committee, provides detailed documentation on shoreline recession along the Racine County coastline during the period 1968-1976.[13] The Keillor-DeGroot study calculated recession rates by comparing the location of the bluff edge as it appeared on 1976 aerial photographs with the location of the bluff edge as it appeared on previous aerial photography. The dates of the "base-line" photography--between April 1968 and December 1971--varied by coastal reach. It should be noted that the Keillor-DeGroot study includes the period during the early and mid-1970's when Lake Michigan levels rose to record heights--a period during which rising lake levels made bluffs and beaches increasingly susceptible to wave attack. Moreover, the lake level was increasing between 1968 and 1971--the span of the baseline photography--and, therefore, the several coastal reaches in the County were not observed under identical conditions.

The shoreline recession rates as identified by the Keillor-DeGroot study are shown in Figure 2. Also shown in Figure 2 are the long-term recession rates--over the period 1836 to 1946--as identified by the U. S. Department of the Army, Corps of Engineers, in its 1951 study of the Racine County coastline.[14] The following is a reach-by-reach description of shore recession rates in Racine County. It should be noted that the reaches alluded to herein are those used in the Keillor-DeGroot study and the shore erosion study conducted under the Wisconsin Coastal Management Program.

Reach 3: The area identified as Reach 3 extends from Pennoyer Park in the City of Kenosha, Kenosha County, to Rosalind Avenue in the Town of Mt. Pleasant, Racine County. Shoreline recession and slope failure have been termed serious problems throughout the entire reach, with the exception of two coastal segments located in Kenosha County.[15] The bluffs in the Racine County portion of this reach are generally 30 to 40 feet in height. The bluff recession rates identified under the Keillor-DeGroot study for the portion of this reach lying in Racine County during the period 1969 to 1976 were generally two feet per year or lower, although a recession rate of five feet per year was estimated at one location.[16] Long-term recession rates of two and three feet per year, respectively, have been recorded at two locations along this reach in Racine County during the period 1836 to 1946 (see Figure 2).

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[13]J. Philip Keillor and Robert DeGroot, Recent Recession of Lake Michigan Shorelines in Racine County, Wisconsin, University of Wisconsin Sea Grant Institute, 1978.

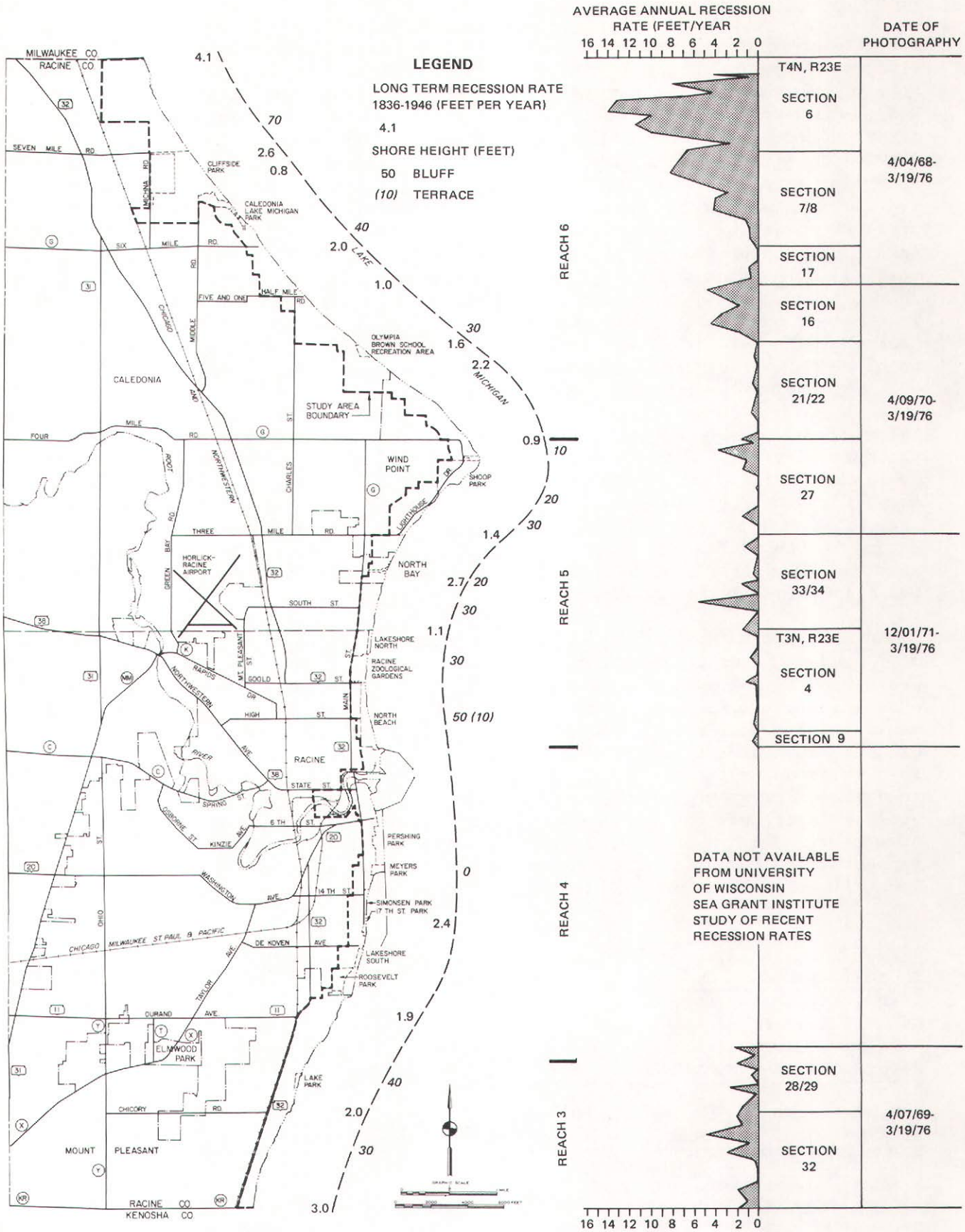
[14]U. S. Department of the Army, Corps of Engineers, Beach Erosion Control Report on Cooperative Study of Racine County, Wisconsin, 1951.

[15]D. M. Mickelson, et al., Shore Erosion Study: Technical Report--Shoreline Erosion and Bluff Stability Along Lake Michigan and Lake Superior Shorelines of Wisconsin, 1977.

[16]The shore erosion study also identified a short-term recession rate of seven feet per year in this reach near the north line of Section 32 of Town 3 North, Range 23 East.

Figure 2

BLUFF RECESSION RATES: RACINE COUNTY, WISCONSIN



Source: University of Wisconsin Sea Grant Institute; Wisconsin Geological and Natural History Survey; U. S. Army Corps of Engineers; and SEWRPC.

Reach 4: The area identified as Reach 4 extends from Rosalind Avenue in the Town of Mt. Pleasant to the northern breakwater of the City of Racine harbor. Shore protection structures--primarily, off-shore breakwaters and shoreline revetments--provide almost continuous protection to the northern two-thirds of this reach, including development within the City of Racine harbor, Pershing Park, and residences farther south.[17] Because of the extensive shore protection, bluff recession rates were not determined for this reach under the Keillor-DeGroot study. The shore erosion study estimated short-term erosion rates of one foot per year, six feet per year, and 11 feet per year at three locations in this reach. The high rate of 11 feet per year occurred at a location just south of the southern end of the breakwater, and may be attributed to the failure of the shoreline revetment at that location during the observation period.[18] As indicated in Figure 2, a long-term recession rate of two feet per year was recorded at two points along this reach over the period 1836 to 1946.

Reach 5: Reach 5 extends from the northern breakwater of the City of Racine harbor to the northern boundary of Shoop Park in the Village of Wind Point. The southern portion of this reach consists of a wide beach--approximately 300 feet--consisting of sand trapped by the harbor breakwater. In other portions of this reach, the beach is much narrower, with beach characteristics in many locations determined by shoreline protection structures. While much of the shoreline is heavily protected with various types of shore protection structures, certain unprotected or poorly protected locations are susceptible to erosion problems, including bluff toe erosion, debris fall, and slump at the top of the bluff.[19] The Keillor-DeGroot study identified bluff recession rates of less than two feet per year throughout most of this reach, although a rate of almost six feet per year was identified at one location.[20] A long-term recession rate of one foot per year was identified at two locations in this reach, while a long-term rate of almost three feet per year was identified at a third location (see Figure 2).

Reach 6: Reach 6 extends from the northern portion of Shoop Park in the Village of Wind Point, Racine County, into the southernmost portion of the City of Oak Creek in Milwaukee County. Bluffs rise to heights of more than 70 feet above lake level in the northern portion of this reach in Racine County. Short-term recession rates for this reach were by far the highest observed in Racine County under the Keillor-DeGroot study. Extremely high rates of 10 to 14 feet per year were observed in the northern half of this reach from 1968 to 1976.

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[17]D. M. Mickelson, et. al., Shore Erosion Study: Technical Report--Shoreline Erosion and Bluff Stability Along Lake Michigan and Lake Superior Shorelines of Wisconsin, 1977.

[18]J. Philip Keillor and Robert DeGroot, Recent Recession of Lake Michigan Shorelines in Racine County, Wisconsin, University of Wisconsin Sea Grant Institute, 1978.

[19]Mickelson, op. cit.

[20]The shore erosion study identified somewhat higher short-term recession rates, including rates of three to four feet per year at points in the central and northern portions of this reach and a rate of nine feet per year near the southern end of the reach.

At one point along this reach, the bluff edge receded approximately 112 feet during this eight-year period. Long-term recession rates ranging from one foot to four feet per year have been documented at selected points along this reach (see Figure 2). The shore erosion study indicates that there is evidence throughout most of this reach of shoreline erosion and slope failure, the erosion problem being much more severe in the northern part of the reach. The shore erosion study attributes the severity of the problem in the northern part of the reach to a variety of interrelated factors, as indicated below:

> The most important factors, not necessarily in the order of their importance, are the following: 1) high lake level; 2) narrow beaches, which are a direct consequence of high lake level; 3) general absence of shore protection structures, such as groins, revetments, and seawalls; 4) constant, or at least repeated, attack on the toe of the bluff by waves, due to both narrow beaches and general absence of protective structures; 5) northwest, southeast orientation of the coast and its general concavity to the northeast, which makes it particularly vulnerable to the ravages of winter storm waves from the northeast; 6) steep and moderately high to high bluffs, which are susceptible to rapid failure by debris fall and debris slide when undercut by wave action at the toe; 7) high content of fine-grain constituents (that is, silt and clay) in the bluff sediments, which when wet are susceptible to failure by slump and flow processes; 8) presence of coarser-grained and more permeable layers in the bluff sediments, through which water can move laterally and issue at the bluff face in the form of seeps; and 9) location of the reach (especially the northern part) just to the south of the Oak Creek (Wisconsin Electric Power Company) power plant and its massive groin-like structure that interrupts the north-south longshore current, thereby trapping sand to the north and resulting in sediment starvation of the beach area to the south.

Significance of Bluff Failure

Bluff failure poses serious problems for both developed and undeveloped portions of the Racine County coastline. Of foremost concern in developed areas is the danger to the safety of residents of houses located close to the bluff face and, therefore, subject to the consequences of unexpected, rapid slope failure by sliding or slumping. In addition, slope failure is a threat to both public and private property along certain portions of the Racine County coastline. Some of the most severe erosion hazards in the coastal area are highlighted below:

1. Lake Park Neighborhood--Town of Mt. Pleasant: Bluff erosion poses a threat to public and private property in the Lake Park neighborhood in the Town of Mt. Pleasant, including several residences; a town park and associated fire station; and street ends, including Larson Street, Kenilworth Avenue, Graceland Avenue, Rosalind Avenue, Bryn Mawr Avenue, and Derby Avenue. The Town has had difficulty funding the improvements required to stabilize this area.

2. City of Racine: Two reaches have been identified as particularly subject to shoreline erosion in the City of Racine. One is the coastal reach between William Street and Augusta Street, north of the City of Racine Zoo. The City has applied for U. S. Army Corps of Engineers assistance in installing shoreline protection measures along this reach. The second

is a reach extending from 14th Street to a point south of 16th Street--the erosion problems here being associated with a gap in the harbor breakwater to the east. Erosion problems in this area are presently under study by the City. The installation of shoreline protection structures here is contingent upon city acquisition of riparian rights associated with private property immediately south of 16th Street.

3. Town of Caledonia: As previously indicated, the highest recession rates in Racine County in the recent past have been observed in the shoreline area designated Reach 6, in the northeastern portion of the Town of Caledonia. This area includes the Town of Caledonia Lake Michigan Park, the Crestview Subdivision, Cliffside County Park, the National Guard target range, and private open space land. With respect to property damage, the most imminent problem is the threat posed by bluff recession to Lakeshore Drive, to associated utility lines, and, ultimately, to residences within the Crestview Subdivision. Bluff recession, if not controlled, would also decrease the area of Cliffside Park and erode the undeveloped open space lands to the north.

   A general strategy for the abatement of bluff erosion in this area is suggested in the erosion control study recently completed for Racine County under the Wisconsin Coastal Management Program.[21] For the coastal area east of Lakeshore Drive, the study recommends public acquisition of existing private property and subsequent installation of bluff toe protection and groundwater and overland flow collection systems and the regrading of the bluff. In conformance with the study recommendations, the Town of Caledonia has acquired through purchase and donation most of the private property located east of Lakeshore Drive adjacent to the Crestview Subdivision. Efforts to stabilize the bluff in this reach, however, depend on the availability of related funding.

   The approach outlined in the erosion control study for bluff erosion abatement at Cliffside Park and the undeveloped shoreland to the north includes the installation of armor stone revetment, the regrading of the bluff, and the construction of water diversion and collection systems. Racine County has studied the erosion problem at Cliffside Park and has developed several erosion control alternatives. Because of the prohibitive costs of these alternatives and the fact that this erosion hazard area is undeveloped, Racine County has adopted the policy of postponing, at least temporarily, any actions to implement erosion abatement plans. North of Cliffside Park at the National Guard target range site, detailed engineering plans have been completed by the U. S. Department of the Army, Corps of Engineers, for stabilization of the bluff. This effort, which involves the installation of riprap along the bluff toe, is being undertaken to prevent eroding fly ash berms at the National Guard site from entering Lake Michigan waters.

Erosion Hazard Abatement Objectives

After reviewing erosion-related problems and issues along the Racine County Lake Michigan coastal area, the Shoreland Development Management Study Steering Committee adopted the following erosion hazard abatement objectives. In

[21]Owen Ayres & Associates, Inc., Erosion Control Study--Racine, Wisconsin, 1979.

adopting these objectives, the Steering Committee recognized that in Racine County, the abatement of existing and the prevention of new shoreline erosion hazards should involve both structural and nonstructural approaches; that structural approaches are particularly important in protecting already developed areas and can serve to protect valuable open space lands as well; and that nonstructural approaches, particularly development setbacks, are important in protecting new development in rural areas from shoreline erosion and recession and in protecting new development in redeveloping areas from such hazards as well.

1. The minimization of erosion-related hazards to human life and safety and to aquatic life.

2. The minimization of water pollution associated with erosion sedimentation.

3. The reduction of erosion-related damages to already developed public and private property, where economically justified and consistent with environmental considerations.

4. The prevention of additional erosion-related hazards to new development--in presently undeveloped areas and in fully developed areas which are redeveloped for alternative uses in the future.

5. The application of structural shoreline protection measures which are effective, aesthetically pleasing, and properly coordinated with shoreline conditions in adjacent coastal reaches, and which have an expected life appropriate to that of the facilities they are intended to protect.

RECREATIONAL ACCESS

Lake Michigan and the natural resource amenities along much of the Lake Michigan shoreline provide a unique setting for a variety of active and passive resource-oriented outdoor recreational activities, including beach strolling and swimming, camping, nature appreciation and study, fishing, and boating. Certain of these activities, such as swimming, fishing, and boating, are referred to as water-based activities since they are dependent on surface water for their very existence. For other activities, such as camping or picnicking, referred to as land-based activities, the quality of the experience is significantly enhanced by the presence of Lake Michigan and adjacent shoreline resources. Such recreational opportunities are available to the general public in the Lake Michigan coastal area only if there is some form of public access--through public land or private land which is open to the public--directly to Lake Michigan or to the adjacent shoreline area. Because of the many competing land uses, a major coastal concern is the provision of access to facilitate participation by the general public in recreational activities along the Lake Michigan coastal area. This section presents background information on public access to the Lake Michigan shoreland area in Racine County.

Public Access Sites

Existing Sites: Existing public outdoor recreation sites already provide considerable public access to the Lake Michigan coastal area in Racine County. Some sites provide opportunities for water-based activities, including swimming, fishing, and boating, while other sites provide access to lands adjacent

to the lake, without providing direct access to Lake Michigan surface waters. Information on existing, publicly owned outdoor recreation and open space sites within the shoreland development management study area is presented in Table 1 and on Map 3.

As indicated in Table 1, outdoor recreation and open space sites constitute a total of 480 acres, or 20 percent of study area. The combined Lake Michigan shoreline frontage of these sites totals 25,500 feet, representing 34 percent of the total length of the Lake Michigan shoreline in Racine County. City of Racine parks comprise 17,600 feet, or about 69 percent of the total frontage devoted to public outdoor recreation use. Cliffside Park, operated by Racine County, accounts for an additional 3,760 feet, or 15 percent of the total frontage in a public outdoor recreation use. The remaining 4,140 feet, or 16 percent of the total, consists of village and town parklands and a school recreation site.

In addition to the public outdoor recreation sites set forth in Table 1, two sites--a 25-acre parcel owned by the State of Wisconsin and a 50-acre parcel owned by the federal government--represent additional publicly owned open space lands along the Lake Michigan shoreline in the northern portion of Racine County. These sites are used primarily as a target range by branches of the military under the management of the National Guard. While these sites are not generally open to the public, the public ownership does have the effect of preserving these sites in open uses.

While there is considerable public ownership of lakefront land in the study area, especially in the City of Racine, public boating access facilities are relatively limited, being provided at only three sites in the study area. One site is the Pershing Park boat launch site, consisting of six boat launch ramps inside the Racine harbor and associated parking. The other sites are hand-carry boat launch areas at Shoop Park and at the 17th Street park site. It should be noted that, in addition to these sites, there is a hand-carry boat launch site located outside the study area in Washington Park on the Root River in the City of Racine. All existing boat moorings and slips and all facilities for dry storage of boats are provided by private interests. A 1979 boat inventory indicated that there were 588 boats in private marine storage facilities in the Racine harbor and in the Root River east of Marquette Street. This includes 170 boats in slips and moorings in the Racine harbor; 246 boats in slips and moorings in the Root River; and 172 boats in dry dock storage along the Root River.[22] Subsequent to the 1979 inventory, an additional marina--Belle Harbor--was developed along the Root River, providing an additional 80 slips.

Potential Access Sites: The Lake Michigan shoreland area of Racine County is already quite intensively developed and, as a result, there is relatively little open space land which can be acquired and used to provide additional public recreational access to the coastal area. As part of this shoreland development management study, all privately held open space lands in the study area of five acres or more in size were identified in an effort to indicate the extent to which recreational lands within the study area could be increased. This inventory identified sites encompassing a total of 308 acres of privately held open space in the study area. The combined Lake Michigan frontage of these open space lands totals 5,260 linear feet. As shown on Map 4, the remaining open space lands along the Lake Michigan shoreline are concentrated in the

[22]McFadzean, Everly, and Associates, Racine Harbor Management Study, 1980.

Table 1

PUBLIC OUTDOOR RECREATION SITES IN THE SHORELAND DEVELOPMENT MANAGEMENT STUDY AREA: 1981

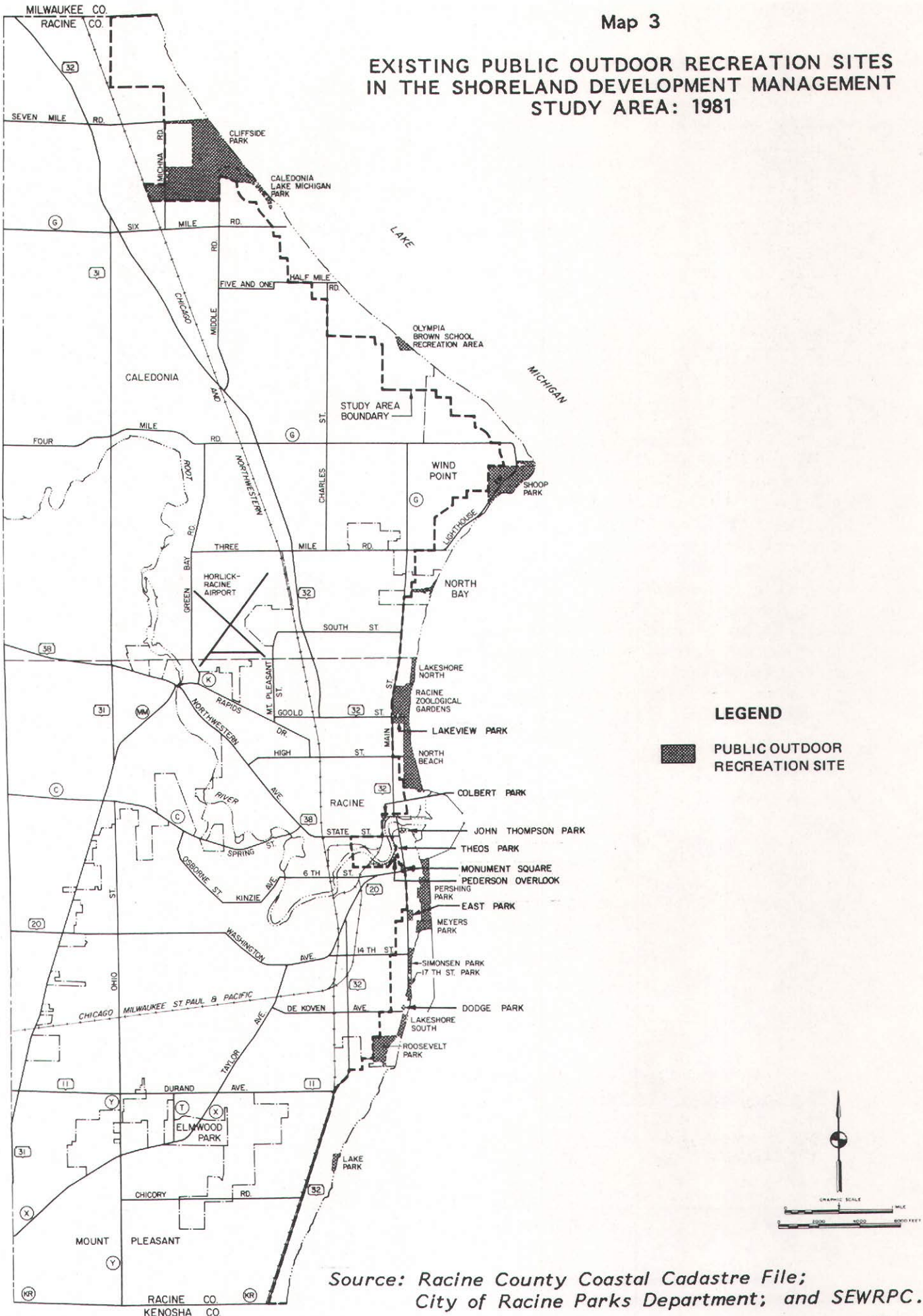
Owner	Site Name	Area (acres)	Frontage on Lake Michigan (feet)
City of Racine	Colbert Park	0.3	--
	Dodge Park	1.3	--
	East Park	2.7	--
	John Thompson Park	0.5	--
	Lakeshore North	3.7	1,280
	Lakeshore South	5.3	1,280
	Lakeview Park	4.5	--
	Meyers Park	7.2	920
	Monument Square	0.6	--
	North Beach	44.7	3,760
	Pershing Park	35.4	3,480
	Pederson Overlook	0.1	--
	Roosevelt Park	17.3	--[a]
	Seventeenth Street Park Site	2.7	1,000
	Shoop Park	63.0	2,960
	Simonsen Park	3.7	1,360
	Theos Park	0.3	--
	Zoological Gardens	32.5	1,560
Village of North Bay	--	4.1	900
Village of Wind Point	--	4.8	300
Town of Caledonia	Caledonia Lake Michigan Park	21.7	1,200
Town of Mt. Pleasant	Lake Park	3.1	800
Racine County	Cliffside Park	213.6	3,760
Racine Unified School District	Olympia Brown School	6.8	940
Total	--	479.9	25,500

[a]The City of Racine sewage treatment plant site which abuts Roosevelt Park on the east provides public access to the waterfront. The sewage treatment plant site has approximately 2,000 linear feet of Lake Michigan frontage.

