APPENDIX 13
Land Use and Management

GREAT LAKES BASIN FRAMEWORK STUDY

Great Lakes Basin Framework Study

APPENDIX 13

LAND USE AND MANAGEMENT

GREAT LAKES BASIN COMMISSION

Prepared by Land Use and Management Work Group

Sponsored by Forest Service and Soil Conservation Service

U.S. Department of Agriculture

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This appendix to the *Report* of the *Great Lakes Basin Framework Study* was prepared at field level under the auspices of the Great Lakes Basin Commission to provide data for use in the conduct of the Study and preparation of the *Report*. The conclusions and recommendations herein are those of the group preparing the appendix and not necessarily those of the Basin Commission. The recommendations of the Great Lakes Basin Commission are included in the *Report*.

OUTLINE

SYNOPSIS

This appendix presents an inventory of existing land use and management conditions in the Great Lakes Basin and a discussion of major problems.

Data on the total drainage area of the Great Lakes Basin, defined on a hydrologic basis, are summarized by Lake basin and river basin group. Land and water areas and present and projected land use acreages defined on a county line basis are presented for the Great Lakes Region. These data are summarized by planning subarea.

Agricultural and forest land resources are examined in depth. An analysis of land use by land capability class shows that for the Region as a whole land use is fairly consistent with its capabilities. A study of land treatment needs is also presented. Land use and agricultural production projections indicate that the land base is adequate to meet the Region's share of national food and fiber requirements through 2020.

Projections of urban land requirements indicate a continuing withdrawal of agricultural and forest land for urban expansion. Problems of changing rural land to urban use are discussed.

Recommendations are presented for programs that will enhance the use and management of Basin's land resources. Suggested programs include accelerated agricultural and forest land treatment, urban and regional information systems, and formulation of a comprehensive land use policy.

FOREWORD

Appendix 13, *Land Use and Management*, was initiated in 1968 and completed in 1971. Its preparation was sponsored by the Forest Service and Soil Conservation Service of the United States Department of Agriculture. The agencies participated under authority contained in Section 6 of the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress, as amended).

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Photographs in this appendix were provided by the Forest Service and Soil Conservation Service of the U.S. Department of Agriculture.

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INTRODUCTION

Objective and Scope

An objective of this *Great Lakes Basin Framework Study* appendix is to present an appraisal of the Region's agricultural, forestry, urban, and other land resources. Management and major problems are outlined together with the potential to produce food, feed, fiber, and forest products. This information is necessary in order to evaluate the potential of these resources to meet the Basin's present as well as projected 1980, 2000, and 2020 needs. The information provided will assist in developing a comprehensive plan for the coordinated and orderly development, management, and use of water and related land resources to satisfy projected needs in the Basin.

Relation to Other Appendixes

There is a direct relationship between the land resource base presented in this appendix and those investigations presented in Appendix 12, *Shore Use and Erosion*; Appendix 14, *Flood Plains*; Appendix 15, *Irrigation*; Appendix 16, *Drainage*; Appendix 17, *Wildlife*; Appendix 18, *Erosion and Sedimentation*; Appendix 19, *Economic and Demographic Studies*; Appendix 21, *Outdoor Recreation*; and Appendix 22, *Aesthetic and Cultural Resources*. Each of these appendixes deals with an aspect of the land resource base.

Historical Background

Less than two centuries ago the Great Lakes Basin was the domain of the Indians and a few French fur traders. Except for small cultivated areas near some Indian villages, nearly all of the area in the Basin States was covered with a vast primeval forest. Principal land use supported a hunting and trapping economy. The streams of the Basin ran clear. Large areas, since drained for agriculture and other uses, were covered for months at a time with standing water. There were no roads. People and produce were transported in birchbark canoes.

The southern half of the Lower Peninsula of Michigan, northern Ohio, Indiana, and southern Wisconsin had several small open prairies that later became sites of early settlement. Dominant forests containing numerous oak openings were also favored by early settlers because they were relatively easy to clear for farms. Most of the remaining land in this area was covered with mixed hardwoods, primarily maple, hickory, elm, ash, and basswood. Forests containing pines were found in parts of southern Michigan, particularly in the Thumb area, Saginaw Valley, and in sandy areas along Lake Michigan. Pines were a more common feature in the northern two-thirds of Michigan, northern Wisconsin, and east central Minnesota, where they were found usually in combination with stands of hardwoods. It was these forests that provided the famous pineries that attracted and supported a booming lumber business from the 1870s to the early 1900s.