Source: Racine County Shoreland Cadastral File; City of Racine Parks Department; and SEWRPC.

Map 3

EXISTING PUBLIC OUTDOOR RECREATION SITES IN THE SHORELAND DEVELOPMENT MANAGEMENT STUDY AREA: 1981



LEGEND

PUBLIC OUTDOOR RECREATION SITE

Source: Racine County Coastal Cadastre File; City of Racine Parks Department; and SEWRPC.

northern portion of the coastal area. It should be noted that while sites in this area could provide general public access facilities participation in resource-oriented outdoor recreational activities in a coastal environment, the high bluffs and rapidly changing shoreline limit their potential for providing direct access for water-based activities such as swimming, fishing, and boating.

Additional public access to the Lake Michigan shoreline could also be provided through the redevelopment of older, developed shoreland areas. Consideration of this approach in Racine County is particularly warranted by the intensively developed nature of the coastal area and the difficulty of providing recreational access on remaining undeveloped land. It should be noted that the City of Racine has already acquired shoreland properties inside the harbor breakwater in order to expand public access to the waterfront. Plans for increasing public access, elimination of blighted areas, and beautification of the Lake Michigan waterfront within and adjacent to the harbor area are set forth in a series of plans for the City of Racine, including the central city plan,[23] the Racine harbor management study,[24] and the redevelopment plan for the lake shore development project.[25]

Additional recreational boat access could be provided at several alternative locations along the Lake Michigan shoreline in Racine County. The south shore lakefront development plan, prepared for the City of Racine in 1960, proposed the development of a marina and moorings inside the breakwater south of Pershing Park.[26] More recently, a study by the U. S. Department of the Army, Corps of Engineers, recommended the construction of additional breakwaters in the southwest portion of the Racine harbor and the provision of boats slips, dry storage facilities, and additional launch ramps in this area.[27] The Racine harbor management study, completed in 1980 by a private consultant for the City of Racine, also recommended the expansion of boat access facilities within the Racine harbor area. The harbor management study, however, recommended the provision of additional mooring capacity in the Racine harbor through the use of floating star moorings and experimentation with floating tire breakwaters in the southern portion of the harbor as an alternative to the conventional breakwater proposed by the Corps of Engineers. The harbor management study also recommended the provision of additional boat launch ramps in the Pershing Park-Gateway Technical Institute harbor to supplement the launch ramps inside the Racine harbor, and the provision of additional private boat slips along the Root River. Finally, the recreation activity management study, prepared under sponsorship of the Wisconsin Coastal Management Program for the coastal area adjacent to and including Cliffside Park, indicated that inland marinas could

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[23]Central City Committee, Central City Plan--Racine, Wisconsin, 1975.

[24]McFadzean, Everly, and Associates, Racine Harbor Management Study, 1980.

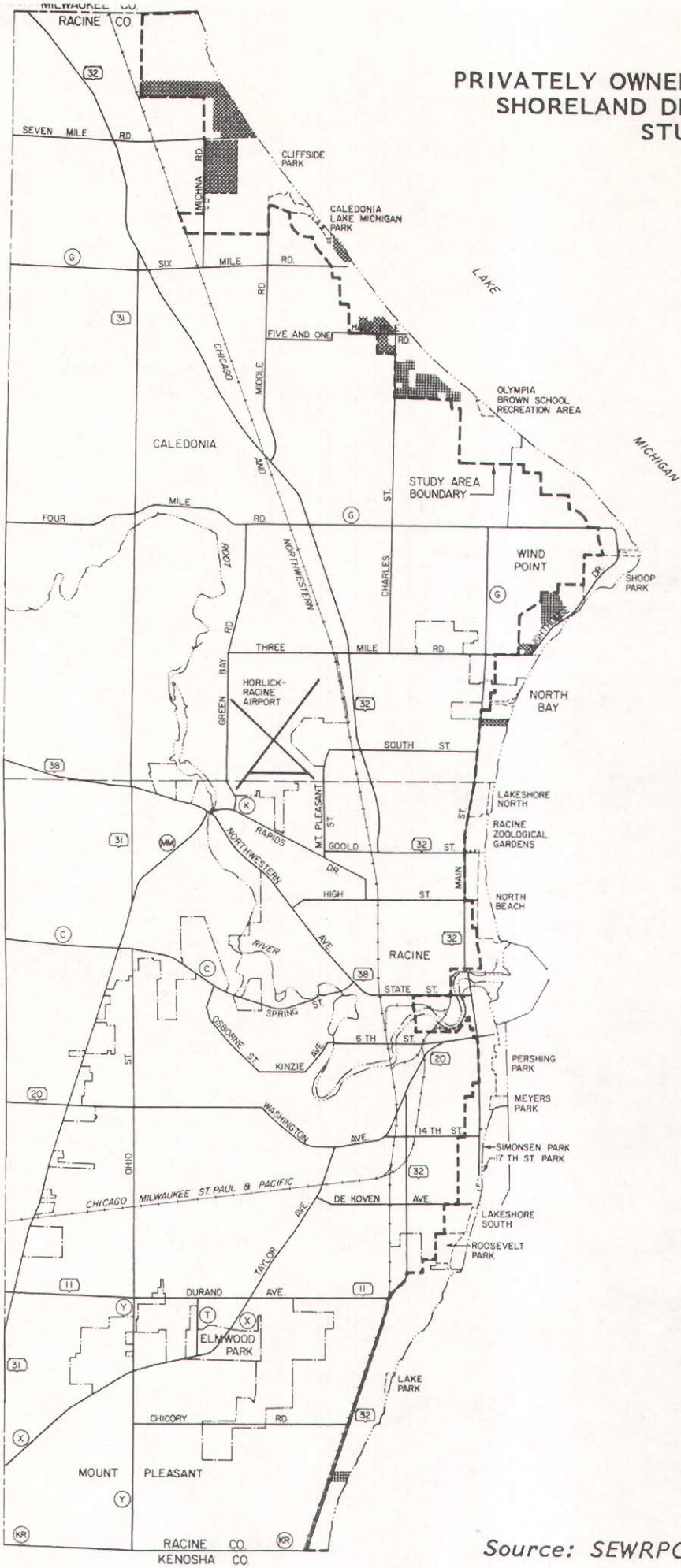
[25]Redevelopment Authority of the City of Racine, Redevelopment Plan--Lakeshore Development Project, 1979.

[26]Ralph H. Burke, Inc., Proposed South Shore Lake Front Development, 1960.

[27]U. S. Department of the Army, Corps of Engineers, Final Environmental Impact Statement, Small Boat Harbor Improvement at Racine Harbor, Wisconsin, 1978.

Map 4

PRIVATELY OWNED OPEN SPACE LANDS IN THE SHORELAND DEVELOPMENT MANAGEMENT STUDY AREA: 1980



LEGEND

PRIVATELY HELD UNDEVELOPED LANDS– FIVE OR MORE ACRES IN SIZE

Source: SEWRPC.

be accommodated at two ravines in this area, with the northern ravine representing the more viable site.[28] Marina development of either site would, however, seriously threaten the very fragile, natural ravine environment of these sites.

In contrast to inland lakes, the ability of Lake Michigan to accommodate recreational boating is determined not by the extent of its surface water, but by the access facilities provided. The provision of additional Lake Michigan boat access facilities is constrained primarily by the high cost of the special facilities required to provide safe recreational boating, such as breakwaters to provide sheltered area during a storm event, and--particularly in the northern shoreland area--by the high bluffs and the rapid shoreline erosion which compound the difficulties of providing recreational boating access facilities.

Recreational Access Needs

Inasmuch as the Lake Michigan shoreline is a recreational resource of regional as well as local significance, it is imperative that any analysis of additional shoreland access needs consider the needs not only of those who live in the coastal area but of the population living well inland. The studies outlined below provide an indication of the need for additional outdoor recreation sites and facilities in Racine County and the overall Southeastern Wisconsin Region. The information provides a useful background for any future planning efforts addressing the need for additional recreational access sites and facilities in the Racine County coastal area.

Outdoor Recreation Needs--Regional Overview: The regional park and open space plan for the year 2000 prepared by the Regional Planning Commission in 1977 indicated that there is a need for a substantial increase in public outdoor recreation sites and facilities to accommodate participation in resource-oriented outdoor recreational activities in the Southeastern Wisconsin Region through the year 2000.[29] This plan, it should be noted, was adopted by the Racine County Board of Supervisors in 1978 and serves as the county park and open space plan. The needs analysis of the regional plan was based upon the application of standards for resource-oriented recreational sites and facilities to anticipated population levels in the entire Southeastern Wisconsin Region. The analysis indicated a need for an additional 5,700 acres of parklands, in the form of large (more than 100 acres) resource-oriented parks in the Region between 1975 and the year 2000. This analysis also indicated a need at the regional level for an additional seven campgrounds, eleven 18-hole golf courses, and five nature centers, as well as for 350 linear miles of recreation trails for such activities as hiking, biking, and nature study. The regional park plan also identified a need for an additional 6,600 linear feet of swimming beaches along the Lake Michigan shoreline in southeastern Wisconsin, as well as a need for an additional 1,310 boat slips and 19 additional boat launch ramps to facilitate recreational boating on Lake Michigan.

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[28]Owen Ayes & Associates, Inc., Recreation Activity Management Study--Racine, Wisconsin, 1979.

[29]See SEWRPC Planning Report No. 27, A Regional Park and Open Space Plan for Southeastern Wisconsin: 2000, 1977.

Forecast of Outdoor Recreation Activity Levels--Racine County: A 1977 study by the University of Wisconsin-Extension Recreation Resources Center provides information on the levels of participation in resource-oriented outdoor recreational activities anticipated in Racine County through the year 1990.[30] While the study indicates that participation levels may be expected to increase substantially, it does not identify the corresponding increase in outdoor recreation sites and facilities that will be required to accommodate the anticipated increase.

Forecasts of participation in selected resource-oriented outdoor recreational activities, prepared by the Recreation Resources Center, are presented in Table 2. The forecast data indicate that level of participation, in terms of the number of occasions, anticipated for each activity in Racine County on an average summer weekend day. Also indicated is the breakdown of participation by resident and nonresident status, with residents consisting of all participants who live in Wisconsin, and nonresidents consisting of out-of-state participants. It is important to note that the recreational activity participation forecasts presented in Table 2 relate to the entire County. Boating and fishing participation data, for example, pertain to the participation in boating and fishing on both Lake Michigan and inland surface waters in Racine County.

As indicated in Table 2, participation in recreational boating in Racine County is expected to increase rapidly, with boating activity on Lake Michigan and inland surface waters combined expected to triple between 1970 and 1990. Participation in four other activities is expected to more than double between 1970 and 1990, including fishing (151 percent increase); camping (132 percent increase); hiking (146 percent increase); and sightseeing (116 percent increase). The smallest relative increase--61 percent--is anticipated for beach swimming. The lower growth rate for beach swimming can be attributed to, among other factors, the increase in opportunities for pool swimming, increased participation in other recreational pursuits, and increasing concern for water quality at many beach sites.

As further indicated in Table 2, out-of-state residents account for a considerable portion of all participation in major recreational activities in Racine County. On an average weekend day in 1970, out-of-state residents accounted for more than one-half of all participation in fishing (57 percent), camping (85 percent), and hiking (51 percent) in Racine County. Nonstate residents accounted for 39 to 42 percent of all participation in swimming, sightseeing, and boating in Racine County in 1970.

Boat Access Facility Needs: The rapid increase anticipated in recreational boating activity combined with the difficulty and expense of providing additional boating access facilities on Lake Michigan warrant special consideration herein of the need for additional access facilities. The U. S. Department of the Army, Corps of Engineers, has conducted an extensive investigation of the need for additional recreational boating access facilities along the western shoreline of Lake Michigan between the Illinois-Wisconsin state line and the Kewaunee-Door County line in Wisconsin. Projections of additional demand for recreational boating access facilities, prepared by the Corps of Engineers, are presented in Table 3. These data refer to "excess demand," which is defined by

[30] Ayse Somerson and Michael Neuman, Impacts of Recreation Within the Coastal Area: Demand and Supply of Recreation in Wisconsin's Coastal Counties, 1977.

Table 2

PARTICIPATION IN SELECTED OUTDOOR RECREATION ACTIVITIES IN RACINE COUNTY: ACTUAL 1970 AND FORECAST 1980 AND 1990

Activity	Participation in Terms of Occasions on an Average Summer Weekend Day									
	1970 Actual					1980 Forecast				
	Resident		Nonresident			Resident		Nonresident		
	Number	Percent	Number	Percent	Total (number)	Number	Percent	Number	Percent	Total (number)
Boating.....	1,543	57.9	1,122	42.1	2,665	3,311	57.6	2,442	42.4	5,753
Fishing.....	939	43.4	1,227	56.6	2,166	1,709	43.0	2,265	57.0	3,974
Swimming.....	6,641	60.7	4,294	39.3	10,935	8,573	60.4	5,622	39.6	14,195
Camping.....	326	15.3	1,807	84.7	2,133	559	15.1	3,141	84.9	3,700
Hiking.....	1,365	48.8	1,433	51.2	2,798	2,760	48.4	2,939	51.6	5,699
Sightseeing.....	3,475	61.3	2,192	38.7	5,667	5,604	61.0	3,585	39.0	9,189

Activity	Participation in Terms of Occasions on an Average Summer Weekend Day						
	1990 Forecast					Forecast Change 1970-1990	
	Resident		Nonresident				
	Number	Percent	Number	Percent	Total (number)	Number	Percent
Boating.....	4,797	57.9	3,482	42.1	8,279	5,614	210.7
Fishing.....	2,361	43.4	3,080	56.6	5,441	3,275	151.2
Swimming.....	10,699	60.8	6,906	39.2	17,605	6,670	61.0
Camping.....	756	15.3	4,185	84.7	4,941	2,808	131.6
Hik ng.....	3,354	48.8	3,515	51.2	6,869	4,071	145.5
Sightseeing.....	7,492	61.4	4,718	38.6	12,210	6,543	115.5

NOTE: Residents consist of participants who live in Wisconsin; nonresidents consist of out-of-state participants.

Source: University of Wisconsin-Extension, Recreation Resources Center.

Table 3

EXCESS DEMAND FOR RECREATIONAL BOATING FACILITIES AT HARBORS ON LAKE MICHIGAN BETWEEN KENOSHA AND KEWAUNEE, WISCONSIN: ESTIMATED 1972 AND FORECAST 1980-2000

Year	Excess Demand for Recreational Boating Facilities							
	Racine and Kenosha Harbors				Other Harbors Between Kenosha and Kewaunee			
	Existing Harbor Sites[c]		Four Additional Harbors[d]		Existing Harbor Sites[c]		Four Additional Harbors[d]	
	Berths	Launch Lanes	Berths	Launch Lanes	Berths	Launch Lanes	Berths	Launch Lanes
1972[a]	160	5	120	4	230	10	270	11
1980[b]	440	13	310	10	1,040	28	1,170	31
1990[b]	770	17	540	12	1,860	48	2,090	53
2000[b]	1,015	21	700	15	2,565	58	2,880	64

[a] Estimate.

[b] Forecast.

[c] Estimated and forecast excess demand, assuming that no additional harbors-of-refuge are developed along Lake Michigan between Kenosha and Kewaunee.

[d] Estimated and forecast excess demand, assuming that four additional harbors-of-refuge are developed along Lake Michigan between Kenosha and Kewaunee.

Source: U. S. Army Corps of Engineers.

the Corps as the demand which would be generated if the supply of facilities were increased while the cost of using the facilities was not increased. It should be noted that the demand data for the Kenosha and Racine harbors were presented in combined form by the Corps of Engineers. It should also be noted that for each year, two excess demand figures are presented, one indicating excess demand assuming that no additional harbors are built and the other indicating excess demand assuming that four additional harbors are built in the Corps study area.

As indicated in Table 3, the Corps estimated that there was a demand for an additional 120 to 160 berths and 4 to 5 launch lanes at Kenosha and Racine harbors combined in 1972. Corps projections indicated that by 1980, demand for additional facilities beyond the 1972 level would range between 310 and 440 berths and between 10 and 13 launch lanes. For the year 2000, the Corps projects a demand for an additional 700 to 1,015 berths and 15 to 21 launch ramps, depending on the extent of facilities developed at other Lake Michigan harbors. The aggregate excess demand for Racine and Kenosha was sufficiently large for the Corps to recommend the development of a marina with approximately 200 slips and an expanded launch area in the Racine harbor. The Corps of Engineers is presently preparing a detailed plan for recreational boating and marina facilities in the Kenosha harbor.

The Regional Planning Commission conducted a telephone survey of existing marinas in the Racine harbor and along the Root River in 1981. All operators responding to the survey indicated they had extensive waiting lists for slips.

Indeed, some operators indicated that they had more names on their waiting lists than the total number of slips available; none of the operators contacted indicated any difficulty in renting out all available spaces.

Recreational Access Objectives

After reviewing the recreational access problems and issues in the Racine County Lake Michigan coastal area, the Shoreland Development Management Study Steering Committee adopted the following recreational access objectives. In adopting these objectives, the Steering Committee recognized that the Lake Michigan shoreline is a recreational resource of regional significance and that opportunities to recreate within a coastal environment should be available not only to residents living in proximity to the Lake Michigan shoreline but to inland residents as well. Finally, the Steering Committee recognized that recreational access to the Lake Michigan shoreline can be provided along undeveloped portions of the coast--although such areas are rapidly becoming scarce--as well as along fully developed areas through appropriate redevelopment.

1. The provision of public outdoor recreation sites and facilities within the Lake Michigan shoreland area to meet, insofar as practicable, existing and future Lake Michigan shoreland recreational access needs, recognizing that Lake Michigan and its shoreland area are recreational resources of regional significance which should be available for recreational use not only to the resident population of the shoreland area, but also to others who desire to recreate within a coastal environment.

2. The enhancement of public access to the lakefront as part of any redevelopment activities undertaken to renew fully developed portions of the coastal area.

3. The provision of recreational boating access facilities by public and/or private interests to meet anticipated needs in a manner which is consistent with environmental conditions as well as with the fiscal limitations of the sponsoring agency.

NATURAL RESOURCE BASE

The proper management of the natural resource base is essential to the maintenance of a healthy environment for all forms of life in any area and to the maintenance of an area's cultural and natural heritage and beauty. The most important remaining natural features of the shoreland development management study area are located between Wind Point and the northern county line. It is important to recognize, however, that the entire Lake Michigan shoreland, including the fully developed area, has underlying ecological, scenic, and recreational value. The preservation of the remaining environmentally significant natural areas in the northern portion of the Racine County coast and the management of fully developed shoreland areas in a manner which recognizes these underlying values is a major concern within the shoreland development management study area.

The principal elements of the natural resource base of the study area are surface waters, floodlands, wetlands, woodlands, and wildlife habitat areas. Scenic viewpoints and historic sites, while not strictly a part of the natural resource base, are closely linked to the underlying resource base and are, therefore, considered herein as well.

Natural Resource Base Elements

Surface Waters: Surface water resources, consisting primarily of Lake Michigan but also of the Root River and other minor streams tributary to Lake Michigan, form a particularly important element of the natural resource base of the study area. Their contributions relative to the economic development, recreational activities, and aesthetic quality of the study area, and of Racine County, are immeasurable. As previously indicated, Racine County's shoreline along Lake Michigan measures 14.4 miles in length. The study area also contains that portion of the Root River estuary from the mouth of the Root River to the Marquette Street bridge, as well as all or portions of two unnamed perennial streams and eight unnamed intermittent streams.

Both inland surface waters and Lake Michigan are susceptible to deterioration as a result of the activities of man. Lake Michigan water quality, for example, is affected by the many discharges from streams and watercourses, industrial waste outfalls, sewage treatment plant outfalls, separate and combined sewer flow relief devices, storm sewer outfalls, and direct surface runoff from adjacent lands. While Lake Michigan continues to provide a good source of potable water with adequate treatment, pollution of Lake Michigan surface waters can restrict recreational opportunities in the lake. For example, while there has been an increase in recreational fishing activity on Lake Michigan, the Wisconsin Department of Natural Resources has prescribed limitations for the human consumption of chubs, large trout, and salmon taken from Lake Michigan because of the presence and accumulation of chemical toxins in the fish. A more detailed discussion of the water quality levels of and sources of water pollution to Lake Michigan and streams and rivers tributary to the lake is found in Lake Michigan Estuary and Direct Drainage Area Subwatersheds Planning Program Prospectus, published by the Regional Planning Commission in 1978.

Floodlands: Floodlands of a river or stream are typically wide, gently sloping areas contiguous with, and usually lying on both sides of, the river or stream channel. Rivers and streams occupy the channels most of the time. However, during even minor flood events, stream discharges increase markedly such that the channel is not able to convey all the flow, and, as a result, stages increase and the river and stream spread laterally over the floodlands.

For planning and regulatory purposes, floodlands are normally defined as the areas, excluding the channel, subject to inundation by the 100-year recurrence interval flood event. This is the event that would be reached or exceeded in severity on the average of once every 100 years. Flood hazard areas along the Root River were identified by the Regional Planning Commission under the Root River watershed planning program, while flood hazard areas along other streams in the study area have been delineated in flood insurance studies conducted by the Federal Emergency Management Agency for the City of Racine, the Village of Wind Point, and the unincorporated area of Racine County. Floodlands identified along the Root River and along other streams within the study area encompass a total of 13 acres, or only 0.6 percent of the study area. Within the study area, floodlands are found along the Root River at two locations--one east of the Marquette Street bridge and the other east of the Main Street bridge; along an unnamed stream located south of the Crestview Subdivision in the Town of Caledonia; and along two unnamed streams within the Village of Wind Point. Flooding along one of the streams in the Village of Wind Point--the unnamed

stream which drains into Lake Michigan south of Shoop Park--may be attributed in part to the accretion of sand along the Lake Michigan shoreline at this point, which occasionally blocks the mouth of the stream.

It is important to note that portions of the Racine County coastal area are also subject to inundation as a result of high lake levels. The aforementioned flood insurance studies identify a narrow band along the Lake Michigan shoreline which is subject to inundation by Lake Michigan on the average of once every 100 years. This band includes those lands lying below 583.9 feet National Geodetic Vertical Datum (mean sea level datum), but does not include lands above this elevation subject to storm wave runup which could occur during the 100-year event.

Woodlands: While relatively scarce, woodlands remain an important natural resource within the shoreland study area.[31] In addition to contributing to clean air and water, woodlands contribute to a diversity of plant and animal life in association with human life and can thereby provide important educational and recreational opportunities. Woodlands covered about 121 acres, or 5 percent of the total study area, in 1980. As shown on Map 5, virtually all remaining woodlands in the study area are located in Cliffside Park, in adjoining Caledonia Lake Michigan Park, and in areas north and west of these parks. It should be noted that certain woodland tracts identified on Map 5 extend beyond the study area. Woodland areas located immediately adjacent to, but outside, the study area encompass a total of 48 acres.

It is important to note that existing woodlands can be destroyed through mismanagement in a short time, thereby contributing to the siltation of streams and the destruction of wildlife habitat areas. Woodlands should be maintained for their total value--scenic, wildlife habitat, educational, recreational, and watershed protection.

Wetlands: Wetlands are defined as areas in which the water table is at, near, or above the land surface, and are characterized both by hydric soils and by the growth of hydrophytes such as sedges, cattails, and willows. Wetland areas like woodland areas, are relatively scarce within the study area, covering 44 acres, or 2 percent of the total study area. As shown on Map 5, the remaining wetlands are located primarily along streams in the portion of the coastal area between Wind Point and the Crestview Subdivision.

Wetlands have important natural functions which make them valuable resources. For example, wetlands contribute to the maintenance of good water quality by serving as traps which retain nutrients and sediments, thus preventing them from reaching streams and lakes. They also provide essential breeding, nesting, resting, and feeding grounds and predator escape cover for many forms of fish and wildlife. In recognition of these important environmental functions, it is important that efforts be made to protect the few wetlands remaining within the study area.

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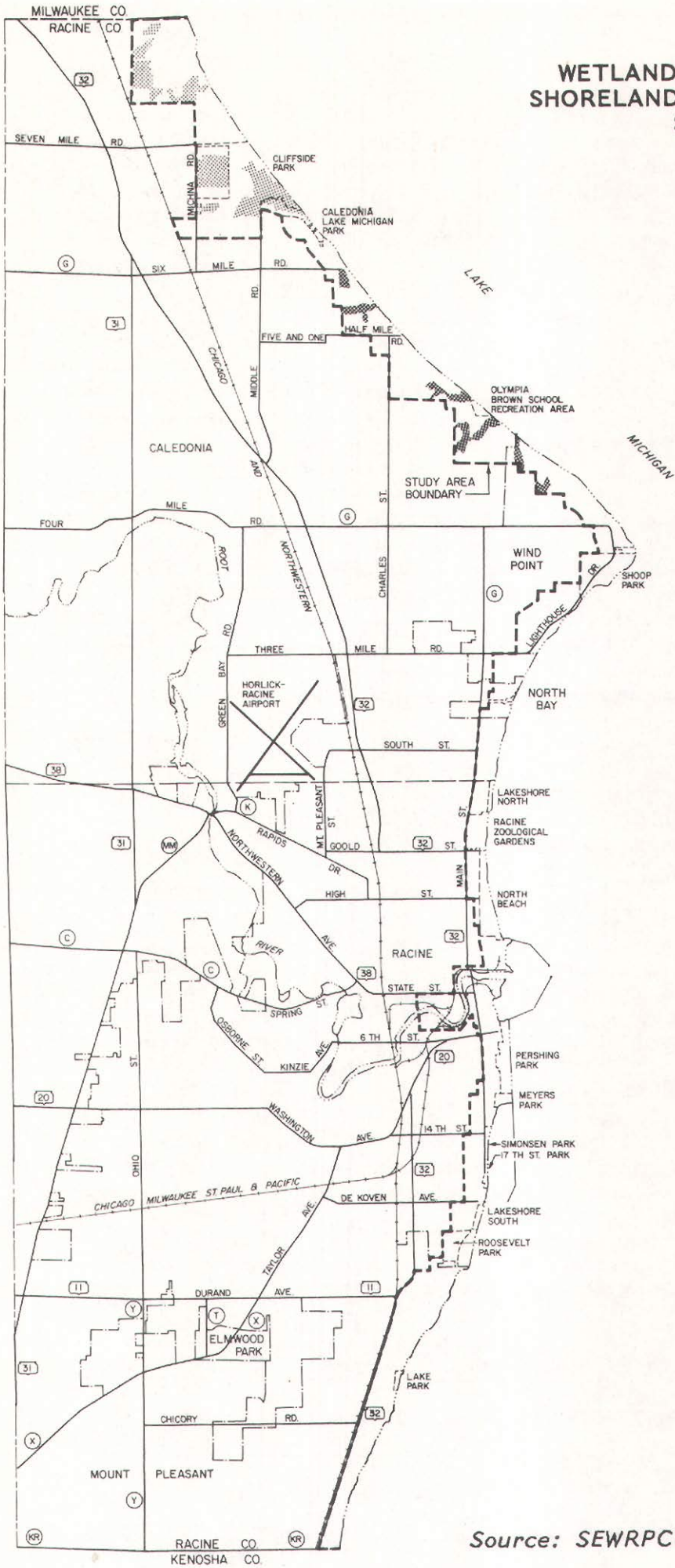
[31]Woodlands are defined by the Regional Planning Commission as those upland areas one acre or more in size having 17 or more deciduous trees per acre, each measuring at least four inches in diameter at breast height, and having 50 percent or more tree canopy coverage. In addition, coniferous tree plantations and reforestation projects are identified as woodlands by the Commission.

Map 5

WETLANDS AND WOODLANDS IN THE SHORELAND DEVELOPMENT MANAGEMENT STUDY AREA: 1980



LEGEND

- WETLANDS
- WOODLANDS

Source: SEWRPC.

Wildlife Habitat: Inventories of wildlife habitat were carried out cooperatively for the entire Southeastern Wisconsin Region by the Wisconsin Department of Natural Resources and the Regional Planning Commission in 1963 and 1970. In these inventories, wildlife habitat areas were categorized as high-, medium-, or low-value areas. High-value habitat areas contain a good diversity of wildlife, are adequate in size to meet all the habitat requirements for the species concerned, and are generally located in proximity to other habitat areas. Medium-value wildlife habitat areas generally lack one of the three above-mentioned criteria for a high-value wildlife habitat area. However, they do contain a good plant and animal diversity. Low-value habitat areas are remnant in nature in that they generally lack two or more of the three above-mentioned criteria for a high-value wildlife habitat, but may, nevertheless, be important if located in proximity to other high- or medium-value wildlife habitat areas, if they provide corridors linking higher value wildlife habitat areas, or if they provide the only available range in the area.

The woodland and wetland areas described above contain virtually all the remaining wildlife habitat in the study area. The woodland areas shown on Map 5 contain most of the medium-value wildlife habitat in the study area as identified in the 1970 wildlife habitat inventory. Wildlife in the area includes, among other species, gray squirrel, rabbit, chipmunk, raccoon, opossum, woodchuck, fox, and deer.[32] The remnant wetland areas along the streams just north of Wind Point contain the remaining low-value wildlife habitat within the study area. No high-value wildlife habitat was identified in the study area in the 1970 inventory.

It should be noted that, although not categorized as a wildlife habitat area in the 1970 inventory, the entire Lake Michigan shoreline has major importance associated with the migration movements of song birds, waterfowl, shore birds, gulls, terns, and raptors (hawks and owls).[33]

Natural Resource Base-Related Elements

Historic Sites: Historic sites comprise an important element of the unique cultural heritage of Racine County and the Southeastern Wisconsin Region. An inventory of historic sites maintained by the State Historical Society of Wisconsin identified a total of 114 historic sites within the shoreline development management study area in 1979. Regional Planning Commission analysis indicates that 102 sites, or 89 percent of the total, consist of historic structures; four sites, or 4 percent of the total, consist of archaeological features; and eight sites, or 7 percent of the total, consist of other cultural features. One-half of the identified historic sites within the study area are concentrated in the City of Racine between 8th Street and Dekoven Avenue. Because of the concentration of historic sites, this portion of the study area and adjacent portions of the City of Racine were designated a historic district--the Southside Historic District--and this district was recognized on the National Register of Historic Places in 1977.

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[32]Owen Ayres & Associates, Inc., Ecological Study--Racine County, Wisconsin, 1979.

[33]Donald R. Thompson, et al., Fish and Wildlife Habitat Study--Wisconsin Great Lakes Shoreline, 1976.

Scenic Viewpoints: A scenic viewpoint is defined by the Regional Planning Commission as a vantage point from which a diversity of natural features can be observed. A special inventory of scenic viewpoints was conducted by the Comsion in 1979. Three basic criteria were applied in identifying such viewpoints: 1) the variety of features viewed should exist harmoniously in a natural or rural landscape: 2) there should be one dominant or particularly interesting feature, such as a river or lake, which serves as a focal point of the scenic area; and 3) the viewpoint should permit an observation area from which the natural features can be viewed. With the aid of topographic maps, areas with a relief of 30 feet or more and a slope 13 percent or more were identified. Areas of steep slopes so identified having a ridge of at least 200 feet in length and a view of significant natural resources within approximately one-half mile of the ridge were identified as scenic viewpoints.

The following scenic viewpoints along coastal reaches in the study area were identified under the Commission inventory: an almost continuous reach from Chicory Road extending to Pershing Park; a continuous reach from Five and One-Half Mile Road to the northern county line; and a short reach along North Beach in the City of Racine.

Natural Areas: Natural areas, as defined by the Wisconsin Scientific Areas Preservation Council, are tracts of land or water so little modified by man's activity, or sufficiently recovered from the effects of such activities, that they contain intact native plant and animal communities believed to be representative of the presettlement landscape. The Wisconsin Department of Natural Resources, Scientific Areas Section, conducted an inventory of natural areas for Racine County in 1974 and updated that inventory for the Lake Michigan coastal area in 1980. These inventories resulted in the identification of a single natural area in the shoreland development management study area meeting the state criteria--namely, the Crestview Ravines and Banks. This site is classified as a Natural Area of Local Significance.[34] Such areas, by definition, are areas which have been modified by man's activities but nevertheless retain a modest amount of natural cover. These areas are suitable for local educational use and may be expected to increase in value if protected in an undisturbed condition.

Environmental Corridors

The Environmental Corridor Concept: One of the most important tasks completed under the Regional Planning effort was the identification and delineation of those areas in southeastern Wisconsin in which significant concentrations of

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[34]Under the Scientific Areas Preservation Council classification system, natural areas are classified into one of the following categories: State Scientific Area, Natural Area of Statewide or Greater Significance, Natural Area of Countywide or Regional Significance, and Natural Area of Local Significance. The classification is based upon a consideration of the 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 man's activities; the commonness of the plant and animal communities present; any unique features within the area; the size of the area; and the area's educational value.

recreational, aesthetic, ecological, and cultural resources occur and which, therefore, should be preserved and protected. Such areas normally include one or more of the following seven elements of the natural resource base which are essential to the maintenance of both the ecological balance and natural beauty of the Region: 1) lakes, rivers, and streams and their 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. While the foregoing elements comprise the integral parts of the natural resource base in southeastern Wisconsin, there are five additional elements which, although not 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 five additional elements are: 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 areas.

The delineation of these 12 natural resource and natural resource-related elements on a map results in an essentially linear pattern of relatively narrow, elongated areas which have been termed "environmental corridors" by the Commission. Primary environmental corridors include a wide variety of the above-mentioned important resource and resource-related elements and are, by definition, at least 400 acres in size, two miles in length, and 200 feet in width.

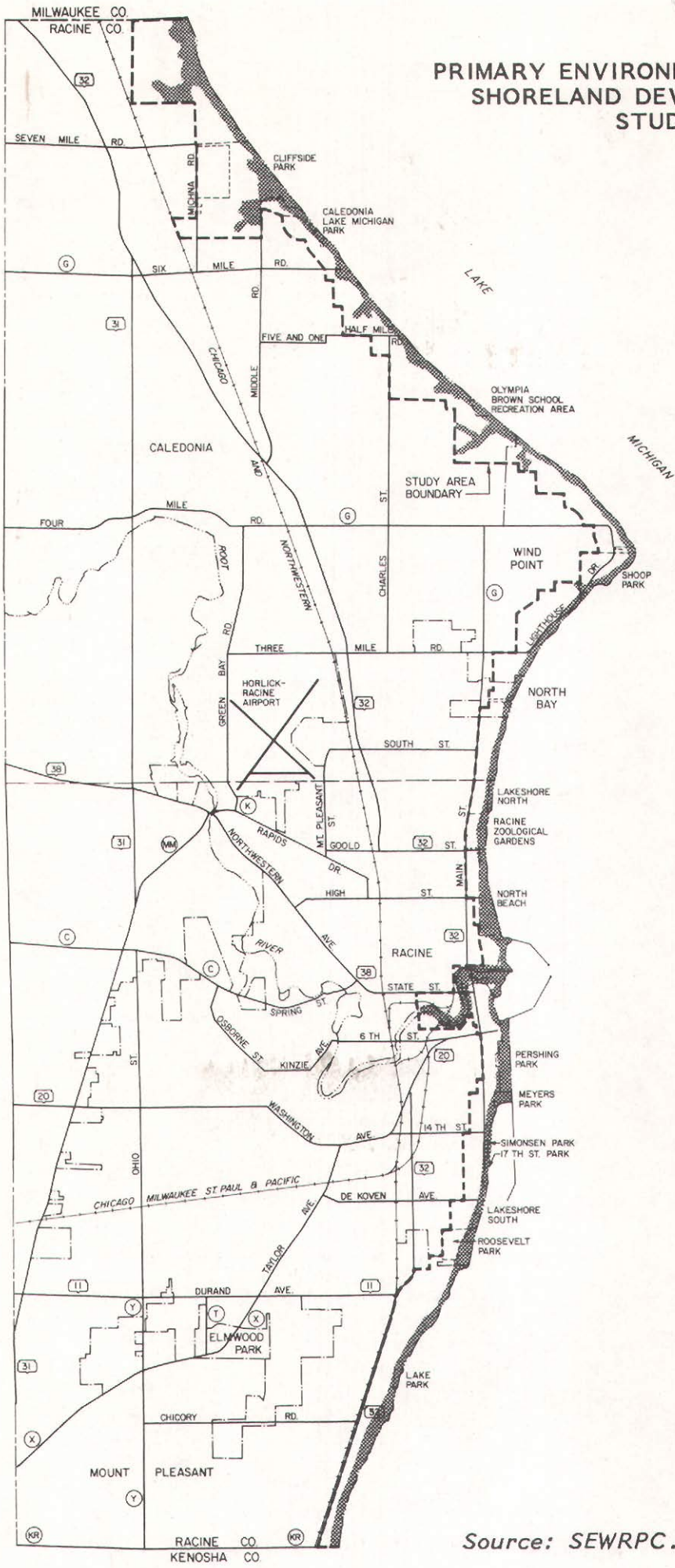
The primary environmental corridors of southeastern Wisconsin generally lie along major stream valleys and major lakes, and in the Kettle Moraine area. Primary environmental corridors contain all of the remaining high-value woodlands, wetlands, and wildlife habitat areas; all of the major bodies of surface water and associated floodlands and shorelands; and many of the best remaining potential park sites. They are, in effect, a composite of the best individual elements of the natural resource base of southeastern Wisconsin, having truly immeasurable environmental and recreational value.

Primary Environmental Corridors Within the Study Area: As shown on Map 6, a single continuous primary environmental corridor has been identified along the Lake Michigan shoreline within the shoreland development management study area. This corridor includes a shoreland area extending 200 feet inland from the edge of the bluff where the bluff is within 200 feet of the lake itself. Where the bluff is more than 200 feet from the lake, the environmental corridor area was delineated as a band 200 feet in depth from the edge of the beach. This corridor includes many of the parks, historic sites, and scenic viewpoints previously identified in the shoreland development management study area. In addition, the primary environmental corridor includes a narrow shoreline area on both sides of the Root River within the study area, as well as most of the wetlands and woodlands along the streams in the study area north of Wind Point. The primary environmental corridor shown on Map 6 encompasses 702 acres, or 30 percent of the total study area.

While much of the Lake Michigan shoreline in Racine County is held in public outdoor recreation use, a considerable portion of the shoreline area has been developed in residential, commercial, industrial, and other intensive urban uses. A primary environmental corridor has, nevertheless, been delineated along the entire Lake Michigan shoreline in recognition of the invaluable natural resource which Lake Michigan represents. The delineation of this environmental corridor recognizes that the Lake Michigan shoreland, including the intensively

Map 6

PRIMARY ENVIRONMENTAL CORRIDORS IN THE SHORELAND DEVELOPMENT MANAGEMENT STUDY AREA: 1980



LEGEND

PRIMARY ENVIRONMENTAL CORRIDOR: 1980

Source: SEWRPC.

developed portions, is a unique area which conditions, and is conditioned by, Lake Michigan and which, because of its proximity to the lake, has important recreational, aesthetic, and ecological values. It should be noted that even intensively developed coastal reaches typically include a narrow band of undeveloped shoreland. Furthermore, the amount of open space land within the identified primary environmental corridor may potentially be increased through the conversion of fully developed but declining areas to open space use, thereby contributing to a more natural coastal environment. Regional plans call for the preservation in essentially natural, open space uses of all remaining undeveloped lands within the identified primary environmental corridors. Regional plans also suggest that, as fully developed areas within primary environmental corridors along Lake Michigan become obsolete or otherwise ready for redevelopment, consideration be given to uses that would enhance the quality of the corridor, that would contribute to the continuity of the corridor, and that would be compatible with the underlying recreational, aesthetic, and ecological values of the Lake Michigan shoreland.

Natural Resource Base Preservation Objectives

After analyzing the various components of the natural resource base along the Lake Michigan shoreline, the Shoreland Development Management Study Steering Committee adopted the following natural resource base preservation objectives. In adopting these objectives, the Steering Committee recognized that the remaining environmentally significant natural areas in the Lake Michigan shoreland area of Racine County are relatively scarce; that this scarcity enhances the importance of these remaining environmentally significant natural areas; and that all of the Lake Michigan shoreland--including the intensively developed portions--has basic underlying aesthetic, recreational, and ecological value.

1. The preservation of the remaining environmentally significant open space lands for the protection of the underlying and sustaining natural resource base and enhancement of the social and economic well being and environmental quality of the study area and the balance of Racine County, particularly through the preservation of remaining nonurban land within the designated primary environmental corridors in essentially natural, open uses.

2. The appropriate management of fully developed shoreland areas--particularly those intensively developed portions of the primary environmental corridor which are obsolete or for which redevelopment is otherwise imminent--to ensure the proper consideration of the innate ecological, aesthetic, and recreational values in the future use of such areas.

LAND USE

The management of land use within the coastal area is a complex task requiring consideration of many interrelated factors. Some of these factors were discussed in the sections of this chapter on shoreline erosion, the provision of adequate public access, and the deterioration of the natural resource base. This section presents additional information on the existing land use base and discusses certain additional land use management considerations within the coastal area.

Existing Land Use

The type and spatial distribution of land uses existing within the shoreland development management study area in 1980 are summarized on Map 7. This map illustrates existing development at this given point in time and shows that a significant portion of the study area--1,435 acres, or 61 percent of the total area--was devoted to intensive urban uses in 1980, including residential; commercial; industrial; transportation, communication, and utility; and governmental and institutional uses. Recreational uses comprised an additional 396 acres, or 17 percent of the total area. The largest single urban use is residential land use, which encompassed 688 acres, or 29 percent of the total study area. The transportation, communication, and utilities category, consisting primarily of streets, off-street parking, railroad rights-of-way, and utility lands, totaled 370 acres, or 16 percent of the study area. The remaining urban categories--commercial, industrial, and governmental and institutional--in combination accounted for 377 acres, or 16 percent of the study area (see Table 4).

Table 4

EXISTING LAND USE IN THE SHORELAND DEVELOPMENT MANAGEMENT STUDY AREA: 1980

Land Use Category	Land Use	
	Acres	Percent of Total
Residential	688	29.2
Commercial	47	2.0
Industrial	132	5.6
Transportation, Communication, and Utilities[a]	370	15.7
Governmental and Institutional	198	8.4
Recreational[b]	396	16.8
Wetlands	44	1.8
Woodlands	121	5.1
Agricultural and Other Open Lands	325	13.8
Water	37	1.6
Total	2,358	100.0

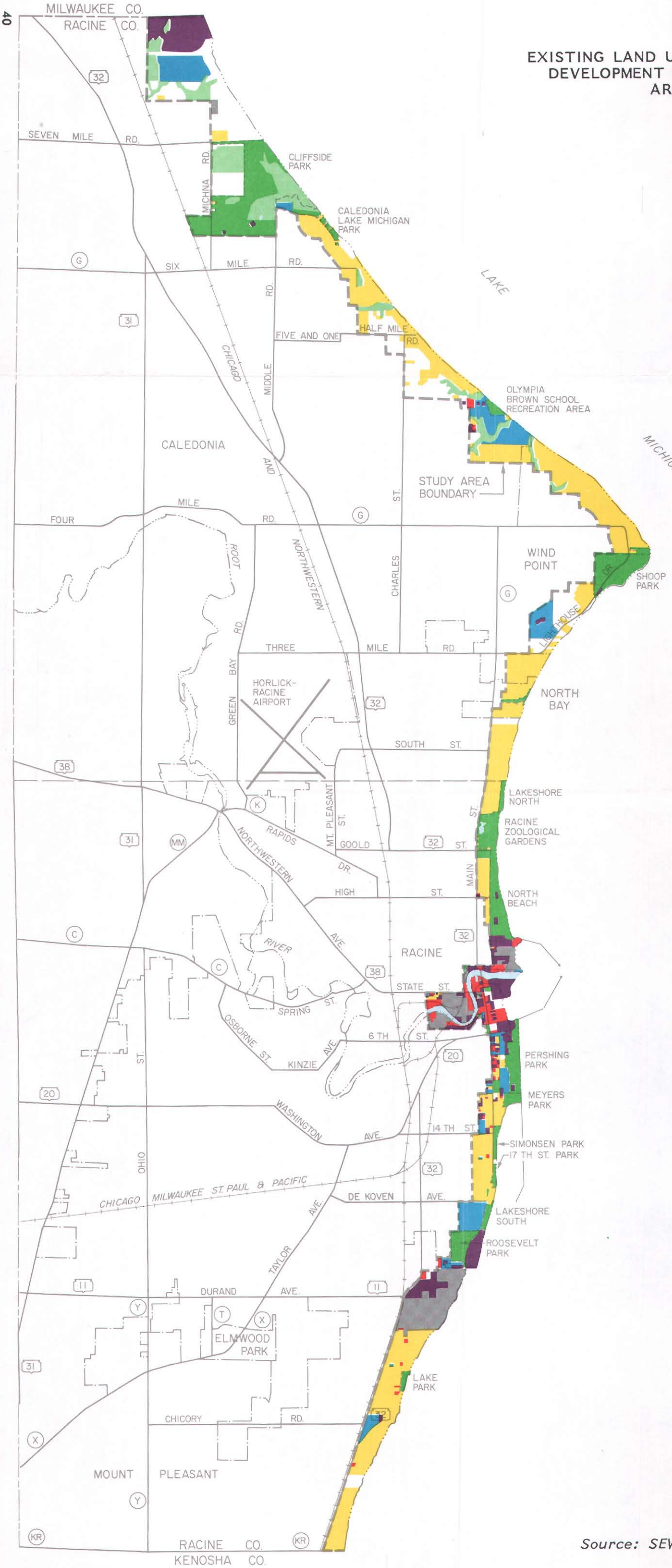
[a] Includes off-street parking, terminals, communication facilities, and utilities.

[b] Excludes wetlands, woodlands, and off-street parking within existing park and outdoor recreation sites. Public park and outdoor recreation sites within the study area encompass a total of 480 acres (see Table 1).

Source: SEWRPC.

Map 7

EXISTING LAND USE IN THE SHORELAND DEVELOPMENT MANAGEMENT STUDY AREA: 1980



LEGEND

- RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL
- TRANSPORTATION, COMMUNICATION, AND UTILITIES
- GOVERNMENTAL AND INSTITUTIONAL
- RECREATIONAL
- WETLANDS AND WOODLANDS
- WATER
- AGRICULTURE AND UNUSED LANDS

GRAPHIC SCALE
0 1/2 1 MILE
0 2000 4000 6000 FEET

Source: SEWRPC.

As further shown on Map 7, most of the remaining undeveloped lands are located in the northern portion of the study area. Remaining undeveloped land, including wetlands, woodlands, and agricultural and other open lands, encompasses 490 acres, or 21 percent of the study area. Surface water, consisting primarily of the Root River, accounts for the balance--37 acres--of the total study area.

Future Land Use

The extent of urban land in the Lake Michigan shoreland area of Racine County indicates that the coastal area provides an attractive setting for many types of development. Because of the many competing land uses and because the Lake Michigan coastal area is a limited resource of immeasurable value, it is necessary that basic priorities be established to indicate those types of land uses which should be encouraged as appropriate within the coastal area--including currently undeveloped areas and existing fully developed areas which may be redeveloped in the future.

In general, uses which are most appropriate to the shoreland--in particular, to lakefront property and adjacent property having a view of Lake Michigan--are those which significantly benefit from, or are significantly enhanced by, a shoreland location; which are not precluded by the flooding, erosion, and recession hazards which exist in the area; which can readily accommodate public access to the shoreland area; which maintain or enhance the beauty of the shoreland environment and related scenic viewpoints; and which restore, maintain, or at least do not unduly impair the natural resource base. After careful consideration, the Steering Committee determined that the following land uses were generally consistent with the foregoing criteria regarding appropriate future shoreland development:

1. Park and open space use.

2. Residential use--in particular, residential development which is designed to maintain lakefront vistas and to incorporate public access to the waterfront, insofar as practicable. In currently undeveloped areas, very low-density residential development on lots of five acres or more in size is an appropriate use.