The first major change in land use came with land settlement, which began around 1800. By 1850 4.4 million acres were in farms. Just 1.9 million of these were considered improved farmland. The area in farms increased rapidly to 13 million acres of improved farmland by 1920.

The next major phase of the Basin's land-use evolution emerged with the rise of the cutover land problem. Most early observers of the land settlement process in the Basin assumed that the plow would follow the axe across the northern landscape. Owners of timberlands expected to cut their merchantable timber and then sell the partially cleared lands to prospective farmers. But much of the land in northern Michigan, Wisconsin, and east central Minnesota proved to be ill-suited for sustained agricultural use. Only those farms located on good soils prospered.

When cleared farms were abandoned, and the word spread that it was not profitable for agriculture, demand for cutover land all but disappeared, and hundreds of owners stopped

paying taxes on all but their choice holdings. In 1932, 17.2 million acres, almost half of the land area of the State of Michigan, was tax-delinquent. By 1941, approximately 4.5 million acres of this area tax-reverted to the State. Thousands of additional acres were saved from possible tax reversion by Federal purchase programs that acquired lands for national forests, wildlife refuges, and military purposes.

The farm settlement and timber-cutting period also brought major changes in water use. The Basin lost much of the land cover that had helped hold back the rapid discharge of flood waters. Soil erosion caused muddy streams and sedimentation problems. Thousands of acres of farmland were drained.

Urban areas began to grow after the Civil War. Many who moved from farms to urban centers found employment in manufacturing and trade. Great Lakes shipping provided an economic base for several port cities, while other cities grew near sites of natural resource extraction. The depression of the 1930s slowed the trend of rural-to-urban migration, but it has proceeded at a rapid pace since World War II.

Suburban developments began in a limited way in the 1890s with the coming of the electric interurban and trolley car, but the automobile was the key to expansion of the suburban fringe. During the 1950s several major cities in the Basin lost population while the suburbs experienced rapid growth. This trend, which continues today, has precipitated many land use and management problems.

Waste disposal also is a problem. Continued use of the lakes and streams for waste disposal necessitated public controls over the handling and treatment of those wastes. Interest is now turning to land disposal of wastewater. This proposal offers new challenges and opportunities for land use and management.