3. Lakefront-oriented commercial, governmental, and institutional uses--in particular, those designed to maintain lakefront vistas and to provide public access to the waterfront.

The foregoing list is not intended to be exhaustive, nor is it implied that these uses are equally suitable for any given shoreland location. Rather, careful evaluation of each development proposal will be necessary to determine its comformance with other shoreland objectives set forth in this chapter and with basic local development needs and goals.

Conservation and Revitalization of Developed Areas

As noted above, about 61 percent of the shoreland area is developed in residential, commercial, industrial, and other intensive urban uses, and an additional 17 percent is in public outdoor recreation use. Much of the existing urban development is quite old; the central portion of the study area between the

Racine Zoological Gardens and DeKoven Avenue, for example, was already fully developed by 1900. Such older urban areas need to be conserved and renewed if they are to continue to provide housing, employment, and shopping opportunities and if they are to enhance the coastal environment.

Exterior structural condition surveys of buildings in the older, central portions of the City of Racine were conducted as part of the Northside Redevelopment Project in 1973[35] and the central city plan in 1974.[36] The survey conducted as part of the central city plan indicated that about 9 percent of the structures in the overall central city plan area are in need of repair and that an additional 9 percent are in need of major rehabilitation and, possibly, demolition. Many of these deteriorated structures are located in the shoreland development management study area, immediately south of the Root River. The Northside Redevelopment Project identified approximately 20 structures as being in need of major repair or in dilapidated condition within the shoreland study area north of the Root River, as well as many additional substandard structures within the balance of the Northside redevelopment study area immediately adjacent to, but outside, the shoreland study area. Additional documentation of the condition of structures within the central portion of the City of Racine, including the shoreland development management study area, is presented in SEWRPC Planning Report No. 14, A Comprehensive Plan for the Racine Urban Planning District, Volume One, Inventory Findings and Forecasts, 1970.

It is important to note that considerable progress has been made in terms of planning for the conservation and revitalization of older, fully developed areas within the shoreland study area and the rest of the central city of Racine. In addition to the central city plan and Northside Redevelopment Project, a southside revitalization plan has been prepared. This plan, completed in 1970, provides a guide for the conservation and renewal of the southeastern portion of the City of Racine and an adjacent portion of the Town of Mt. Pleasant.[37] In addition, the harbor management study, mentioned earlier in this chapter, provides an overall plan for the renovation and beautification of the land adjacent to the Racine harbor, north and south of the Root River.

Land Use Objectives

After analyzing the existing land use base within the study area, the Shoreland Development Management Study Steering Committee adopted the following land use development, redevelopment, and management objectives:

1. The allocation of shoreland areas to uses which significantly benefit from, or are significantly enhanced by, a shoreland location; which are not precluded by the flooding, erosion, and recession hazards which exist in the area; which can readily accommodate public access to the shoreland area; and which maintain the beauty of the shoreland environment and related scenic vistas.

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[35]Fitzhugh Scott Architects/Planners, Inc., Northside Redevelopment Plan, 1974.

[36]Central City Committee, Central City Plan--Racine, Wisconsin, 1975.

[37]Llewelyn-Davis, Southside Revitalization Study, 1970.

2. A spatial distribution of land uses within the shoreland area which would result in a compatible interrelationship of diversified land uses.

3. A spatial distribution of the various land uses in the shoreland area which will result in the protection and wise use of the natural resources of the coastal area.

4. The conservation and revitalization of fully developed areas within the shoreland study area in order to maintain existing housing, shopping, and employment opportunities and to enhance the coastal environment.

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Chapter III

SHORELAND DEVELOPMENT MANAGEMENT FRAMEWORK ANALYSIS AND RECOMMENDATIONS

INTRODUCTION

There are a variety of measures, both regulatory and nonregulatory, by which local, county, state, and federal units and agencies of government can regulate or otherwise influence development in the Lake Michigan shoreland area of Racine County in the public interest. In combination, these measures can be viewed as an overall shoreland development management framework. The purpose of this chapter is to analyze this existing management framework and to determine whether and how it might be improved to better achieve the broad shoreland management objectives recommended by the Shoreland Development Management Study Steering Committee and set forth in Chapter II of this report. The focus of this analysis is on county and local units of government, although state and federal government regulations affecting the shoreland area are also considered.

This chapter analyzes the existing management framework within the context of the four major coastal concerns identified by the Steering Committee as discussed in Chapter II--namely, Lake Michigan shoreline erosion, the provision of public access to the Lake Michigan shoreland area, the preservation of the natural resource base of the Lake Michigan shoreland area, and various land use-related concerns. Several recommendations are made which are intended to address any weaknesses identified in the existing management framework.

OVERVIEW OF THE EXISTING SHORELAND DEVELOPMENT MANAGEMENT FRAMEWORK

County and Local Regulatory Framework

Under Wisconsin Statutes, county and local units of government have been granted a variety of regulatory powers which can be used to guide development within the Lake Michigan shoreland area in the public interest. Among the most important of these are zoning and land subdivision regulations.

Zoning ordinances regulate the use of land and, in addition, regulate such aspects of development as the size of lots and the placement of structures on lots. Zoning ordinances are presently in effect in each of the five minor civil divisions which have jurisdiction in the Lake Michigan coastal zone area of Racine County. The City of Racine, the Villages of North Bay and Wind Point, and the Town of Mt. Pleasant have adopted and currently administer their own zoning ordinances. The Town of Caledonia has adopted the Racine County zoning ordinance, which is administered for the Town of Caledonia by the Racine County Planning and Zoning Department. It should be noted that the Village of Wind Point is currently in the process of preparing a new zoning ordinance and zoning district map.

In addition to comprehensive zoning regulations, the City of Racine, the Village of Wind Point, and Racine County have adopted special floodland regulations which serve to limit filling and development within 100-year recurrence

interval flood hazard areas. Racine County floodland regulations apply to floodlands throughout the entire unincorporated area of the County. As indicated in Chapter II, 100-year recurrence interval flood hazard areas along the Root River were identified by the Regional Planning Commission under the Root River watershed planning program, while flood hazard areas along other streams in the study area have been delineated under flood insurance studies conducted by the Federal Emergency Management Agency for the City of Racine, the Village of Wind Point, and the unincorporated area of Racine County. These flood insurance studies also identify a narrow band along the Lake Michigan shoreline which is subject to inundation by the lake on the average of once every 100 years, and which is also subject to existing county and local floodland regulations.

Racine County has also adopted shoreland zoning regulations which impose special restrictions on the location of certain structures and set forth restrictions on tree cutting, filling, grading, and certain agricultural practices within shoreland areas of Racine County. County shoreland regulations apply within unincorporated areas of Racine County to those lands lying within 1,000 feet of the ordinary high water mark of navigable lakes, ponds, and flowages and 300 feet of the ordinary high water mark of navigable streams, or to the landward side of the floodplain, whichever is greater.

Subdivision control ordinances regulate the division of larger tracts of land into lots for development. The City of Racine and the Village of Wind Point have each adopted subdivision control ordinances. Racine County adopted a subdivision control ordinance in 1956, which, under Wisconsin Statutes, regulates land subdivision within the entire unincorporated area of the County. Under Wisconsin Statutes, towns may adopt subdivision control ordinances which parallel, or are more stringent than, the county subdivision control ordinance. The Town of Caledonia has adopted a subdivision control ordinance, while the Town of Mt. Pleasant has not. The Town of Caledonia subdivision control ordinance adopts by reference the Racine County subdivision control ordinance and sets forth local requirements for land developers with respect to the construction and financing of public improvements. It should be noted that Racine County is in the process of preparing a new subdivision control ordinance; the 1956 ordinance will remain in effect until the new ordinance is adopted. It should also be noted that the general applicability of existing subdivision control regulations within the shoreland area is limited because of the relative scarcity of undeveloped land, with remaining undeveloped lands being concentrated, to a large extent, in the Town of Caledonia.

State and Federal Regulatory Framework

The State of Wisconsin and the federal government have long been involved in the management of water resources. Historically, state and federal water management activities have been related to the protection of public rights on navigable waters, while more recently water quality has become an important management concern. Of particular concern in the shoreland development management study are the means by which state and federal agencies regulate various activities affecting the protection of the Lake Michigan shoreline.

The U. S. Department of the Army, Corps of Engineers, is the primary federal agency responsible for the regulation of structures and work related to surface waters. Initial Corps of Engineers authority to regulate structures or work in or affecting navigable waters stems from the River and Harbor Act of

1899. Corps of Engineers regulatory authority was expanded with the passage of the Federal Water Pollution Control Act amendments of 1972. Section 404 of this act authorized the Corps to administer a permit program to regulate the deposition of dredged and fill materials into waters and related wetlands of the United States. The State of Wisconsin, through the Wisconsin Department of Natural Resources, regulates shore protection-related activities under the provisions of Chapter 30 of the Wisconsin Statutes. State regulatory authority with respect to shore protection and erosion control projects is largely confined to projects initiated at or below the ordinary high water mark. A more detailed discussion of state and federal regulatory measures is presented later in this chapter.

Nonregulatory Framework

Local, county, state, and federal units and agencies of government can also act to achieve shoreland development objectives through numerous nonregulatory measures. For example, the public sector can install shore protection structures to reduce the impacts of shore erosion processes, if sufficient resulting benefit to the public can be shown. Public acquisition of land, in whole or in partial interest, can be used to ensure the permanent preservation of significant environmental lands, particularly within urbanizing areas. Such nonregulatory measures for achieving shoreland development management objectives are also discussed in this chapter.

SHORELINE EROSION

The previous chapter of this report analyzed the erosion hazards along the Lake Michigan shoreline in Racine County and set forth related broad erosion hazard abatement objectives. There are various measures, both regulatory and nonregulatory, available to concerned agencies and units of government by which these objectives can be achieved.

Erosion Hazard Abatement: Regulatory Measures

Local, state, and federal units of government have been granted a wide range of authority by which to guide shoreland development activity in the interest of preventing and reducing erosion hazards and of maintaining the quality of the coastal environment. Local units of government have primary responsibility for the management of land use within shoreland areas above the ordinary high water mark in the interest of erosion hazard abatement. Regulation of the coastal system at or below the ordinary high water mark is the combined responsibility of local, county, state, and federal units and agencies of government. This section discusses existing regulatory powers and describes the manner in which such powers are currently utilized to minimize erosion hazards, with particular emphasis on county and local regulations.

County and Local Regulatory Framework: Shoreland zoning regulations, comprehensive zoning regulations, and subdivision control ordinances represent the most important means by which county and local units of government can regulate shoreland areas in the interest of minimizing erosion hazards. Shoreland zoning provides county governments with a solid basis for managing land use in a manner which serves to minimize erosion hazards within unincorporated

shoreland areas. Cities and villages can rely on comprehensive zoning and subdivision control regulations to manage their shorelands in a manner which serves to minimize abatement of erosion hazards. Cities and villages may also enact shoreland zoning regulations, similar to county shoreland zoning regulations, and include therein provisions to minimize shoreline erosion hazards.

To effectively address shoreline erosion problems, local land use controls--including shoreland zoning, comprehensive zoning, and subdivision control ordinances--should be used to restrict or prohibit uses which are susceptible to erosion damage within erosion hazard areas; to require special review of structural shore protection devices to ensure that they are properly designed and installed; and to regulate any land disturbance within the shoreland area which may increase erosion.[1] The application of land use controls to prevent new development from occurring in erosion hazard areas and to regulate land disturbances which may increase erosion is particularly important within undeveloped shoreland areas. It is, for example, more cost-effective and environmentally sound to ensure that new development is safely sited outside the erosion hazard area than to allow additional development within the hazard area, thereby necessitating subsequent shore protection measures. While preventive controls are less applicable to fully developed shoreland areas, such areas should be regulated as they become ready for redevelopment to prevent the repetition of past mistakes. Finally, it should be noted that the regulation of shoreline erosion protection devices is important in undeveloped areas, and may be important in fully developed areas as individual riparian owners replace or improve existing shore protection structures.

Minimizing Erosion Hazards Through Zoning--County and local zoning powers--including general comprehensive zoning and special shoreland zoning regulations--represent important means of minimizing Lake Michigan erosion hazards. An important initial step in the application of zoning powers to minimize erosion hazards is the identification of an erosion hazard area. An erosion hazard area may be defined as that portion of the shoreland which may be expected to be subject to loss through erosion during a specified time period. This area can be identified through an analysis of past shoreland recession rates, exposure of the shoreline to storm waves, and bluff characteristics, including soil composition, surface and subsurface drainage, bluff height and slope, and vegetative cover. The key policy decision in the identification of the erosion hazard area is the length of time over which erosion hazard projections should be made. In general, the longer the projection period, the deeper the erosion hazard area.

Within the erosion hazard area, zoning ordinances should prohibit residential, institutional, commercial, and industrial buildings which are permanent in nature unless it is demonstrated that the site will be effectively protected through structural shore protection measures. Septic tank systems should be prohibited inasmuch as they may increase unstable slope conditions by adding moisture or weight to the bluff. Permitted uses in erosion hazard areas generally include open space uses, buildings accessory to other uses which can be readily moved, and minor improvements such as walkways and fences. Zoning regulations should also regulate any land disturbance within the erosion hazard area which may increase erosion problems, such as filling, grading, removal of trees and shrubs, removal of beach material, and removal of topsoil or loss of topsoil due to faulty drainage.

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[1]D. A. Yanggen, Regulations to Reduce Coastal Erosion Losses, 1981.

Finally, zoning powers can be used in erosion hazard areas to regulate shore protection devices. Zoning ordinances may, for example, stipulate that all shoreline protection structures--such as breakwaters, groins, and riprap--are conditional uses, whether carried out above or below the ordinary high water mark. Zoning powers can be used to regulate the installation and modification of shore protection devices and can require the maintenance of such devices once they are installed. Regulation of shore protection structures by local units of government can help to prevent adverse impacts, such as the acceleration of erosion rates on nearby reaches or unsightly filling activities, which may otherwise result.

Erosion Hazard Provisions of Existing Zoning--As previously indicated, Racine County presently exercises shoreland zoning powers within statutory shoreland zoning jurisdiction areas of the Towns of Caledonia and Mt. Pleasant, including the area lying within 1,000 feet of the ordinary high water mark of Lake Michigan. Certain provisions of the county shoreland zoning ordinance serve to minimize erosion hazards along the Lake Michigan shoreline. Most importantly, the county shoreland ordinance has the effect of making virtually any man-made alteration of a shoreland zoning area a conditional use subject to county review and approval. Specifically, earth movements such as grading, top soil removal, filling, root cutting, construction, altering, or enlargement of waterways, removal of stream or lake bed materials, excavation, and soil and water conservation structures--among other activities--are designated conditional uses within the shoreland area. As a result, conditional use permits must be obtained for the construction of new buildings, the installation of shore protection structures, and most other alterations of the shoreland area. In its shoreland conditional use review process, Racine County attempts to ensure that new structures are safely sited with respect to erosion hazards, that shore protection structures are well designed and environmentally sound, and that alterations of the shoreland in general do not increase shore erosion hazards. All applications for conditional use permits within the shoreland area are referred as a matter of course to the Racine County Soil and Water Conservation District office. In addition, Racine County may seek review comments from the Wisconsin Department of Natural Resources, the University of Wisconsin Sea Grant Institute, the U. S. Army Corps of Engineers, and the Technical Subcommittee of the Racine County Coastal Management Program Technical Advisory Committee.

The county shoreland zoning ordinance also establishes a setback of 400 feet from the ordinary high water mark for all structures except public utilities, recreational facilities, single-family homes, and existing water-oriented commercial uses. The residential uses and the water-oriented commercial uses allowed within this 400-foot setback are subject to the 100-foot minimum shore yard requirement of the comprehensive county zoning ordinance. The comprehensive zoning ordinance also specifies, however, that shore yards may be reduced to the average of the shore yards existing on abutting properties, but cannot be less than 50 feet.

While the conditional use permit requirements of the county shoreland zoning ordinance serve to minimize erosion hazards, the shoreland zoning requirements could be made more effective if they included development setback requirements which are directly related to erosion hazards for specific reaches along the shoreline. As noted in Chapter II, short-term recession rates along the Lake Michigan shoreline in the unincorporated area of Racine County vary significantly, ranging from less than 1 foot to 14 feet per year. The setback required to ensure the safe siting of additional structures in shoreland areas

thus varies considerably from reach to reach. The development of such setback requirements involves the determination and mapping of erosion hazard areas on a reach-by-reach basis, based on a consideration of past erosion rates, bluff characteristics, and exposure to storm waves, as noted above. Once developed, the setback requirements and related construction standards could be made an integral part of shoreland zoning regulations. This approach could significantly strengthen the County's position in regulating the location of new structures in the interest of preventing additional erosion hazards.

Racine County shoreland zoning regulations could also be made more effective by specifying, in as much detail as practicable, the factors which the County considers in reviewing conditional use permit applications for shore protecting activities. The shoreland regulations could be expanded to indicate the general design criteria--such as the stable bluff slope, the slope of protective revetments, and the provisions for bluff drainage--which the County considers in its review process. The shoreland regulations could, moreover, establish requirements for shore protection structure maintenance. The Technical Subcommittee of the Racine County Coastal Management Program Technical Advisory Committee, which was established by Racine County to investigate a number of shoreline erosion-related concerns, could assist the County in codifying these design and maintenance considerations. Any such effort should be properly coordinated with other shoreline permit review agencies--namely, the Wisconsin Department of Natural Resources and the U. S. Army Corps of Engineers.

The zoning ordinances of the City of Racine and the Villages of North Bay and Wind Point are generally devoid of provisions pertaining to Lake Michigan shoreline erosion hazards. These municipalities have not adopted special shoreland zoning regulations, as Racine County has done, nor have they incorporated special erosion hazards regulations into their comprehensive zoning ordinances. The City of Racine and the Village of Wind Point, however, have each adopted floodland zoning regulations which restrict filling and development within 100-year recurrence interval flood hazard areas within the respective communities. The regulations apply to the Lake Michigan shoreline below the highest lake level elevation that might be expected during a 100-year period. These regulations provide a basis for the local regulation of filling or development--including the installation of shore protection devices such as groins or revetments--below this elevation.

Even though most of the incorporated portion of the study area is already intensively developed, the adoption of shore erosion-related zoning regulations--either through the modification of existing comprehensive zoning or through the adoption of special shoreland zoning regulations--may be useful in minimizing erosion hazards. Such zoning could, for example, control the expansion of any existing structures which are subject to erosion damages, and regulate new development in the remaining undeveloped shoreland areas and in declining areas which are redeveloped for alternative uses, in order to prevent the creation of new erosion hazards. In addition, zoning regulations could be used to strengthen the local regulation of structural shore protection activities, including the installation of new, and the maintenance and replacement of existing, shore protection structures such as groins and shoreline revetments. In this regard, it is important to recall that local units of government are primarily responsible for the management of shoreland areas above the ordinary high water mark and exercise concurrent jurisdiction with the Wisconsin Department of Natural Resources and the U. S. Army Corps of Engineers below the ordinary high water mark. To the extent that shore protection

activities are confined to the area above the ordinary high water mark, they are essentially unregulated within the incorporated portion of the study area, owing to the present lack of local controls.

A determination as to whether there is a need for shore erosion-related zoning provisions within the three incorporated coastal communities requires further study--particularly, the precise mapping of anticipated future erosion hazard areas, based on a consideration of past recession rates, bluff characteristics, and existing shore protection, as described above. Such precise mapping would provide a basis for determining what other types of shore erosion-related zoning controls, if any, are needed within the City of Racine and the Villages of North Bay and Wind Point.

Minimizing Erosion Hazards Through Subdivision Control Ordinances--Subdivision control ordinances can supplement zoning ordinances in the regulation of land use to minimize shore erosion hazards. The following passage from Regulations to Reduce Coastal Erosion Losses[2] indicates how subdivision control ordinances can be used to prevent shore erosion hazards:

> Subdivision regulations can reduce coastal erosion damages by: 1) prohibiting the subdivision of lands subject to serious erosion unless the hazards are overcome; 2) requiring the designation of erosion hazard areas on the plat and the use of deed restrictions to control lands unsuitable for buildings; 3) requiring that each lot provide a safe building site with adequate area to meet the erosion hazard setbacks and other dimensional requirements of the zoning ordinances; 4) ensuring that stormwater drainage, grading, and similar activities which may accelerate erosion are undertaken in a manner compatible with conditions at the site; 5) requiring the subdivider to install reasonably necessary public improvements, including erosion control measures, or provide a surety that the improvements will be installed. . . .

Subdivision control ordinances represent a particularly important means of avoiding the creation of additional erosion hazards where substantial portions of the shoreline are undeveloped. It is again noted that the applicability of subdivision control regulations within the shoreland area of Racine County is limited because of the relative scarcity of undeveloped lands, with remaining undeveloped lands being concentrated primarily within the Town of Caledonia, where the county subdivision control ordinance applies.

As previously noted, Racine County is in the process of preparing a new subdivision control ordinance to replace the present ordinance which was adopted by the County in 1956. In its present form, the preliminary draft of the revised county subdivision control ordinance contains many important regulations not included in the existing ordinance which would contribute to the wise use of the natural resource base of the County. The revised ordinance could be strengthened in certain respects, however, to ensure the avoidance of new shoreline erosion hazards attendant to future Lake Michigan shoreland development. First, the subdivision control ordinance should require that erosion hazard setback lines--previously discussed in the context of shoreland zoning--be shown on land division plat maps. This approach is similar to

[2]Ibid.

the delineation of flood hazard areas on plat maps, as would be required under the revised county subdivision control ordinance. Secondly, the subdivision control ordinance should require that an erosion hazard abatement plan be prepared by the subdivider. In this plan, the subdivider would indicate that all permanent structures would be located outside the erosion hazard setback area or, alternatively, indicate the types of structural shore protection measures that would be installed to justify a smaller setback. Third, the subdivision control ordinance should require that new lots created along the Lake Michigan shoreline be oriented perpendicular to the shoreline. The perpendicular orientation of shoreline lots, in conjunction with appropriate setback requirements, can serve to minimize the threat of shoreline erosion and bluff failure to new shoreline development.[3]

There being relatively little undeveloped land within the shoreland area of the City of Racine and the Villages of Wind Point and North Bay, land subdivision regulations have, as a practical matter, little application to the control of erosion hazards in the incorporated portion of the study area. It should be noted, however, that a review of the subdivision control ordinances of the City of Racine and the Village of Wind Point indicates that there are no specific provisions in these ordinances for the minimization of Lake Michigan shoreline erosion hazards.

State and Federal Regulatory Framework: As previously noted, the State of Wisconsin and the federal government both regulate shore protection activities on the Lake Michigan shoreline. The State of Wisconsin, through the Wisconsin Department of Natural Resources (DNR), regulates the Lake Michigan coastal area primarily below the ordinary high water mark under the provisions of Chapter 30 of the Wisconsin Statutes. For example, Chapter 30 provides for the establishment of bulkhead lines by local units of government and prohibits the deposit of materials or filling at or below the ordinary high water mark or beyond an established bulkhead line. Under Chapter 30, the installation of riprap and shore protection structures at or below the ordinary high water mark requires a DNR permit. DNR permits are also required to grade or otherwise remove soil from the bank of any navigable body of water where the area exposed will exceed 10,000 square feet; this provision, it should be noted, affects the grading of the bank below and above the ordinary high water mark. The latter provision notwithstanding, the overall limited regulatory authority of the Department of Natural Resources above the ordinary high water mark underscores the importance of county and local management of shore protection activities.

It should be noted that the provisions of Chapter 30 relative to the establishment of bulkhead lines or the placement of structures or deposits in navigable waters do not apply to submerged shorelands in Lake Michigan, the title to which has been granted to municipalities by the State. While the State holds in trust the title to the beds of all natural lakes in Wisconsin, the State has granted the title to portions of the beds of Lake Michigan to certain local units of government for specific public purposes. The City of Racine obtained the title to the beds of submerged lands through six different acts of the State Legislature between 1911 and 1967. Some of these areas have been filled; the remaining submerged lands to which the City holds the title consist

[3]A discussion of the proper orientation of lots along the Lake Michigan shoreline is presented in Racine County Shoreland Cadastre Program, published by the Racine County Planning and Zoning Department in 1981.

primarily of the submerged lands along the shoreline between the northern breakwater of the Racine harbor and Melvin Avenue and the submerged lands along the shoreline between Meyers Park and 21st Street.[4] The City of Racine holds most of the adjacent shoreland in public recreation and related uses, and holds the riparian rights to most of the private lakefront properties which remain in these reaches. Submerged lands which have been granted to the City are subject to the regulatory authority of the U. S. Army Corps of Engineers.

The federal regulation of shore protection activities, through the U. S. Army Corps of Engineers, parallels in many respects that of the State. As mentioned earlier in this chapter, Corps of Engineers water regulatory authority stems from the River and Harbor Act of 1899 and the Federal Water Pollution Control Act amendments of 1972. Section 10 of the River and Harbor Act requires that permits be obtained for all structures and work in or affecting navigable waters of the United States, including Lake Michigan. Section 404 of the Federal Water Pollution Control Act of 1972 requires that permits be obtained for the deposition of dredged or fill materials to "waters of the United States," as defined by the U. S. Army Corps of Engineers, including Lake Michigan. Under Section 404, the discharge of fill materials includes, among other things, the placement of fill necessary to the construction of any structure in regulated waters; the building of any structure or impoundment requiring rock, sand, dirt, or other material for its construction; and property protection and/or reclamation devices such as riprap, groins, seawalls, breakwaters, and revetments. Shore protection activities may require both Section 10 and Section 404 permits. Corps of Engineers jurisdiction under Section 10 of the River and Harbor Act extends to the ordinary high water mark of navigable waters; Corps jurisdiction under Section 404 of the Federal Water Pollution Control Act includes wetlands adjacent to regulated waters and extends to the ordinary high water mark of regulated waters in the absence of adjacent wetlands.

Coordination of Regulatory Authority: Because of the overlapping federal, state, county, and local regulatory authority within the Lake Michigan coastal area, it is important that the regulatory functions be coordinated to avoid unduly restricting shoreland development activities--including, importantly, the installation or modification of necessary shore protection structures. In this regard, it should be noted that the Wisconsin Department of Natural Resources and the U. S. Army Corps of Engineers have recently developed a joint state-federal application form for water regulatory permits and approvals. To further facilitate the review/permit process, the Racine County Planning and Zoning Department should serve as the "first contact" agency for all riparian landowners proposing structural shore protection or other work along Lake Michigan at or below the ordinary high water mark. In this capacity, the Department should distribute the state-federal permit application form along with the county conditional use application form as needed, and explain the basic permit application procedures of the respective agencies to concerned riparians. The Department should, moreover, notify the concerned local unit of government of any proposed work. In addition, Racine County should remain receptive to any efforts by the DNR and Corps of Engineers to develop a joint water regulatory permit application form which may be used by counties in the State, as well as by the DNR and Corps of Engineers, in the regulation of shoreland areas.

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[4]Wisconsin Department of Natural Resources, Lake Bed Grants, 1976.

Erosion Hazard Abatement: Nonregulatory Measures

Local, county, state, and federal units of government can also act to minimize Lake Michigan erosion hazards through nonregulatory measures, including structural measures to stabilize eroding areas and the dissemination of information on existing and potential erosion hazards. In addition, the public acquisition of erosion hazard areas can assist in preventing the creation of additional erosion hazards, since public ownership virtually eliminates the possibility of urban encroachment by private development.

Structural Measures to Stabilize Eroding Areas: As indicated in Chapter II, a variety of structural measures are available for the abatement of Lake Michigan shoreline erosion. Structural solutions are particularly important in coastal areas where erosion threatens existing public and private development. Structural solutions vary considerably in terms of their longevity and effectiveness and in terms of their impacts on the coastal environment. A recent inspection of shore protection structures along the Lake Michigan coastline in southeastern Wisconsin indicated that the most long-lasting and effective erosion abatement structures have in general been installed by units of government and by industry.[5]

As further indicated in Chapter II, government-sponsored efforts to stabilize eroding shoreland areas are planned or underway at several locations along the Lake Michigan shoreland in Racine County. The Town of Caledonia has acquired, through purchase and donation, eroding shoreland properties east of Lake Shore Drive adjacent to the Crestview Subdivision, and has formulated a drainage and erosion control plan to stabilize the eroding bluffs. The City of Racine has applied to the U. S. Army Corps of Engineers for assistance in installing shoreline protection structures along an eroding coastal reach north of the Racine Zoological Gardens, and is currently attempting to identify a solution to shore erosion problems along a short coastal reach south of 14th Street. Detailed engineering plans have been prepared by the U. S. Army Corps of Engineers for the installation of bluff toe protection at the National Guard target range site in the Town of Caledonia, and construction is expected to begin in 1982.

Dissemination of Erosion Hazard Information: While there has been a general increase in the public awareness of, and concern for, Lake Michigan shoreline erosion hazards, increased informational efforts directed at riparian landowners and local officials may contribute further to the abatement of shoreline erosion hazards. Lake Michigan riparians need to be made aware of potential erosion hazard situations sufficiently in advance of their occurrence in order to be able to decide on a course of action--whether that course is to undertake shore protection, to relocate threatened structures where this is feasible, or simply to do nothing. A broader base of information regarding Lake Michigan shoreline erosion would also strengthen the capability of local units of government to resolve shoreline erosion problems.

Racine County has, for a number of years, actively explored shore erosion problems and has developed a data base on shoreline erosion. The County has initiated special studies on shore erosion, such as the study of recent bluff recession rates along Lake Michigan by J. PHilip Keillor and Robert DeGroot of

[5]David W. Hadley, Shoreline Erosion in Southeastern Wisconsin, 1976.

the University of Wisconsin Sea Grant Institute.[6] Recognizing that shoreline erosion is a dynamic process, Racine County in 1979 initiated the Coastwatch Program, which involves the continuous monitoring of coastal conditions at selected points along the Lake Michigan shoreline in Racine County and detailed documentation of alterations to the shoreline, climatic conditions, and wave patterns. As previously indicated, the County has also established a Technical Subcommittee of the Racine Coastal Management Program Technical Advisory Committee, and has directed that subcommittee to investigate a number of erosion-related concerns. The Technical Subcommittee is investigating, among other issues, the feasibility of structure relocation as an approach to saving threatened structures, and the cost and longevity of various shore protection structures. It should be noted that the county data base on shore erosion would be significantly enhanced if the County were to undertake the identification and mapping of erosion hazard areas, as previously discussed. Such mapping would identify lands and existing structures which are now threatened, or which may be expected to be threatened, by shore erosion over a specified time period.

If informed more accurately and in advance of potential hazards and alternative strategies, concerned riparian owners and local officials will be more able to address shore erosion problems in an effective manner. It is important, then, that Racine County continue to collect and analyze Lake Michigan shoreline erosion information. The University of Wisconsin-Extension, through its appropriate county extension agent, should assist Racine County in the dissemination of information on Lake Michigan shoreline erosion hazards and alternative erosion hazard abatement strategies to local officials and riparian property owners. The Wisconsin Geological and Natural History Survey, the University of Wisconsin Sea Grant Institute, the Gateway Technical Institute, and the University of Wisconsin-Parkside may also assist in the dissemination of information on Lake Michigan shoreline erosion.

Public Acquisition of Erosion Hazard Areas: Another nonregulatory approach to preventing the creation of new erosion hazard situations available to county and local units of government is the public acquisition of erosion hazard areas. This approach can provide permanent assurance that incompatible urban development will not occur in erosion hazard areas. However, the public purchase of erosion hazard areas solely for the purpose of avoiding erosion damages is not in general use in Wisconsin. Rather, erosion hazard areas are typically purchased for a number of reasons, particularly for the provision of public shoreland recreation sites, when such use can be safely accommodated. A discussion of public acquisition of land for outdoor recreation use in the shoreland area is presented in the next section of this chapter.

Erosion Hazard Abatement Recommendations

After reviewing the existing shoreland development management framework as it relates to Lake Michigan shoreline erosion hazards, the Shoreland Development Management Study Steering Committee formulated the following recommendations for the improved management of eroding shoreland areas.

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[6]J. Philip Keillor and Robert DeGroot, Recent Recession of Lake Michigan Shorelines in Racine County, Wisconsin, University of Wisconsin Sea Grant Institute, 1978.

1. Racine County should undertake a mapping program to identify those Lake Michigan coastal reaches which may be expected to be subject to erosion hazards during a specified time period, based upon a consideration of past shore recession rates, bluff characteristics, extent of existing shore protection, and exposure to storm events. This mapping program should include the entire Lake Michigan shoreline in Racine County and should make full use of previous related work, including, importantly, the shore erosion study, the Keillor-DeGroot study of recent Lake Michigan bluff recession rates, and the findings of the Racine Coastwatch Program.

2. Racine County should incorporate erosion hazard-area setbacks into the county shoreland zoning regulations. The setbacks should reflect the erosion hazards for specific reaches identified in the mapping program recommended above.

3. Racine County, assisted by the Technical Subcommittee of the Racine County Coastal Management Program Technical Advisory Committee, should modify its shoreland zoning regulations to indicate, in as much detail as practicable, the design criteria considered by the County in its and to establish requirements for the maintenance of shore protection structures.

4. In preparing its new subdivision control ordinance, Racine County should include provisions requiring that Lake Michigan shore erosion hazard areas be shown on land division plat maps. In addition, Racine County should include provisions requiring that erosion hazard abatement plans be prepared for any lands which are proposed to be developed and are subject to Lake Michigan erosion hazards, indicating the precautions that will be taken to prevent future erosion hazard situations. Such plans should indicate that residences, commercial buildings, and other permanent structures will be located outside identified erosion hazard areas or, alternatively, indicate the types of shore protection measures that will be installed to justify a smaller setback. Finally, the new subdivision control ordinance should require that new lots created along the Lake Michigan shoreline be oriented perpendicular to the shoreline. The perpendicular orientation of shoreline lots, in conjunction with appropriate development setback requirements, can serve to minimize the threat of shoreline erosion and bluff failure to new shoreline development.

5. Racine County should continue to collect and analyze information on Lake Michigan shoreline erosion hazards and erosion hazard abatement strategies. The County, with the assistance of the University of Wisconsin Sea Grant Institute, has already begun development of a data base on Lake Michigan shoreline erosion. This data base would be significantly enhanced by the proposed effort to identify and map existing and anticipated erosion hazard areas, by the continuation of the county Coastwatch Program, and by the continuation of the work of the Technical Subcommittee of the Racine County Coastal Management Program Technical Advisory Committee as it investigates various shore erosion concerns. The University of Wisconsin-Extension, through its appropriate county extension agent, should assist Racine County in the dissemination of shoreline erosion information to local officials and riparian property owners. Other agencies and institutions which may assist in the dissemination of erosion-related information include the Wisconsin Geological

and Natural History Survey, the University of Wisconsin Sea Grant Institute, the Gateway Technical Institute, and the University of Wisconsin-Parkside.

6. The City of Racine and the Villages of North Bay and Wind Point should determine whether shoreline erosion-related zoning regulations are necessary after an analysis of the results of the recommended county effort to identify and map existing and future erosion hazard areas along the Lake Michigan shoreline in Racine County. Despite the highly developed nature of the Lake Michigan shoreline in the incorporated civil divisions, certain erosion-related zoning provisions may be useful. Zoning powers could, for example, be used to regulate the expansion of existing residences, commercial buildings, and other structures which are subject to erosion hazards; to regulate new development in remaining undeveloped shoreline areas and declining areas which may be redeveloped for alternative uses, in order to prevent the creation of new erosion hazards; and to regulate the installation and modification of structural shore protection devices and to require the maintenance of structural shore protection devices once they are installed. Such shoreline erosion-related zoning regulations could be established as part of local comprehensive zoning ordinances or as special shoreland zoning regulations similar to county shoreland zoning regulations.

7. The Racine County Planning and Zoning Department should serve as the "first contact" agency for all riparian landowners proposing structural shore protection or other work along Lake Michigan at or below the ordinary high water mark. In this capacity, the Department should distribute the state-federal permit application form along with the county conditional use application form as needed, and explain the basic permit application procedures of the respective agencies to concerned riparians. The Department should, moreover, notify the concerned local unit of government of any proposed work. In addition, Racine County should remain receptive to any efforts by the DNR and Corps of Engineers to develop a joint water regulatory permit application form which may be used by counties in the State as well as by the DNR and Corps of Engineers in the regulation of shoreland areas.

RECREATIONAL ACCESS

Chapter II of this report indicated that, while much of the Lake Michigan shoreline in Racine County is publicly owned and accessible to the general public, participation in resource-oriented outdoor recreation activities in the shoreland area and throughout Racine County--and the attendant need for related recreation sites and facilities--may be expected to increase significantly over the next two decades. While a number of studies have been made regarding the recreation potential of specific portions of the county coastline, no detailed plan for public recreation access within the coastal zone area of the County has been prepared. Competition for coastal resources in the face of the relative scarcity of undeveloped land within the coastal area underscores the need for such a plan. Without such a plan, opportunities for the provision of new shoreland recreation sites and facilities may be lost forever. This section outlines the potential scope of a shoreland recreation access study and describes the various measures, both regulatory and nonregulatory, which are available to county and local units of government in implementing a shoreland recreation plan.

Shoreland Recreation Access Study

A shoreland recreation access study should culminate in a plan which can serve as a guide to the County and the local units and agencies of government concerned in the provision of outdoor recreation sites and facilities in the shoreland area. This plan should identify which of the remaining undeveloped shoreland areas should be publicly acquired and developed for public outdoor recreation use. The plan should also address the maintenance and improvement of existing outdoor recreation sites within the shoreland area, as well as the manner in which public access can be enhanced as part of urban redevelopment activities. A shoreland recreation access study should include, at a minimum, the following steps:

1. The refinement and detailing of the broad shoreland recreation access objectives set forth in Chapter II of this report and the development of related standards as appropriate.

2. The identification of existing and anticipated shoreland recreation access site and facility needs; this analysis should recognize the significance of Lake Michigan and its adjacent shorelands as a regional recreational resource and, therefore, consider the needs not only of those who live in the coastal area, but of the population living well inland.

3. The identification and evaluation of existing and potential outdoor recreation sites within the shoreland area. The analysis of existing sites should include an evaluation of the need for site maintenance and renovation. The analysis of potential sites should consider remaining undeveloped shoreland areas and fully developed areas which are declining or otherwise obsolete and potentially available for conversion to alternative uses. The analysis of potential sites should, moreover, identify the feasibility of using existing public lands, such as street-ends along the lake, to increase opportunities for public access to the coastal area.

4. The formulation of a plan to guide the provision of sites and facilities that will meet the identified needs. This plan should be of sufficient detail to guide the acquisition of land by concerned units of government and should recommend specific property acquisition boundaries.

5. The identification of the public costs of implementing the plan, and analysis of the impacts of these costs on county and local government fiscal structure.

6. The identification of the manner in which the plan can be implemented, including an identification of the units and agencies of government responsible for specific plan implementation actions.

A shoreland recreation access study should draw upon, synthesize, and detail, as appropriate, the findings and recommendations of previous studies regarding public access for specific coastal reaches, such as the Racine harbor management study[7] and the recreation activity management study[8] prepared for

[7]McFadzean, Everly, and Associates, Racine Harbor Management Study, 1980.

[8]Owen Ayres & Associates, Inc., Recreation Activity Management Study--Racine, Wisconsin, 1979.

Cliffside Park and adjacent undeveloped lands. The Racine harbor management study, in particular, provides an important framework for the development of a more attractive and accessible system of waterfront parks and recreation areas in the City of Racine. The plan is, however, conceptual in nature and requires detailing and refinement before it can be implemented. The shoreland recreation access study should also incorporate, as appropriate, the findings and recommendations of the park and outdoor recreation plans prepared by a private consultant for the Towns of Mt. Pleasant and Caledonia in 1977. The shoreland recreation access study should, moreover, be properly coordinated and integrated with the shoreland recreation plans of adjacent jurisdictions, including Milwaukee County, the City of Oak Creek, Kenosha County, and the Town of Somers.

A shoreland recreation access study should address site and facility needs for both boating and nonboating recreational activities. Nonboating shoreland recreational activities include activities such as shore fishing and beach swimming, both of which require direct access to the surface waters of Lake Michigan, as well as activities such as hiking, nature study, and picnicking, which do not require direct access to the Lake but which are significantly enhanced by a shoreland environment. Facilities for recreational boating on Lake Michigan warrant special attention under a shoreland recreation access study because of the anticipated increase in Lake Michigan boating activity and because of the high capital outlays involved in providing Lake Michigan recreational boating facilities. As indicated in Chapter II of this report, there have been numerous studies of the feasibility of providing additional Lake Michigan boat access facilities at various points along the Lake Michigan coastline. The shoreland recreation access study would provide an opportunity to synthesize the results of previous studies and to arrive at a concensus among the units and agencies of government concerned regarding the future provision of Lake Michigan boat access facilities. Upon completion and local adoption of a shoreland recreation access plan, local units of government can act to implement the plan through a variety of measures, as described below.

Shoreland Access: Regulatory Measures

Zoning: Local zoning powers can be used to ensure that existing public and private recreation lands remain in outdoor recreation use and that proposed future park and recreation lands remain available for such use until they can be acquired by the appropriate unit of government. Upon completion of the shoreland recreation access study as outlined above, undeveloped lands which are recommended for future outdoor recreation use should be placed in a park and recreation zoning district. Such zoning would serve to protect and preserve the character of existing natural resources, permit the provision of compatible outdoor recreation facilities, and prohibit urban and other incompatible uses. Most of the remaining privately held undeveloped lands within the shoreland development management study area are presently placed in basic zoning districts which permit residential development, and are therefore subject to conversion to intensive urban use. As previously noted, under county shoreland zoning regulations, virtually all forms of urban development within the statutory county shoreland zoning jurisdiction area are conditional uses, subject to county review. This review process does not, however, guarantee that potential outdoor recreation sites will not be developed for intensive urban land uses.

A park and recreation zoning district should also be applied to existing public outdoor recreation sites to ensure that these sites remain in outdoor recreation use. While public outdoor recreation sites are already under public

control, the inclusion of such sites in local park and recreation districts provides added assurance that such lands will not be converted to alternative uses without appropriate public review and scrutiny. At the present time, Cliffside Park is the only public recreation site within the shoreland development management study area which has been placed within a park and recreation district. Lake Park in the Town of Mt. Pleasant has been placed in the Town's Public/Utility Lands District, which has the effect of preserving the site in public or public utility use. The remaining public recreation sites within the study area have been placed in residential, office-institutional, and agricultural districts under existing zoning. Analysis of existing zoning ordinances indicates that the City of Racine and the Villages of North Bay and Wind Point presently do not have park and recreation districts within their respective zoning ordinances. The creation of such a district would be the first step toward properly zoning their existing park and recreation sites.

As a rule, existing private outdoor recreation sites should also be placed in local park and recreation zoning districts. There is, however, only one private outdoor recreation site in the study area--the outdoor recreation facility area associated with the Prairie School in the Village of Wind Point, which is presently in the basic agricultural district and planned unit development overlay district of the village zoning ordinance. In the preparation of its new zoning district map, the Village of Wind Point should place the Prairie School site in an institutional zoning district, in keeping with the primary use of the site as an educational institution.

Subdivision Control Ordinances: Subdivision control ordinances may incorporate provisions for parkland dedication and/or fees in lieu of dedication during the land development process, as well as provisions requiring public access to navigable streams and lakes. The role of subdivision control ordinances in implementing a shoreland recreation access plan would, however, be limited because of the relative scarcity of undeveloped land within the shoreland area. As previously noted, remaining undeveloped lands within the coastal area are concentrated primarily in the Town of Caledonia, and are, accordingly, subject to county subdivision control regulations. The preliminary draft of the county subdivision control ordinance includes requirements not provided for in the present ordinance regarding land dedication for park and open space use. Specifically, the draft ordinance specifies that land be dedicated to the appropriate local municipality for neighborhood park, playground, or open space use at a rate of one acre for every 40 dwelling units, or that the payment of a fee be made in lieu of such dedication. The draft ordinance also requires that subdivisions be designed to provide public access to adjacent navigable streams and lakes at intervals of one-half mile, as required by Wisconsin Statutes. These regulations will facilitate the provision of public outdoor recreation sites throughout Racine County, including, potentially on a limited basis, within the Lake Michigan coastal area.

Shoreland Access: Nonregulatory Measures

Cities, villages, towns, and counties are authorized under the State Statutes to acquire and develop property for park and recreation purposes. Acquisition of property for park and recreation purposes may be accomplished in various ways, ranging from dedication by land developers at the time of platting as described above, to outright purchase of full fee simple or lesser interest by local units of government. The expansion of Lake Michigan shoreland recreation access opportunities may involve the acquisition of fully developed but

declining areas, clearance, and redevelopment for future outdoor recreation use, as well as the acquisition and development of existing undeveloped shoreland areas.

Acquisition through purchase of full fee simple interest in property is the usual means by which local units of government acquire land for park and outdoor recreation purposes. County and local units of government have traditionally relied on state and federal assistance to help finance the acquisition and development of outdoor recreation sites and facilities. As a result of state and federal fiscal constraints, however, the most important of the local recreation aid programs--the state Outdoor Recreation Action Program (ORAP) and the federal Land and Water Conservation (LAWCON) program--are not operative at the present time. The local park aid provisions of the ORAP program recently expired, and no money has been appropriated for local park aids under the LAWCON program for fiscal year 1981-1982.

In view of the scarcity of state and federal park and outdoor recreation aids and the growing fiscal constraints faced by all local units of government, alternatives to the usual purchase of full fee simple interest in land should be explored. Purchase by local units of government of less than fee interest of potential recreation sites may be somewhat cheaper than acquisition of the entire interest, and may accordingly result in more rapid acquisition and use of such lands. Such acquisition of less than fee interest may be in the form of scenic easements for vista protection, or in the form of grants of various access and development rights for construction and use of park facilities. The City of Racine has, for example, secured the right of public access to private shoreline property through negotiation with riparian owners, primarily as part of city efforts to install shore protection along selected coastal reaches. In this way, the City has secured public access rights to privately held shoreline property along two coastal reaches south of the Racine harbor, thereby providing linkages between existing lakefront parks in this area.

Finally, it should be noted that responsibility for the acquisition and development of land for future park and recreation use in the Racine County shoreland area rests with the county and local units of government. The Wisconsin Department of Natural Resources, which is responsible for the acquisition and development of state parkland, has no plans to acquire Racine County shoreland property for recreation use. The scarcity of sites of the size normally acquired by the DNR for state park purposes makes any proposals for direct state parkland acquisition of the coastal area of Racine County unrealistic.

Recreation Access Recommendations

After reviewing recreation access problems and issues in the Lake Michigan coastal area of Racine County, the Shoreland Development Management Study Steering Committee formulated the following recommendations to enhance public recreational opportunities within the Lake Michigan shoreland area of Racine County.

1. Racine County, in conjunction with the coastal civil divisions, including, importantly, the City of Racine, should undertake a shoreland recreation access study following the guidelines previously set forth in this section. It should be noted that, subsequent to the initiation of the shoreland development management study, both Racine County and the

City of Racine applied for grants under the Wisconsin Coastal Management Program in support of Lake Michigan shoreland recreation access studies, and both have received a funding commitment. The City of Racine study is intended to result in a detailed plan to guide acquisition, development, and redevelopment of city waterfront parks in an effort to increase the accessibility, attractiveness, and continuity of the existing system of city waterfront parks. The Racine County study is intended to identify and evaluate potential shoreland recreation sites, determine the general availability of such sites, and develop a plan for the acquisition and development of remaining sites as well as for the enhancement of existing lakefront recreation areas. It is imperative that the city and county studies be closely coordinated. Efforts should be made at the outset to mutually establish the scope and specific end products of the respective studies, as well as to ensure the use of a common data base. Properly coordinated, the resulting plans will provide a guide for the development of a more integrated park and open space system along the common Lake Michigan shoreline.