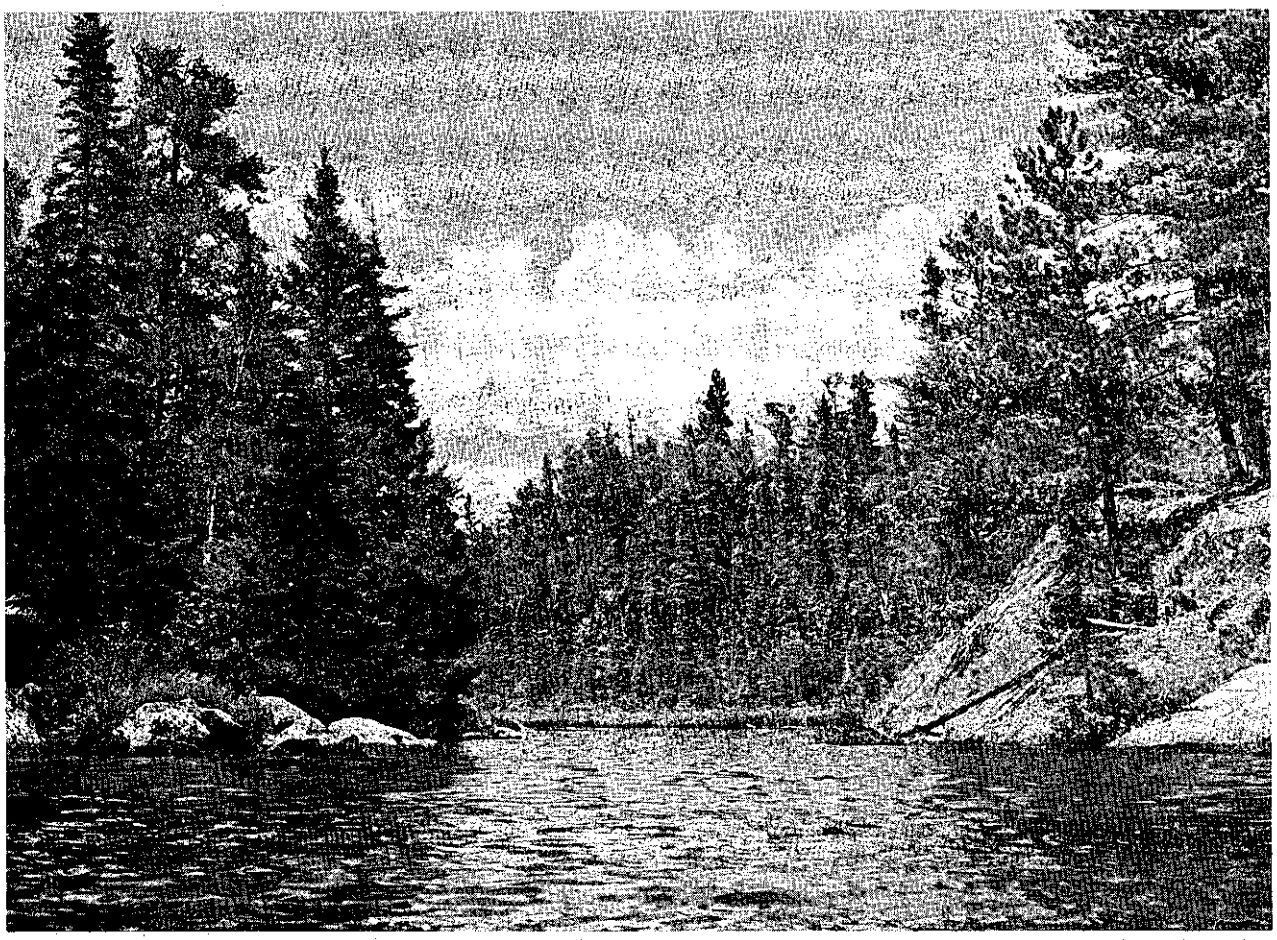


FIGURE 13–1 Great Lakes Basin Forests. At one time, most of the Great Lakes Basin was covered by vast forests with clear lakes and streams.

Section 1

PRESENT LAND AREA

1.1 Introduction

Basic to a study of land use and management conditions is delineation of the total Great Lakes Basin area. Land and water areas were determined on a county basis. The total Basin area was also determined on a hydrologic basis.

1.2 Methodology

1.2.1 Land and Water Areas

Several sources of county data were used in developing estimates of land and water areas. Since other reports often use just one data source, they may be at variance with the figures contained here. Problems concerning the definition of water areas were the most difficult to resolve. The procedures used in this study are believed to be the most reasonable in view of existing data.

The total area of each county (land plus water) was obtained from *Area Measurement Reports*.[1] These reports contain county measurements performed at the time of the 1960 census, with adjustments to reflect changes in county boundaries after that date (e.g., Menominee County, Wisconsin). For counties bordering on the Great Lakes, the area within harbors and embayments whose headlands are less than 10 nautical miles apart was included in total county area.

Total water area by county was calculated from data in the *Area Measurement Reports* (AMR), and the *National Inventory of Soil and Water Conservation Needs* (CNI).[2] The AMR reported only water area more than 40 acres. This included ponds, lakes, or similar areas of 40 acres or more, and streams and channels one-eighth mile or more in width. Also included was the water surface (more than 40 acres) of harbors and embayments. The CNI reported water areas less than 40 acres, including lakes and ponds with surface area of more than 2 acres, but less than 40 acres, and rivers and streams less than one-eighth mile in width. Total water area in this appendix is a summation of the AMR and CNI reported areas. Total land area was then calculated as a residual.

1.2.2 Hydrologic Areas

A watershed inventory completed as part of the 1967 CNI provided the basic data for determination of hydrologic areas. These data were reviewed in each State and adjusted where necessary to conform to more recent reports. The CNI reported only total drainage area measurements. No attempt has been made to break down these data into land and water areas.

1.3 Region, Plan Areas, Planning Subareas

The Great Lakes Region, as defined in this study, is an approximation by county boundaries of the Great Lakes hydrologic area. The Region is divided into five plan areas on a county basis. These plan areas, one for each of the five Great Lakes, have been further divided into groups of associated counties called planning subareas. These planning subareas include whole counties. There are 15 planning subareas in the Region (Figure 13–2).

The Region encompasses more than 86.5 million acres, including more than 2.9 million acres of water area (exclusive of the Great Lakes) and more than 83.5 million acres of land (Table 13–1). It includes 191 counties in parts of eight States. Michigan covers the largest portion of the Region; Pennsylvania covers the smallest (Figure 13–3).