2. All existing public park and outdoor recreation areas in the shoreland development management study area should be placed within a park and recreation zoning district or similar zoning district which would serve to preserve the character of existing natural resources, permit the provision of compatible outdoor recreation facilities, and prohibit urban and other incompatible uses. The City of Racine and the Villages of North Bay and Wind Point should consider creating such a district and placing existing public park and recreation lands in this district. Racine County, in conjunction with the Town of Caledonia, should place existing public park and recreation lands located in the Town of Caledonia in the recreational park district of the county zoning ordinance.

   As a rule, existing private outdoor recreation sites should also be placed in a park and recreation zoning district. There is, however, only one private outdoor recreation site in the study area--the outdoor recreation area associated with the Prairie School in the Village of Wind Point--and that site should be placed in an institutional zoning district in keeping with the primary use of the site as an educational institution. It is additionally recommended, however, that the zoning agencies of the Towns of Caledonia and Mt. Pleasant, the Villages of North Bay and Wind Point, and the City of Racine consider modifying existing zoning district maps, as appropriate, to ensure that private outdoor recreation sites outside the study area, as well as public outdoor recreation sites both inside and outside the study area, are zoned in park and recreation zoning districts or similar districts.

3. Upon completion of the proposed shoreland recreation studies, all additional recreation areas recommended under these studies should be placed in a park and recreation zoning district by the concerned local units of government.

4. Upon completion of the proposed shoreland recreation studies, Racine County and the concerned local units of government should acquire those lands recommended for future outdoor recreation use through the acquisition of full fee simple interest in property or through approaches involving the acquisition of less than fee simple interest, in accordance with the findings and recommendations of those studies.

NATURAL RESOURCE BASE

Chapter II of this report described the various elements of the natural resource base within the shoreland development management study area, and discussed the importance of the proper management of the natural resource base to the maintenance of a healthy environment, to the provision of recreational opportunities, and to the protection of the natural beauty of the coastal area of Racine County. As indicated in Chapter II, the most important natural resource features of the study area, including the remaining wetlands, woodlands, and wildlife habitat areas, are located in the Town of Caledonia. It should be noted, however, that the entire Lake Michigan coastline--including the intensively developed areas--has underlying ecological, scenic, and recreational values. In recognition of this fact, a primary environmental corridor has been identified along the entire Lake Michigan shoreline in Racine County (see Map 6 in Chapter II of this report). This environmental corridor contains many of the parks, historic sites, and scenic viewpoints which are found throughout the shoreland development management study area, as well as many of the remaining wetland and woodland areas found in the northern portion of the study area.

As indicated in Chapter II, while much of the Lake Michigan shoreland area in Racine County is held in public outdoor recreation use, a considerable portion of this shoreland area has been developed in residential, commercial, industrial, and other intensive urban uses. Nevertheless, a primary environmental corridor 200 feet deep has been delineated along the entire Lake Michigan shoreline, including the intensively developed area, in recognition of the invaluable natural resource which Lake Michigan represents. It should be noted that even intensively developed coastal reaches typically include a narrow band of undeveloped shoreline. Moreover, the amount of open space land within the identified primary environmental corridor may potentially be increased through the conversion of fully developed but declining areas to open space use. While the large-scale conversion of intensively developed shoreland areas to open space use is not anticipated, the conversion of selected parcels--particularly parcels adjacent to existing public open space lands--back to open space use could contribute significantly to the restoration of a more natural coastal environment.

The broad natural resource base objectives set forth in Chapter II of this report call for the preservation of the remaining nonurban land within the designated primary environmental corridor in essentially natural, open space uses, and the proper management of the fully developed portions of the corridor to ensure appropriate consideration of the underlying ecological, scenic, and recreational values in the future use of such areas. The following sections describe measures by which these objectives can be achieved.

Natural Resource Base Protection: Regulatory Measures

Zoning: Local zoning powers can be used to ensure the preservation of the remaining open space lands within the Lake Michigan shoreland primary environmental corridor, as well as of remnant wetlands and woodlands within the shoreland development management study area. As indicated in the discussion of public shoreland recreation access, existing outdoor recreation sites in the study area should be placed in a park and recreation zoning district or a similar district, which would serve to protect and preserve the character

of existing natural resources, permit the provision of compatible outdoor recreation facilities, and prohibit urban and other incompatible uses. Future park and outdoor recreation sites should also be placed in a park and recreation zoning district as soon as such sites are identified. Remaining wetlands within the study area should be placed in a conservancy district, which serves to preserve the wetland areas and prohibit their destruction through incompatible urban development. Remaining woodlands within the study area which are not placed in a park and recreation district or conservancy district should be placed in an upland conservancy district or similar zoning district, which serves to protect and preserve significant woodlands while allowing for low-density, rural residential development.

A comparison of Map 5 in Chapter II and Map 8 in this chapter indicates the manner in which existing zoning could be modified to better protect the natural resource base. Of primary concern is the preservation of the identified wetlands and woodlands in the Town of Caledonia. As previously noted, Racine County administers the county zoning ordinance in the Town of Caledonia jointly with the Town. Racine County, in conjunction with the Town of Caledonia, should place the identified woodlands situated west and north of Cliffside Park in the R-1 Country Estate District provided for in the Racine County zoning ordinance. This district is roughly equivalent to the upland conservancy district described above. Presently, these woodlands are zoned in the A-2 General Farming and Residential District which allows residential development on lots as small as 40,000 square feet.[9] In addition, the remnant wetland areas within the shoreland development management study area in the Town of Caledonia should be placed within the C-1 Resource Conservation District of the Racine County zoning ordinance. Presently, these wetland areas are placed in zoning districts which permit residential and institutional uses.

It should be noted that the recently completed Racine County farmland preservation plan identified a small area of prime agricultural land within and adjacent to the shoreland development management study area in the northern portion of the Town of Caledonia--specifically, the southern one-half of Section 6 of U. S. Public Land Survey Town 4 North, Range 23 East.[10] The farmland preservation plan recommends that such areas be preserved for agricultural use. This can be achieved through the application of exclusive agricultural zoning, utilizing the A-1 General Farming District of the Racine County zoning ordinance. The area is presently placed in the A-2 General Farming and Residential District. Exclusive agricultural zoning would preserve the area for agricultural use and would, in addition, ensure the availability of open space land for the expansion of Cliffside Park, as recommended in the recent study of Cliffside Park and adjacent undeveloped lands prepared for Racine County by Owen Ayres & Associates, Inc.[11]

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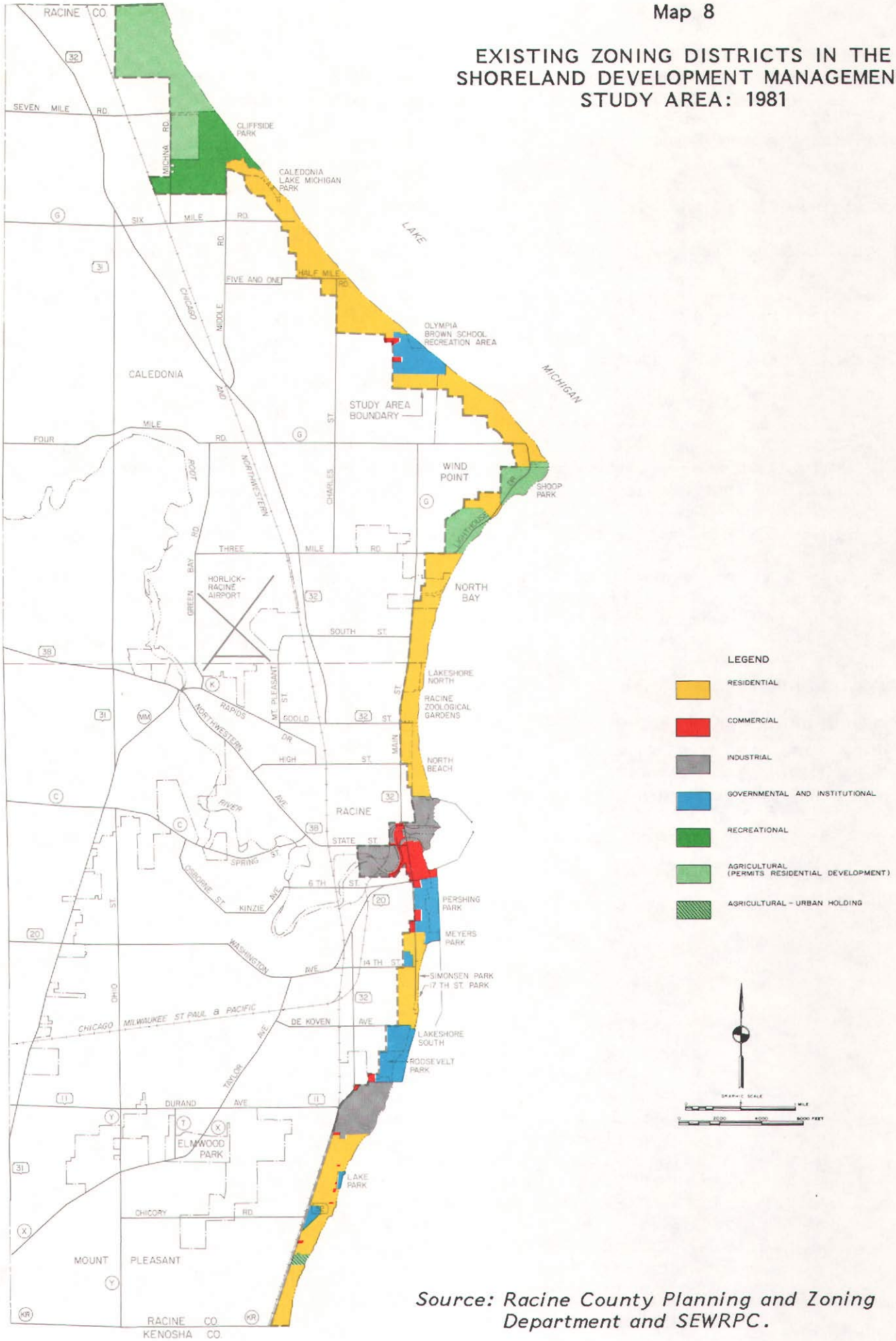
[9]The A-2 District of the Racine County zoning ordinance which is applied in the Town of Caledonia permits single-family dwellings on lots as small as 40,000 square feet. The A-2 District also specifies a minimum farm size of 10 acres. Thus, parcels of land in the A-2 District may be divided to create residential lots 40,000 square feet or more in area, provided that at least 10 acres of the original parcel remains intact.

[10]See SEWRPC Community Assistance Planning Report No. 46, A Farmland Preservation Plan for Racine County, Wisconsin, August 1981.

[11]Owen Ayres & Associates, Inc., Summary Report--Lake Access Study, Ecological Study, Erosion Control Study, Recreation Activity Management Study, 1979.

Map 8

EXISTING ZONING DISTRICTS IN THE SHORELAND DEVELOPMENT MANAGEMENT STUDY AREA: 1981



Source: Racine County Planning and Zoning Department and SEWRPC.

It should be noted that county shoreland zoning regulations already contribute to the preservation of the natural resource base within shoreland areas--including the area within 1,000 feet of the ordinary high water mark of Lake Michigan in the Towns of Caledonia and Mt. Pleasant. County shoreland zoning regulates tree cutting and shrubbery removal within this area. Moreover, under county shoreland zoning, virtually any man-made alteration of this shoreland area is a conditional use, subject to county review. The zoning recommendations set forth above would, however, strengthen the County's ability to preserve remaining woodlands and wetlands and other open space lands within the study area. It should be noted that Racine County, like all other counties in the State, will eventually have to place wetlands located within the statutory shoreland zoning jurisdiction area in a shoreland-wetland zoning district, in conformance with the shoreland-wetland zoning provisions of Chapter NR 115 of the Wisconsin Administrative Code.[12]

It is important to note that Racine County shoreland zoning regulations are applicable only to the shorelands of the unincorporated areas of Racine County. Even though most of the incorporated portion of the study area is already intensively developed, many coastal reaches which might be considered fully developed include at least a narrow band of undeveloped shoreline, vegetative cover, and areas of steep slope. The adoption of protective shoreland zoning regulations could contribute to the preservation and enhancement of the underlying ecological and scenic values along such reaches. Shoreland zoning can regulate the placement of additional structures and restrict tree cutting, shrubbery removal, filling, and grading within the coastal area, thereby preserving the remaining shore cover and scenic beauty of the coastal area, as well as minimizing shoreline erosion. Such regulations could be established as part of comprehensive local zoning ordinances or as special shoreland zoning regulations similar to the Racine County shoreland zoning regulations.

Subdivision Control Ordinances: Subdivision control ordinances represent an important regulatory measure by which local units of government can guide urban development in a manner which is consistent with the protection and wise use of the natural resource base. It is again noted that the applicability of subdivision control regulations within the shoreland area is limited because of the relative scarcity of undeveloped lands, with remaining undeveloped land being concentrated largely within the Town of Caledonia, where county subdivision control regulations apply.

The preliminary draft of the county subdivision control ordinance includes many provisions that would serve to maintain and protect the natural resource base. The draft ordinance includes requirements regarding the suitability of

[12]The Wisconsin Department of Natural Resources has embarked upon a mapping program, known as the Wisconsin Wetlands Inventory, to identify wetland areas within each county in the State. Chapter NR 115 of the Wisconsin Administrative Code establishes the process to be followed in the preparation of a final wetland inventory map for each county. This process includes county zoning agency review of the preliminary wetland maps prepared by the DNR; conduct of a public hearing to solicit public comments on the preliminary maps; the resolution of any identified mapping problems by the DNR and the county; and approval of the final inventory map by the DNR. Under NR 115, each county must, within six months after receipt of the final wetland inventory map from the DNR, place all shorelands that are designated wetlands on the inventory map in a shoreland-wetland zoning district. Preliminary wetland inventory maps for Racine County are currently being prepared.

land for development, prohibiting the subdivision of land that is held to be unsuitable by reason of flooding, inadequate drainage, adverse soil or rock formation, and other limiting factors. The ordinance also contains regulations which are intended to minimize soil erosion and sedimentation and other adverse impacts attendant to the development process. These regulations, modified to include the Lake Michigan shoreline erosion provisions previously recommended in this chapter, should contribute to the maintenance and protection of the natural resource base throughout Racine County--including, potentially on a limited basis, within the Lake Michigan coastal area.

Natural Resource Base Protection: Nonregulatory Measures

Public acquisition represents perhaps the surest way to preserve environmentally significant open space lands. Not only does public acquisition serve to preserve the natural resource base, but it often provides additional public outdoor recreational opportunities. The shoreland recreation studies proposed by Racine County and the City of Racine and described in the previous section of this chapter should identify the remaining open space lands in the coastal area which should be acquired for open space preservation purposes, as well as for public outdoor recreation purposes. As previously noted, in view of growing fiscal constraints and the decline of state and federal outdoor recreation aid programs, alternatives to the usual purchase of full fee simple interest in land should be employed in place of outright acquisition, whenever appropriate, to ensure the preservation of, and to provide access to, Lake Michigan shoreland areas.

As previously indicated, a primary environmental corridor 200 feet wide has been delineated along the entire Lake Michigan shoreline in Racine County in recognition of the invaluable natural resource which Lake Michigan represents. A considerable portion of this corridor has been developed for residential, commercial, industrial, or other intensive urban uses. Much of this corridor development is old, the central portion of the study area between the Racine Zoological Gardens and DeKoven Avenue, for example, having been fully developed by 1900. As these corridor lands become obsolete or otherwise ready for redevelopment, the City of Racine should consider their acquisition and conversion to open use to enhance the Lake Michigan primary environmental corridor and to provide continuity between existing park and open space lands located along the Lake Michigan shoreline. The shoreland recreation study proposed by the City of Racine should identify lands presently in urban use which should be acquired for environmental corridor restoration purposes, as well as for public outdoor recreation purposes.

Natural Resource Preservation Recommendations

After reviewing the existing management framework as its relates to the natural resource base within the Lake Michigan shoreland area, the Shoreland Development Management Study Steering Committee formulated the following recommendations to better achieve the natural resource preservation objectives set forth in Chapter II of this report.

1. Racine County, in conjunction with the Town of Caledonia, should amend the existing zoning district map for the Town of Caledonia to properly protect the remaining wetlands and woodlands within the study area in the Town. Remaining woodlands which are not placed in the Recreational

Park District of the county zoning ordinance should be placed in the Country Estate District, which limits development to large lot residential use and thereby serves to preserve existing natural features. Remaining wetlands should be placed in the Resource Conservation District of the Racine County zoning ordinance, thereby prohibiting urban development within these remnant wetland areas. Agricultural lands recommended for preservation under the Racine County farmland preservation plan should be placed in the General Farming District of the county zoning ordinance. Such zoning would preserve the area for agricultural use and would ensure the availability of open space land for the expansion of Cliffside Park, as recommended in the recent study of Cliffside Park and adjacent lands prepared for Racine County by Owen Ayres & Associates, Inc.[13]

2. The City of Racine and the Villages of North Bay and Wind Point should consider enacting shoreland zoning regulations to protect the Lake Michigan shoreland area. Shoreland zoning can regulate the placement of structures and restrict tree cutting, shrubbery removal, filling and grading, and the removal of beach material within the Lake Michigan shoreland area, thereby preserving remaining shore cover and the scenic beauty of the shoreland area. Such regulations could be established as part of comprehensive local zoning ordinances or as special shoreland zoning regulations similar to the Racine County shoreland zoning regulations.

3. The shoreland recreation studies proposed by the City of Racine and Racine County should identify all remaining open space land within the coastal area that should be acquired for open space preservation purposes, as well as for outdoor recreation purposes. The proposed City of Racine study should, in addition, identify lands presently in urban use which are obsolete or otherwise ready for redevelopment and which should be acquired for environmental corridor restoration purposes. Upon completion of these studies, Racine County and the concerned local units of government should acquire open space lands in full or partial interest, as recommended in the studies. In general, outright acquisition of open space lands is most appropriate in the preservation of significant natural resource areas which are threatened by urban encroachment. Approaches involving the acquisition of less than fee simple interest--such as the purchase of conservancy or scenic easements--may be used to protect less critical resource areas where such approaches may be shown to be a cost-effective means of preserving open space.

LAND USE

As indicated in Chapter II of this report, the management of land use within the Lake Michigan shoreland area is a complex task requiring the consideration of many interrelated factors and the close coordination and cooperation of the many interests concerned. Previous sections of this chapter have dealt with various aspects of the management of land use in the coastal area within the context of shoreline erosion hazard abatement, the provision of public

[13]Owen Ayres & Associates, Inc., Summary Report--Lake Access Study, Ecological Study, Erosion Control Study, Recreation Activity Management Study, 1979.

access to the shoreland, and natural resource protection. This section is concerned with the overall future pattern of land use within the shoreland management study area as reflected in existing zoning, and with the conservation and renewal of existing fully developed portions of the study area.

Future Land Use Pattern

As a rule, zoning ordinances and attendant zoning district maps provide an important expression of community land use development objectives. Generalized existing zoning districts within the shoreland area are shown on Map 8. The areas placed in the various zoning districts have been measured, and the results are presented in Table 5.

A large portion of the shoreland development management study area has been placed in zoning districts which permit urban development--a finding which is not surprising, given the highly developed nature of the study area. As indicated in Table 5, 2,137 acres, or 91 percent of the study area, have been placed in zoning districts which permit residential, commercial, industrial, and governmental and institutional development. The largest single zoning category is residential, which accounts for 1,094 acres, or 46 percent of the study area. In terms of lake frontage, lands placed in districts which allow urban development account for 13.6 linear miles, or 95 percent of the total length of the Lake Michigan shoreline in Racine County.

Of particular importance in the analysis of existing zoning in the study area is the zoning of the remaining undeveloped lands. As previously noted, the shoreland development management study area is already highly developed, with 61 percent of the area having been developed for intensive urban uses by 1980 and with recreational uses comprising an additional 17 percent of the total. Map 4 in Chapter II of this report indicates the location of privately held, undeveloped tracts of land of at least five acres in size. A comparison of Map 4 in Chapter II and Map 8 in this chapter indicates that most of these areas have been placed in zoning districts which permit residential development and which are therefore subject to urban use. It should be noted that the agricultural districts currently applied within the Town of Caledonia and the Village of Wind Point allow urban development. The A-2 General Farming and Residential District of the Racine County zoning ordinance applied within the Town of Caledonia permits single-family dwellings on lots with a minimum area of 40,000 square feet, while specifying a minimum farm size of 10 acres. Thus, a parcel of land in the A-2 District may be divided into lots as small as 40,000 square feet and thereby converted from rural to urban use. However, the ordinance has an unusual provision that at least 10 acres of the original parcel must remain intact.

Previous sections of this chapter have set forth recommendations regarding the manner in which zoning district maps should be modified to better achieve shoreland recreation access and open space preservation objectives. Thus, it was recommended that existing outdoor recreation sites be placed in a park and recreation district and that, upon completion of the recommended shoreland recreation studies, any additional lands designated for public recreation use also be placed in a park and recreation zoning district. It was also recommended that the remaining wetlands and woodlands in the shoreland development management study area be protected from urban encroachment by placing them in zoning districts which preserve their resource values.

Table 5

EXISTING ZONING DISTRICTS IN THE SHORELAND DEVELOPMENT MANAGEMENT STUDY AREA: 1981

General Zoning District[a]	Town of Caledonia				Town of Mt. Pleasant				City of Racine			
	Area		Frontage on Lake Michigan		Area		Frontage on Lake Michigan		Area		Frontage on Lake Michigan	
	Acres	Percent	Linear Miles	Percent	Acres	Percent	Linear Miles	Percent	Acres	Percent	Linear Miles	Percent
Districts Which Permit Urban Development												
Residential	343	34.6	1.91	45.8	179	57.2	1.64	66.1	321	48.2	2.82	57.0
Commercial	6	0.6	--	--	7	2.2	--	--	64	9.6	0.28	5.7
Industrial	--	--	--	--	106	33.9	0.61	24.6	136	20.4	0.66	13.3
Governmental and Institutional	77	7.7	0.45	10.8	14	4.5	0.15	6.1	145	21.8	1.19	24.0
Agricultural	352	35.5	1.10	26.4	--	--	--	--	--	--	--	--
Subtotal	778	78.4	3.46	83.0	306	97.8	2.40	96.8	666	100.0	4.95	100.0
Districts Which Prohibit Urban Development												
Agricultural-Urban Holding District	--	--	--	--	7	2.2	0.08	3.2	--	--	--	--
Recreational	214	21.6	0.71	17.0	--	--	--	--	--	--	--	--
Subtotal	214	21.6	0.71	17.0	7	2.2	0.08	3.2	--	--	--	--
Total	992	100.0	4.17	100.0	313	100.0	2.48	100.0	666	100.0	4.95	100.0

General Zoning District[a]	Village of Wind Point				Village of North Bay				Study Area Total			
	Area		Frontage on Lake Michigan		Area		Frontage on Lake Michigan		Area		Frontage on Lake Michigan	
	Acres	Percent	Linear Miles	Percent	Acres	Percent	Linear Miles	Percent	Acres	Percent	Linear Miles	Percent
Districts Which Permit Urban Development												
Residential	210	60.7	1.48	60.2	41	100.0	0.30	100.0	1,094	46.4	8.15	56.8
Commercial	--	--	--	--	--	--	--	--	77	3.3	0.28	1.9
Industrial	--	--	--	--	--	--	--	--	242	10.2	1.27	8.8
Governmental and Institutional	--	--	--	--	--	--	--	--	236	10.0	1.79	12.5
Agricultural	136	39.3	0.98	39.8	--	--	--	--	488	20.7	2.08	14.5
Subtotal	346	100.0	2.46	100.0	41	100.0	0.30	100.0	2,137	90.6	13.57	94.5
Districts Which Prohibit Urban Development												
Agricultural-Urban Holding District	--	--	--	--	--	--	--	--	7	0.3	0.08	0.6
Recreational	--	--	--	--	--	--	--	--	214	9.1	0.71	4.9
Subtotal	--	--	--	--	--	--	--	--	221	9.4	0.79	5.5
Total	346	100.0	2.46	100.0	41	100.0	0.30	100.0	2,358	100.0	14.36	100.0

[a]The zoning district categories are generalized categories. The residential category on Map 8 includes the R1, R2, R3, R4, and R5 Districts of the City of Racine zoning ordinance; the R2, R3, R4, R5, R7, and R8 Districts of the Racine County zoning ordinance; the R40E, R100, and RM2 Districts of the Town of Mt. Pleasant zoning ordinance; and the residential districts of the zoning ordinance of the Villages of North Bay and Wind Point. The commercial category on Map 8 includes the B1, B2, B3, B4, B5, and O Districts of the City of Racine zoning ordinance; the B1 District of the Racine County zoning ordinance; and the B1, B2, and B3 Districts of the Town of Mt. Pleasant zoning ordinance. The industrial category on Map 8 includes the I2 District of the City of Racine zoning ordinance; and the M1 and ME Districts of the Town of Mt. Pleasant zoning ordinance. The governmental and institutional category on Map 8 includes the O/I District of the City of Racine zoning ordinance; the P1 District of the Racine County zoning ordinance; and the PUL District of the Town of Mt. Pleasant zoning ordinance. The recreational category on Map 8 includes the P2 District of the Racine County zoning ordinance. The agricultural category on Map 8 includes the A2 District of the Racine County zoning ordinance and the agricultural district of the Village of Wind Point zoning ordinance. The agricultural-urban holding category on Map 8 includes the AUH District of the Town of Mt. Pleasant zoning ordinance.

Source: Racine County Planning and Zoning Department and SEWRPC.

In addition to implementing the foregoing zoning recommendations, local units of government in the coastal area should review the zoning of other shoreland areas--particularly undeveloped areas as well as fully developed but declining areas which may be redeveloped for alternative future uses--to ensure that the zoning properly restricts new development to appropriate shoreland uses. As indicated in Chapter II, uses which are most appropriate to the Lake Michigan waterfront property and adjacent property having a view of Lake Michigan are those which significantly benefit from, or are significantly enhanced by, a shoreland location; which are not precluded by the flooding, erosion, and recession hazards which exist in the area; which can readily accommodate public access to shoreland areas; which maintain or enhance the beauty of the shoreland environment and related scenic vistas; and which restore, maintain, or at least do not unduly impair the natural resource base. Land uses identified by the Shoreland Development Management Study Steering Committee as meeting these general criteria were listed in Chapter II and include park and open space use; residential use which is designed to maintain lakefront vistas, including very low-density residential development; and lakefront commercial, governmental, and institutional uses which are designed to maintain lakefront vistas and to provide public access to the waterfront.

Conservation and Revitalization of Developed Areas

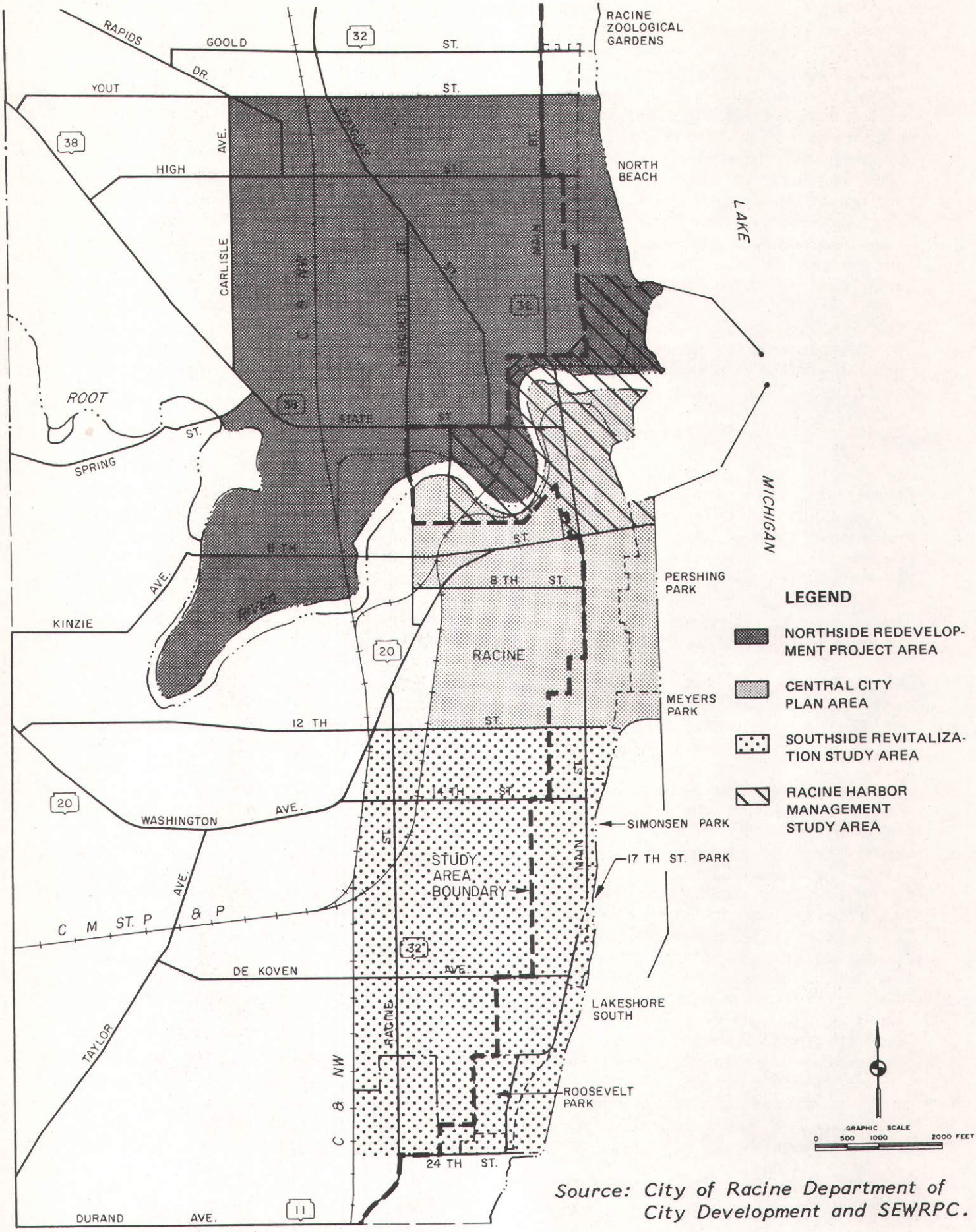
As previously indicated, much of the development within the central portion of the shoreland development management study area is old, with the portion of the study area between the Racine Zoological Gardens and DeKoven Avenue having been developed by the beginning of this century. Chapter II of this report cited previous studies that indicate the extent of deteriorating structural conditions within, and adjacent to, this portion of the study area. The conservation and renewal of the oldest portions of the study area is essential if these areas are to continue to provide viable housing, employment, shopping, and recreational opportunities and if they are to enhance the coastal environment.

Between 1970 and 1980, a number of planning activities were undertaken to promote the conservation and revitalization of the older central area of the City of Racine, including that portion within the shoreland development management study area. Conservation and renewal plans have been prepared for various central city areas under the Northside Redevelopment Project, the central city plan program, and the harbor management study, all of which were discussed in Chapter II, and under the Southside Revitalization Study. The Southside Revitalization Study, completed in 1970, provided a guide for housing rehabilitation, transportation improvements, industrial and commercial development and redevelopment, and recreational development for the south side of the City of Racine and adjacent portion of the Town of Mt. Pleasant (see Map 9). The Northside Redevelopment Project, completed in 1974, and the central city plan, completed in 1975, resulted in the preparation of similar plans for central city areas north and south of the river. The harbor management study, completed in 1980, represents a guide for the future use and management of the Racine harbor as well as for the revitalization and beautification of lands adjacent to the harbor.

The foregoing plans provide a framework within which more detailed redevelopment plans and plan implementation activities can be formulated. In this regard, several special efforts are underway to renew portions of the central city which are within the shoreland development management study area. Thus, detailed redevelopment plans have been prepared for the Lakeshore Development

Map 9

REDEVELOPMENT PLANNING AREAS IN THE CITY OF RACINE



Source: City of Racine Department of City Development and SEWRPC.

Project area and the Monument Square East urban renewal area, both areas being situated south of the Root River and west of the Racine harbor (see Map 10). These plans, prepared under Section 66.431 of the Wisconsin Statutes (the Blight Elimination and Slum Clearance Act), are being implemented by the Redevelopment Authority of the City of Racine. The plan for the Lakeshore Development Project area is particularly noteworthy for the regulations which it imposes on building height and coverage in an effort to maintain lake vistas as redevelopment proceeds within the area. In addition to these action-oriented redevelopment plans, the City of Racine in 1980 established a tax incremental finance district and formulated a related plan of public improvements for a portion of the City within the shoreland development management study area (see Map 10). This plan, prepared under Section 66.46 of the Wisconsin Statutes, is intended to stimulate additional private investment through additional public improvements within the district.

It should also be noted that Racine has acted to bring about the renewal of its older areas by expending city funds to upgrade public facilities and by targeting federal aids to renewal areas. In 1979, the City designated a neighborhood strategy area as the primary target for funds available under the community development block grant program of the U. S. Department of Housing and Urban Development (HUD) and other housing and public improvement programs. The neighborhood strategy area includes all of the central city plan area and much of the Northside Redevelopment Project area, and most of the Southside Revitalization Study area, and includes the shoreland development management study area between St. Patrick Street and 21st Street.

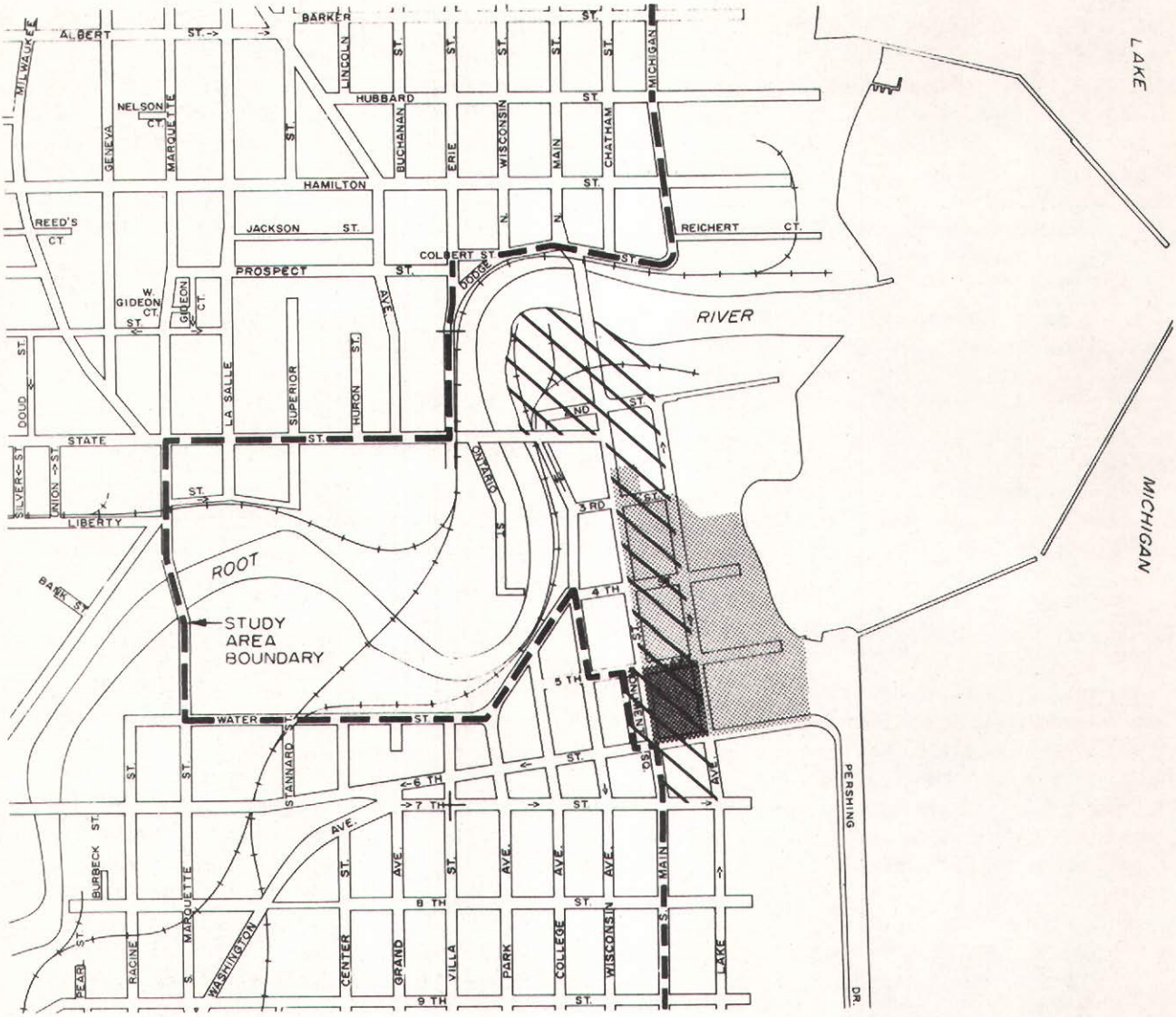
Land Use Recommendations

Previous sections of this report have set forth recommendations for the improvement of the management of land use in the Lake Michigan shoreland area within the context of shoreline erosion hazard abatement, the provision of public access to the shoreland, and natural resource base protection. The Shoreland Development Management Study Steering Committee formulated the following additional recommendations to ensure the sound management of land use within the coastal area.

1. The zoning agencies of the five local units of government with jurisdiction in the Racine County Lake Michigan shoreline area should review the present zoning of their shoreland areas to ensure that the zoning properly restricts new development to appropriate shoreland uses. Uses most appropriate to the Lake Michigan shoreland area are those which significantly benefit from, or are significantly enhanced by, a shoreland location; which are not precluded by flooding, erosion, and recession hazards which exist in the area; which can readily accommodate public access to shoreland areas; which maintain or enhance the beauty of the shoreland environment and related scenic vistas; and which restore, maintain, or at least do not unduly impair the natural resource base. Land uses identified by the Shoreland Development Management Study Steering Committee as meeting these general criteria include park and open space uses; lakefront-oriented commercial, governmental, and institutional uses--in particular, those designed to maintain lakefront vistas and to provide public access to the waterfront; and residential uses--in particular, residential development which is designed to maintain lakefront vistas and to incorporate public access to the waterfront, insofar as

Map 10

SPECIAL REDEVELOPMENT PROJECT AREAS IN THE CITY OF RACINE



LEGEND

- TAX INCREMENTAL DISTRICT NO. 1
- LAKESHORE DEVELOPMENT PROJECT AREA
- MONUMENT SQUARE EAST URBAN RENEWAL AREA

Source: City of Racine Department of City Development and SEWRPC.

possible. In currently undeveloped areas, very low-density residential development on lots of five acres or more in size is considered an appropriate use.

2. The City of Racine should continue its ongoing effort to conserve and revitalize its older urban areas, including, importantly, older development within the shoreland development management study area.

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Chapter IV

SUMMARY AND CONCLUSION

INTRODUCTION

Over the past several years, public officials and citizens in Racine County and the State of Wisconsin have expressed increasing concern over the management of the Lake Michigan shoreland area. This concern stems from an increasing awareness of the unique, but limited, resource which the Lake Michigan shoreland area represents, of the many competing and frequently conflicting land uses continually proposed within the Lake Michigan shoreland area, and of the problems resulting from past misuse and mismanagement of the shoreland area. These general concerns prompted Racine County to undertake a shoreland development management study.

More specifically, this study was initiated by Racine County to remedy certain perceived inadequacies in the current management of development along the Lake Michigan shoreline. These perceived inadequacies include a lack of adequate policies at the county and local level regarding the unique physical development issues, problems, and opportunities existing in the Lake Michigan shoreland area; a lack of coordination among the various levels and units of government, as well as private interests, in decision-making affecting development in the shoreland area; and the application of outdated shoreland management practices by local units of government in shaping and guiding coastal development.

Given these concerns, Racine County, in February of 1980, submitted an application to the Wisconsin Coastal Management Council for funding in support of a county shoreland development management study. The Wisconsin Coastal Management Council administers federal funds available for such studies under Section 306 of the federal Coastal Zone Management Act of 1972, as amended. Upon grant approval, the Racine County Board retained the Southeastern Wisconsin Regional Planning Commission to assist the staff of the County Planning and Zoning Department in the conduct of the work. The conduct of the study was guided by a Steering Committee consisting of representatives from Racine County, local units of government in the study area, the Racine County Conservation League, and the Wisconsin Department of Natural Resources.

The study was designed to identify and analyze the existing shoreland development concerns and to determine whether and how the existing shoreland management framework might be improved to better achieve agreed-upon coastal development objectives. To this end, the following work elements were undertaken as part of the shoreland management study: identification and analysis of shoreland development concerns; formulation of shoreland development objectives; analysis of existing shoreland development management practices; and formulation of recommendations to improve shoreland development management practices.

For the purposes of the study, the shoreland area of Lake Michigan was defined as all that area of Racine County lying within approximately 1,000 feet of the

normal high water mark of Lake Michigan,[1] as well as certain lands along the Root River east of the Marquette Street bridge. The study area encompasses 2,358 acres, or about 1.1 percent of the total area of Racine County. The study area includes 14.4 miles of Lake Michigan shoreline. The resident population of the study area in 1980 totaled 9,240 persons.

SHORELAND DEVELOPMENT CONCERNS

The study area is a unique area which both conditions, and is conditioned by, Lake Michigan. A number of development issues and concerns have arisen in the study area owing to its proximity to the lake. The major coastal concerns identified by the study Steering Committee include erosion of the Lake Michigan shoreline, the provision of public access to the Lake Michigan shoreland area, the preservation of the natural resource base along the Lake Michigan shoreline, and various land use-related concerns, including the overall land use pattern within the shoreland area and the conservation and renewal of fully developed portions of the shoreland area. The first operational step in the shoreland development management study was the collection and analysis of information on each of the identified concerns. To the maximum extent possible, relevant data were collated from previous studies of the coastal area and from Regional Planning Commission files. A summary of the most important information regarding the identified coastal concerns is presented below.

Shoreline Erosion

Erosion and recession are major problems along portions of the Lake Michigan shoreline in Racine County. Both beach erosion and bluff erosion problems exist. However, bluff erosion is a major concern because of the threat to human life and property it poses, as well as because of the associated aesthetic impacts. Bluff erosion and instability are the processes by which natural forces, sometimes accelerated or decelerated by man's activities, result in the intermittent, sometimes massive, recession of the top of the bluff.

There is considerable variation in bluff recession rates along the Racine County coastal reaches. These rates, moreover, vary with time and with lake level and weather conditions. Highest recent recession rates have been observed in the northern portion of the Town of Caledonia, particularly along the shoreline areas of Sections 6, 7, and 8 of U. S. Public Land Survey Town 4 North, Range 23 East. At one point along this reach, a recession rate of 14 feet per year was recorded for the period 1968 through 1976. Conversely, recent bluff recession rates have generally been less than six feet per year along the balance of the county shoreline, with well-protected reaches, particularly in the City of Racine, experiencing no measurable recession.

Bluff failure poses serious problems for both developed and undeveloped portions of the county coastline. Within the Town of Mt. Pleasant, bluff erosion represents a threat to public and private property in the Lake Park neighbor-

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[1]The actual study area boundary is a clearly identifiable man-made or natural physical feature lying closest to a line 1,000 feet from the ordinary high water mark of Lake Michigan. Along several reaches of the study area in the northern portion of the County, real property lines had to be used as the study area boundary, owing to the absence of major physical features near the shoreline in this area.

hood, including several residences; a town park and associated fire station; and street ends, including Larson Street, Kenilworth Avenue, Graceland Avenue, Rosalind Avenue, Bryn Mawr Avenue, and Derby Avenue.

Within the City of Racine, two reaches have been identified as being particularly subject to shoreline erosion. One is the coastal reach between Williams Street and Augusta Street, north of the Racine Zoological Gardens; the City has applied to the U. S. Army Corps of Engineers for assistance in installing shoreline protection measures along this reach. The second is a reach extending from 14th Street to a point south of 16th Street--the erosion problems here being associated with a gap in the breakwater to the east. Erosion problems in this area are presently under study by the City.

As previously indicated, the highest recession rates in Racine County in the recent past have been observed along the coastline in the northeastern portion of the Town of Caledonia. This area includes the Town of Caledonia Lake Michigan Park, the Crestview Subdivision, Cliffside County Park, the National Guard target range, and private open space land. With respect to property damage, the most imminent problem is the threat posed by bluff recession to Lakeshore Drive along Lake Michigan Park, to associated utility lines, and, ultimately, to residences within the Crestview Subdivision. Bluff erosion, if not controlled, would also decrease the physical area of Cliffside Park, destroy ecologically significant areas in the park, and erode the undeveloped open space lands to the north.

Several steps have been taken to minimize erosion hazards along the coastline in the northeastern portion of the Town of Caledonia. The Town of Caledonia has acquired, through purchase and donation, most of the private property located east of Lakeshore Drive adjacent to the Crestview Subdivision, and has formulated a drainage and erosion control plan to stabilize the eroding bluff. Efforts by the Town to stabilize the bluff along this reach, however, depend on the availability of technical guidance and assistance and public funding. The U. S. Army Corps of Engineers has completed engineering plans as the initial step toward the stabilization of the bluff along the National Guard target range site. Racine County has studied the erosion problems at Cliffside Park and has developed several erosion control alternatives. Because of the high cost of these alternatives, however, and the fact that this erosion hazard area is undeveloped, Racine County has adopted the policy of postponing, at least temporarily, any action to implement the erosion abatement plans.

Recreational Access

Lake Michigan and the natural resources along the Lake Michigan shoreline--including the Root River estuary and the ravine areas of the streams that flow into the lake--provide a unique setting for a variety of outdoor recreational activities, and existing outdoor public recreation sites provide considerable public access to the Lake Michigan coastal area in Racine County. Some sites provide opportunities for water-based activities, including swimming, fishing, and boating, while other sites provide access to lands adjacent to the lake, without providing direct access to Lake Michigan surface waters.

Public outdoor recreation sites and open space sites constitute a total of 480 acres, or 20 percent of the study area. The combined Lake Michigan shoreline frontage of these sites is 25,500 feet, representing 34 percent of the total length of the Lake Michigan shoreline in Racine County. City of Racine

parks comprise 17,600 feet, or 69 percent of the total frontage devoted to outdoor recreation use. Cliffside Park, operated by Racine County, accounts for an additional 3,760 feet, or 15 percent of the total frontage in public outdoor recreation use. The remaining 4,140 feet, or 16 percent of the total, consists of village and town parklands and a school-related recreation site.

While a considerable proportion of the lakefront land is in public ownership, especially in the City of Racine, public facilities providing access to the lake for boating are relatively limited, being provided at only three sites. One site is the Pershing Park boat launch site, consisting of six boat launch ramps located inside the Racine Harbor and associated automobile parking. The other sites are hand-carry launch areas at the City of Racine's Shoop Park and 17th Street park site. All existing boat moorings and slips and all facilities for dry storage for boats are provided by private interests. A 1979 inventory indicated that there were 588 boats in private marine storage facilities in the Racine harbor and in the Root River east of Marquette Street. This includes 170 boats in slips and moorings in the Racine harbor; 246 boats in slips and moorings on the river; and 172 boats in dry dock storage along the Root River. Subsequent to the 1979 inventory, an additional marina--Belle Harbor--was developed along the Root River, providing an additional 80 slips.

While much of the Lake Michigan shoreline in Racine County is publicly owned and accessible to the general public, participation in resource-oriented outdoor recreational activities in the shoreland area and throughout Racine County--and the attendant need for related recreation sites and facilities--may be expected to increase significantly over the next two decades. A recent study by the University of Wisconsin-Extension Recreation Resources Center provides information on the levels of participation anticipated for resource-oriented outdoor activities in Racine County through the year 1990. Participation in recreational boating is expected to increase very rapidly, with boating activities on Lake Michigan and inland surface waters combined expected to triple between 1970 and 1990. Participation in certain other activities is expected to more than double between 1970 and 1990, including fishing (151 percent increase); camping (132 percent increase); hiking (146 percent increase); and sightseeing (116 percent increase). The smallest relative increase--61 percent--is anticipated for beach swimming. The lower growth rate for beach swimming can be attributed to, among other factors, the increased opportunities for pool swimming, increased participation in other recreational pursuits, and increasing concern for water quality at many beach sites.

Natural Resource Base

The proper management of the natural resource base is essential to the maintenance of a healthy environment for all forms of life and to the maintenance of the cultural and natural heritage and natural beauty of an area. The most important natural features of the study area include surface waters, woodlands, wetlands, and wildlife habitat areas.

Surface Water: Surface water resources, consisting primarily of Lake Michigan but also of the Root River and minor streams directly tributary to Lake Michigan, form a particularly important element of the natural resource base of the study area. Their contribution to the economic development, recreational potential, and aesthetic quality of the study area, and of Racine County, is immeasurable. As previously indicated, the Racine County shoreland along Lake Michigan measures 14.4 miles in length. The study area also contains a portion

of the Root River estuary, from the mouth of the Root River to the Marquette Street bridge--approximately 1.2 miles upstream from the mouth of the Root River--as well as all or portions of two unnamed perennial streams and eight unnamed intermittent streams.

Woodlands: While relatively scarce, woodlands remain an important natural resource within the shoreland study area. In addition to contributing to clean air and water, woodlands contribute to a diversity of plant and animal life in association with human life and can thereby provide important educational and recreational opportunities. Woodlands covered about 121 acres, or 5 percent of the total study area, in 1980. Virtually all remaining woodlands in the study area are located in Cliffside Park, in adjoining Caledonia Lake Michigan Park, and in areas north and west of these parks.

Wetlands: Wetlands are defined as areas in which the water table is at, near, or above the land surface, and are characterized both by hydric soils and by the growth of hydrophytes such as sedges, cattails, and willows. Wetland areas, like woodland areas, are relatively scarce within the study area, covering 44 acres, or 2 percent of the total study area. The remaining wetlands are located primarily along streams in the portion of the coastal area between Wind Point and the Crestview Subdivision.

Wildlife Habitat: The woodland and wetland areas described above constitute virtually all of the remaining wildlife habitat in the study area. The woodland areas contain most of the medium-value wildlife habitat in the study area as identified in the Regional Planning Commission's 1970 wildlife habitat inventory. The remnant wetland areas along the streams just north of Wind Point contain the remaining low-value wildlife habitat within the study area. No high-value wildlife habitat was identified in the study area in the 1970 inventory.

Lake Michigan Primary Environmental Corridor: While the most important natural resource features of the study area, including the remaining wetlands, woodlands, and wildlife habitat areas, are located in the Town of Caledonia, it is important to note that the entire Lake Michigan coastline--including the intensively developed areas--has underlying ecological, scenic, and recreational values. In recognition of this fact, a primary environmental corridor has been identified along the entire Lake Michigan shoreline in Racine County. This environmental corridor contains many of the parks, historic sites, and scenic viewpoints which are found throughout the shoreland development management study area, as well as many of the remaining wetland and woodland areas found in the northern portion of the study area.

While much of the Lake Michigan shoreland area in Racine County is held in public outdoor recreation use, a considerable portion of this shoreland area has been developed in residential, commercial, industrial, and other intensive urban uses. A primary environmental corridor 200 feet wide has been delineated along the entire Lake Michigan shoreline, including the intensively developed area, in recognition of the invaluable natural resource which Lake Michigan represents. In this respect, it should be noted that even intensively developed coastal reaches typically include a narrow band of undeveloped shoreline. Moreover, the amount of open space land within the identified primary environmental corridor may potentially be increased through the conversion of fully developed, but declining areas to open space use. While large-scale conversion of intensively developed shoreland areas to open space use is not anticipated,

the conversion of selected parcels--particularly parcels adjacent to existing public open space lands--back to open space use could contribute significantly to the restoration of a more natural coastal environment.

Land Use

The Regional Planning Commission 1980 land use inventory indicated that a significant portion of the study area--1,435 acres, or 61 percent of the total area--is devoted to intensive urban uses, including residential; commercial; industrial; transportation, communication, and utility; and governmental and institutional uses. Recreational uses comprise an additional 396 acres, or 17 percent of the total area. The largest single urban use is residential use, which encompasses 688 acres, or 29 percent of the total study area. The transportation, communication, and utilities category, consisting primarily of streets, off-street parking, railroad rights-of-way, and utility lands, totals 370 acres, or 16 percent of the study area. The remaining urban categories--commercial, industrial, and governmental and institutional--in combination account for 377 acres, or 16 percent of the study area.

It is important to note that much of the existing development within the study area is quite old; the central portion of the study area between the Racine Zoological Gardens and DeKoven Avenue, for example, was already fully developed by 1900. Such older urban areas need to be conserved and renewed if they are to continue to provide viable housing, employment, and shopping opportunities and if they are to enhance the coastal environment. Exterior structural condition surveys, conducted as part of the Northside Redevelopment Project in 1973 and the central city plan in 1974, provide an indication of the need for urban conservation and renewal activities within and adjacent to the study area. The survey conducted as part of the central city plan indicated that about 9 percent of the structures in the overall central city plan area were in need of repair, and that an additional 9 percent were in need of major rehabilitation and, possibly, demolition. Many of these deteriorated structures are located in the shoreland development management study area immediately south of the Root River. The Northside Redevelopment Project identified approximately 20 structures as being in need of major repair or in dilapidated condition within the shoreland study area north of the Root River, as well as many additional substandard structures within the balance of the Northside Redevelopment Project study area immediately adjacent to, but outside, the shoreland study area.

SHORELAND DEVELOPMENT MANAGEMENT OBJECTIVES

After reviewing problems and issues relating to Lake Michigan shoreline erosion, the provision of public access to the Lake Michigan shoreland area, the preservation of the natural resource base of the shoreland area, and other land use-related concerns, the Shoreland Development Management Study Steering Committee formulated a series of general shoreland development management objectives. The Steering Committee formulated five erosion hazard abatement objectives, three public shoreland access objectives, two shoreland natural resource base preservation objectives, and four shoreland land use development and redevelopment objectives. These objectives provide goals that should be promoted by public policy within this shoreland area over time, and provide a broad framework within which further planning can take place and more specific objectives can be formulated.

SHORELAND DEVELOPMENT MANAGEMENT FRAMEWORK

There are a variety of measures, both regulatory and nonregulatory, by which local, county, state, and federal units and agencies of government can regulate or otherwise influence development in the Lake Michigan shoreland area of Racine County in the public interest. In combination, these measures can be viewed as an overall shoreland development management framework. The existing management framework was analyzed under the study to determine whether and how it might be improved to better achieve the general shoreland development management objectives.

Overview of the Existing Shoreland Development Management Framework

County and Local Regulatory Framework: Under Wisconsin Statutes, county and local units of government have been granted a variety of regulatory powers which can be used to guide development within the Lake Michigan shoreland area in accordance with shoreland development objectives. Among the most important of these are zoning and land subdivision regulations.

Zoning ordinances regulate the use of land and, in addition, regulate such aspects of development as the size of lots and the placement of structures on lots. Zoning ordinances are presently in effect in each of the five minor civil divisions which have jurisdiction in the Lake Michigan coastal zone area of Racine County. The City of Racine, the Villages of North Bay and Wind Point, and the Town of Mt. Pleasant have adopted and currently administer their own zoning ordinances. The Town of Caledonia has adopted the Racine County zoning ordinance, which is administered for the Town by the Racine County Planning and Zoning Department. It should be noted that the Village of Wind Point is currently in the process of preparing a new zoning ordinance and zoning district map.

In addition to comprehensive zoning regulations, the City of Racine, the Village of Wind Point, and Racine County have adopted special floodland regulations which serve to limit filling and development within 100-year recurrence interval flood hazard areas. Racine County floodland regulations apply to floodlands throughout the entire unincorporated area of the County. The Village of Wind Point floodland ordinance was recently adopted by the Village on an interim basis, pending completion of the new village zoning ordinance which will incorporate final floodland regulations.

Racine County has also adopted shoreland zoning regulations which impose special restrictions on the location of certain structures and set forth restrictions on tree cutting, filling, grading, and certain agricultural practices within shoreland areas of Racine County. County shoreland regulations apply within unincorporated areas of Racine County to those lands lying within 1,000 feet of the ordinary high water mark of navigable lakes, ponds, and flowages, and within 300 feet of the ordinary high water mark of navigable streams, or to the landward side of the floodplain, whichever is greater.

Subdivision control ordinances regulate the division of larger tracts of land into lots for development. The City of Racine and the Village of Wind Point have each adopted subdivision control ordinances. Racine County adopted a subdivision control ordinance in 1956, which, under Wisconsin Statutes, regulates land subdivision within the entire unincorporated area of the County. Under

Wisconsin Statutes, towns may adopt subdivision control ordinances which parallel, or are more stringent than, the county subdivision control ordinance. The Town of Caledonia has adopted a subdivision control ordinance, while the Town of Mt. Pleasant, to date, has not. The Town of Caledonia subdivision control ordinance adopts by reference the Racine County subdivision control ordinance, and places local requirements on land developers with respect to the construction and financing of public improvements. It should be noted that Racine County is currently in the process of preparing a new subdivision control ordinance; the 1956 ordinance will remain in effect until the new ordinance is adopted. It should also be noted that the general applicability of subdivision control regulations within the shoreland area is limited because of the relative scarcity of undeveloped land, with remaining undeveloped lands being concentrated, to a large extent, in the Town of Caledonia.

State and Federal Regulatory Framework: The State of Wisconsin and the federal government have long been involved in the management of water resources. Historically, state and federal water management activities have been related to the protection of public rights on navigable waters, while more recently water quality has become an important management concern. Of particular concern in the shoreland development management study are the means by which state and federal agencies regulate various activities affecting protection of the Lake Michigan shoreline.

The U. S. Army Corps of Engineers is the primary federal agency responsible for the regulation of structures and work related to surface waters. Initial Corps of Engineers authority to regulate structures or work in or affecting navigable waters stems from the River and Harbor Act of 1899. Corps of Engineers regulatory authority was expanded with the passage of the Federal Water Pollution Control Act amendments of 1972. Section 404 of this act authorized the Corps to administer a permit program to regulate the deposition of dredged and fill materials into waters and related wetlands of the United States.

The State of Wisconsin, through the Wisconsin Department of Natural Resources, regulates shore protection-related activities under the provisions of Chapter 30 of the Wisconsin Statutes. State regulatory authority regarding shore protection and erosion control projects is largely confined to projects initiated at or below the ordinary high water mark.

Nonregulatory Framework: Local, county, state, and federal units and agencies of government can also act to achieve shoreland development objectives through numerous nonregulatory measures. For example, the public sector can install shore protection structures to reduce the impacts of shore erosion processes, if sufficient resulting benefit to the public can be shown. The public sector can disseminate information on Lake Michigan shoreline erosion to Lake Michigan riparians to assist them in deciding on a course of action to minimize shoreline erosion hazards. Public acquisition of land, in whole or in partial interest, can be used to ensure the permanent preservation of significant environmental lands, particularly within urbanizing areas.

Study Recommendations

As previously indicated, under the shoreland development management study, existing shoreland management practices were analyzed in light of the shoreland management objectives formulated under the study. This analysis lead to the development of recommendations intended to make existing shoreland management

practices more consistent with the established objectives regarding shoreline erosion, the provision of public access to the Lake Michigan shoreland area, the preservation of the natural resource base of the shoreland area, and appropriate land use within the shoreland area. Included are recommendations regarding modifications to comprehensive zoning ordinances, shoreline zoning regulations, and subdivision control ordinances, as well as recommendations regarding additional studies that should be undertaken within the coastal area. The recommendations formulated under the guidance of the Shoreland Development Management Study Steering Committee are presented below.

Erosion Hazard Abatement Recommendations:

1. Racine County should undertake a mapping program to identify those Lake Michigan coastal reaches which may be expected to be subject to erosion hazards during a specified time period, based upon a consideration of past shore recession rates, bluff characteristics, extent of existing shore protection, and exposure to storm events. This mapping program should include the entire Lake Michigan shoreline in Racine County, and should make full use of previous related work, including, importantly, the shore erosion study, the Keillor-DeGroot study of recent Lake Michigan bluff recession rates, and the findings of the Racine Coastwatch Program.

2. Racine County should incorporate erosion hazard-area setbacks into the county shoreland zoning regulations. The setbacks should reflect the erosion hazards for specific reaches identified in the mapping program recommended above.

3. Racine County, assisted by the Technical Subcommittee of the Racine County Coastal Management Program Technical Advisory Committee, should modify its shoreland zoning regulations to indicate, in as much detail as practicable, the design criteria considered by the County in its review of conditional use permits for shore protection activities, and to establish requirements for the maintenance of shore protection structures.

4. In preparing its new subdivision control ordinance, Racine County should include provisions requiring that Lake Michigan shore erosion hazard areas be shown on land division plat maps. In addition, Racine County should include provisions requiring that erosion hazard abatement plans be prepared for any lands which are proposed to be developed and which are subject to Lake Michigan erosion hazards, indicating the precautions that will be taken to prevent future erosion hazard situations. Such plans should indicate that residences, commercial buildings, and other permanent structures will be located outside identified erosion hazard areas or, alternatively, indicate the types of shore protection measures that will be installed to justify a smaller setback. Finally, the new subdivision control ordinance should require that new lots created along the Lake Michigan shoreline be oriented perpendicular to the shoreline. The perpendicular orientation of shoreline lots, in conjunction with appropriate development setback requirements, can serve to minimize the threat of shoreline erosion and bluff failure to new shoreline development.

5. Racine County should continue to collect and analyze information on Lake Michigan shoreline erosion hazards and erosion hazard abatement strategies. The County, with the assistance of the University of Wisconsin

Sea Grant Institute, has already begun development of a data base on Lake Michigan shoreline erosion. This data base would be significantly enhanced by the proposed effort to identify and map existing and anticipated erosion hazard areas, by the continuation of the county Coastwatch Program, and by the continuation of the work of the Technical Subcommittee of the Racine County Coastal Management Program Technical Advisory Committee as it investigates various shore erosion concerns. The University of Wisconsin-Extension, through its appropriate county extension agent, should assist Racine County in the dissemination of shoreline erosion information to local officials and riparian property owners. Other agencies and institutions which may assist in the dissemination of erosion-related information include the Wisconsin Geological and Natural History Survey, the University of Wisconsin Sea Grant Institute, the Gateway Technical Institute, and the University of Wisconsin-Parkside.

6. The City of Racine and the Villages of North Bay and Wind Point should determine whether shoreline erosion-related zoning regulations are necessary after an analysis of the results of the recommended county effort to identify and map existing and future erosion hazard areas along the Lake Michigan shoreline in Racine County. Despite the highly developed nature of the Lake Michigan shoreline in the incorporated civil divisions, certain erosion-related zoning provisions may be useful. Zoning powers could, for example, be used to regulate the expansion of existing residences, commercial buildings, and other structures which are subject to erosion hazards; to regulate new development in remaining undeveloped shoreline areas and declining areas which may be redeveloped for alternative uses, in order to prevent the creation of new erosion hazards; and to regulate the installation and modification of structural shore protection devices and to require the maintenance of structural shore protection devices once they are installed. Such shoreline erosion-related zoning regulations could be established as part of local comprehensive zoning ordinances or as special shoreland zoning regulations similar to county shoreland zoning regulations.

7. The Racine County Planning and Zoning Department should serve as the "first contact" agency for all riparian landowners proposing structural shore protection or other work along Lake Michigan at or below the ordinary high water mark. In this capacity, the Department should distribute the state-federal permit application form along with the county conditional use application form as needed, and explain the basic permit application procedures of the respective agencies to concerned riparians. The Department should, moreover, notify the concerned local unit of government of any proposed work. In addition, Racine County should remain receptive to any efforts by the Wisconsin Department of Natural Resources (DNR) and U. S. Army Corps of Engineers to develop a joint water regulatory permit application form which may be used by counties in the State as well as by the DNR and Corps of Engineers in the regulation of shoreland areas.

Recreation Access Recommendations:

1. Racine County, in conjunction with the coastal civil divisions, including, importantly, the City of Racine, should undertake a shoreland recreation access study following the guidelines previously set forth in

Chapter III of this report. It should be noted that, subsequent to the initiation of the shoreland development management study, both Racine County and the City of Racine applied for grants under the Wisconsin Coastal Management Program in support of Lake Michigan shoreland recreation access studies, and both have received a funding commitment.[2]

The City of Racine study is intended to result in a detailed plan to guide acquisition, development, and redevelopment of city waterfront parks in an effort to increase the accessibility, attractiveness, and continuity of the existing system of city waterfront parks. The Racine County study is intended to identify and evaluate potential shoreland recreation sites, determine the general availability of such sites, and develop a plan for the acquisition and development of remaining sites as well as for the enhancement of existing lakefront recreation areas. It is imperative that the city and county studies be closely coordinated. Efforts should be made at the outset to mutually establish the scope and specific end products of the respective studies, as well as to ensure the use of a common data base. Properly coordinated, the resulting plans will provide a guide for the development of a more integrated park and open space system along the common Lake Michigan shoreline.

2. All existing public park and outdoor recreation areas in the shoreland development management study area should be placed within a park and recreation zoning district or similar zoning district which would serve to preserve the character of existing natural resources, permit the provision of compatible outdoor recreation facilities, and prohibit urban and other incompatible uses. The City of Racine and the Villages of North Bay and Wind Point should consider creating such a district and placing existing public park and recreation lands in this district. Racine County, in conjunction with the Town of Caledonia, should place existing public park and recreation lands located in the Town of Caledonia in the recreational park district of the county zoning ordinance.

   As a rule, existing private outdoor recreation sites should also be placed in a park and recreation zoning district. There is, however, only one private outdoor recreation site in the study area--the outdoor recreation area associated with the Prairie School in the Village of Wind Point--and that site should be placed in an institutional zoning district in keeping with the primary use of the site as an educational institution. It is additionally recommended, however, that the zoning agencies of the Towns of Caledonia and Mt. Pleasant, the Villages of North Bay and Wind Point, and the City of Racine consider modifying existing zoning district maps, as appropriate, to ensure that private outdoor recreation sites outside the study area as well as public outdoor recreation sites both inside and outside the study area are zoned in park and recreation zoning districts or similar districts.

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[2]The City of Racine and Racine County have chosen consultants for the shoreland public access studies. The City of Racine has retained the Sanborn Group, Inc., to conduct the study of city waterfront parks, while Racine County has selected the Regional Planning Commission to undertake its shoreland public access study.

3. Upon completion of the proposed shoreland recreation studies, all additional recreation areas recommended under these studies should be placed in a park and recreation zoning district by the concerned local units of government.

4. Upon completion of the proposed shoreland recreation studies, Racine County and the concerned local units of government should acquire those lands recommended for outdoor recreation use through the acquisition of full fee simple interest in property or through approaches involving the acquisition of less than fee simple interest, in accordance with the findings and recommendations of those studies.

Natural Resource Preservation Recommendations:

1. Racine County, in conjunction with the Town of Caledonia, should amend the existing zoning district map for the Town of Caledonia to properly protect the remaining wetlands and woodlands within the study area in the Town. Remaining woodlands which are not placed in the Recreational Park District of the county zoning ordinance should be placed in the Country Estate District, which limits development to large lot residential use and thereby serves to preserve existing natural features. Remaining wetlands should be placed in the Resource Conservation District of the Racine County zoning ordinance, thereby prohibiting urban development within these remnant wetland areas. Agricultural lands recommended for preservation under the Racine County farmland preservation plan should be placed in the General Farming District of the county zoning ordinance. Such zoning would preserve the area for agricultural use and would ensure the availability of open space land for the expansion of Cliffside Park, as recommended in the recent study of Cliffside Park and adjacent lands prepared for Racine County by Owen Ayres & Associates, Inc.

2. The City of Racine and the Villages of North Bay and Wind Point should consider enacting shoreland zoning regulations to protect the Lake Michigan shoreland area. Shoreland zoning can regulate the placement of structures and restrict tree cutting, shrubbery removal, filling, grading, and the removal of beach material within the shoreland area, thereby preserving remaining shore cover and the scenic beauty of the area. Such regulations could be established as part of comprehensive local zoning ordinances or as special shoreland zoning regulations similar to the Racine County shoreland zoning regulations.

3. The shoreland recreation studies proposed by the City of Racine and Racine County should identify all remaining open space land within the coastal areas that should be acquired for open space preservation purposes, as well as for outdoor recreation purposes. The proposed City of Racine study should, in addition, identify lands presently in urban use which are obsolete or otherwise ready for redevelopment and which should be acquired for environmental corridor restoration purposes. Upon completion of these studies, Racine County and the concerned local units of government should acquire open space lands in full or partial interest, as recommended in the studies. In general, outright acquisition of open space lands is most appropriate in the preservation of significant natural resource areas which are threatened by urban encroachment.

Approaches involving the acquisition of less than fee simple interest--such as the purchase of conservancy or scenic easements--may be used to protect less critical resource areas where such approaches may be shown to be a cost-effective means of preserving open space.

Land Use Recommendations:

1. The zoning agencies of the five local units of government with jurisdiction in the Racine County Lake Michigan shoreline area should review the present zoning of their shoreland areas to ensure that the zoning properly restricts new development to appropriate shoreland uses. Uses most appropriate to the Lake Michigan shoreland area are those which significantly benefit from, or are significantly enhanced by, a shoreland location; which are not precluded by flooding, erosion, and recession hazards which exist in the area; which can readily accommodate public access to shoreland areas; which maintain or enhance the beauty of the shoreland environment and related scenic vistas; and which restore, maintain, or at least do not unduly impair the natural resource base. Land uses identified by the Shoreland Development Management Study Steering Committee as meeting these general criteria include park and open space uses; lakefront-oriented commercial, governmental, and institutional uses--in particular, those designed to maintain lakefront vistas and to provide public access to the waterfront; and residential uses--in particular, residential development which is designed to maintain lakefront vistas and to incorporate public access to the waterfront, insofar as possible. In currently undeveloped areas, very low-density residential development on lots of five acres or more in size is considered an appropriate use.

2. The City of Racine should continue its ongoing effort to conserve and revitalize its older urban areas, including, importantly, older development within the shoreland development management study area. It should be noted that several efforts are underway to renew portions of the central city which are included in the shoreland development management study area. The City has prepared, and is in the process of implementing, plans for the Lakeshore Redevelopment Project area and the Monument Square East urban renewal area, and the City has established a tax incremental finance district and formulated a related plan of public improvements for a portion of the City within the shoreland development study area south of the Root River. The plan for the Lakeshore Development Project area is particularly noteworthy for the regulations which it imposes on building height and coverage in order to maintain lake vistas as redevelopment proceeds within the area. The City of Racine should continue such revitalization programs in an effort to increase public access, maintain lake vistas, and enhance the overall beauty of the shoreland area.

CONCLUSION

The management of the Lake Michigan shoreland is a complex task requiring the consideration of many interrelated factors and the close coordination and cooperation of the many interests concerned. The shoreland development management study was undertaken to determine whether and how the existing management system might be improved to better achieve coastal development priorities. Under the guidance of the Shoreland Development Management Study Steering Committee, this study has identified major coastal management concerns within

the Lake Michigan shoreland area of Racine County; set forth broad goals which public policy within the shoreland area should promote over time; analyzed existing shoreland management practices; and formulated recommendations to improve shoreland management practices, including recommendations for modifications to local land use regulatory ordinances and recommendations for additional studies that should be undertaken within the coastal area.

In conclusion, the success of the future management of the Lake Michigan shoreland area of Racine County depends, in large measure, on the coordination and cooperation of the units and agencies of government concerned. Racine County, the City of Racine, the Villages of North Bay and Wind Point, the Towns of Caledonia and Mt. Pleasant, the Racine County Soil and Water Conservation District, the Wisconsin Department of Natural Resources, and the U. S. Army Corps of Engineers all have management responsibilities within the common Lake Michigan shoreland area. Appropriate coordination among these agencies and units of government--including the coordination of planning activities, regulatory activities, and land acquisition, development, and redevelopment activities--can contribute significantly to the attainment of common shoreland management objectives.

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