1.4 Basins and River Basin Groups

The Great Lakes Basin, defined on a hydrologic basis, is divided into five Lake basins (Figure 13–4), which are further divided into river basin groups representing the drainage areas of major rivers and stream complexes. The 15 river basin groups represent a total

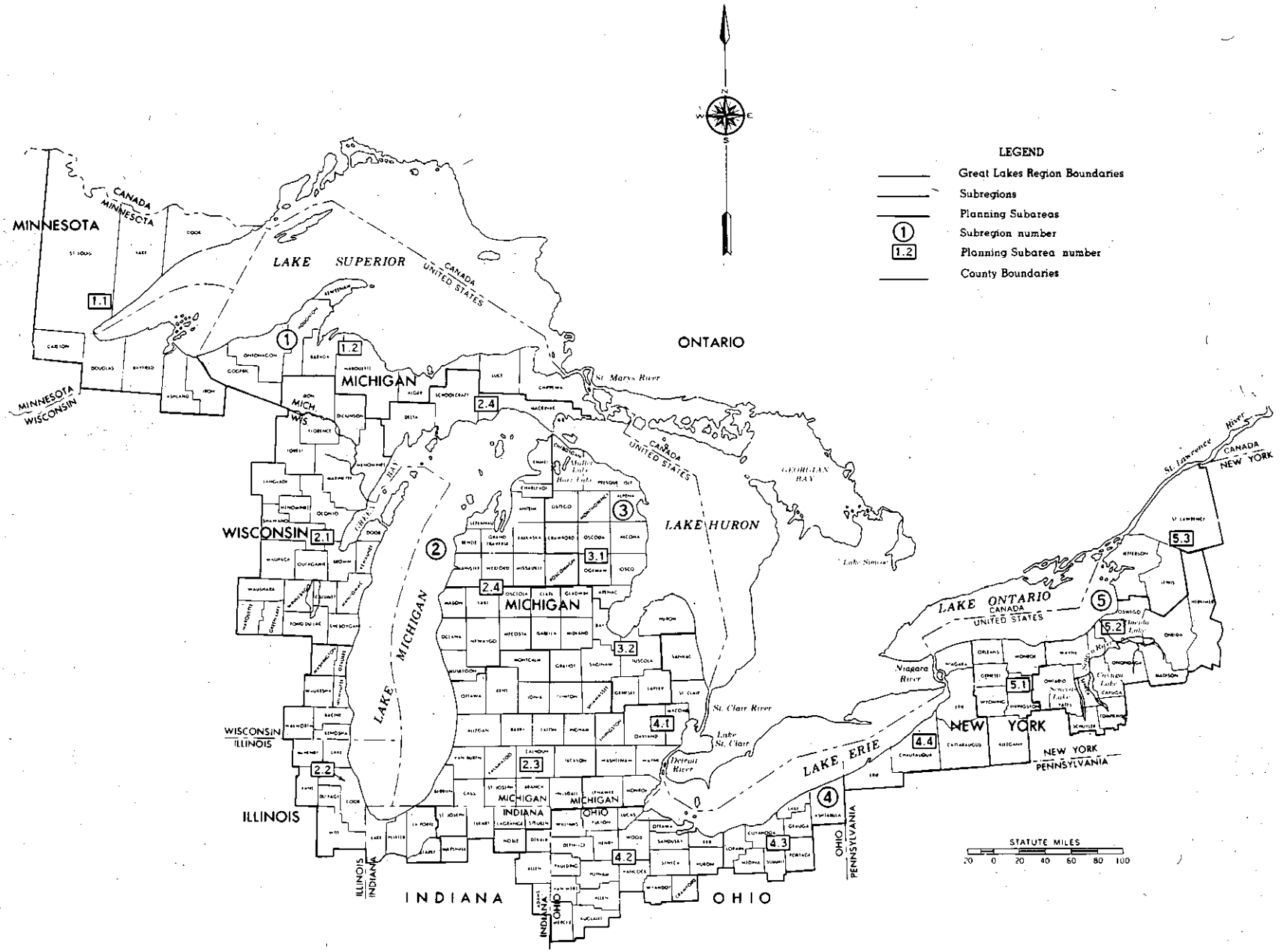


FIGURE 13–2 Basin Map—Planning Subareas

drainage area of 75,284,000 acres (Table 13–2).

Since the hydrologic areas include only portions of some counties, these measurements differ from those for the Region, which are on a county basis. The total area of the 15 planning subareas is 11,222,900 acres larger than the total area of the 15 river basin groups (Table 13–3).

TABLE 13–1 Total Area, Water Areas, and Total Land Area by Planning Subarea[1]

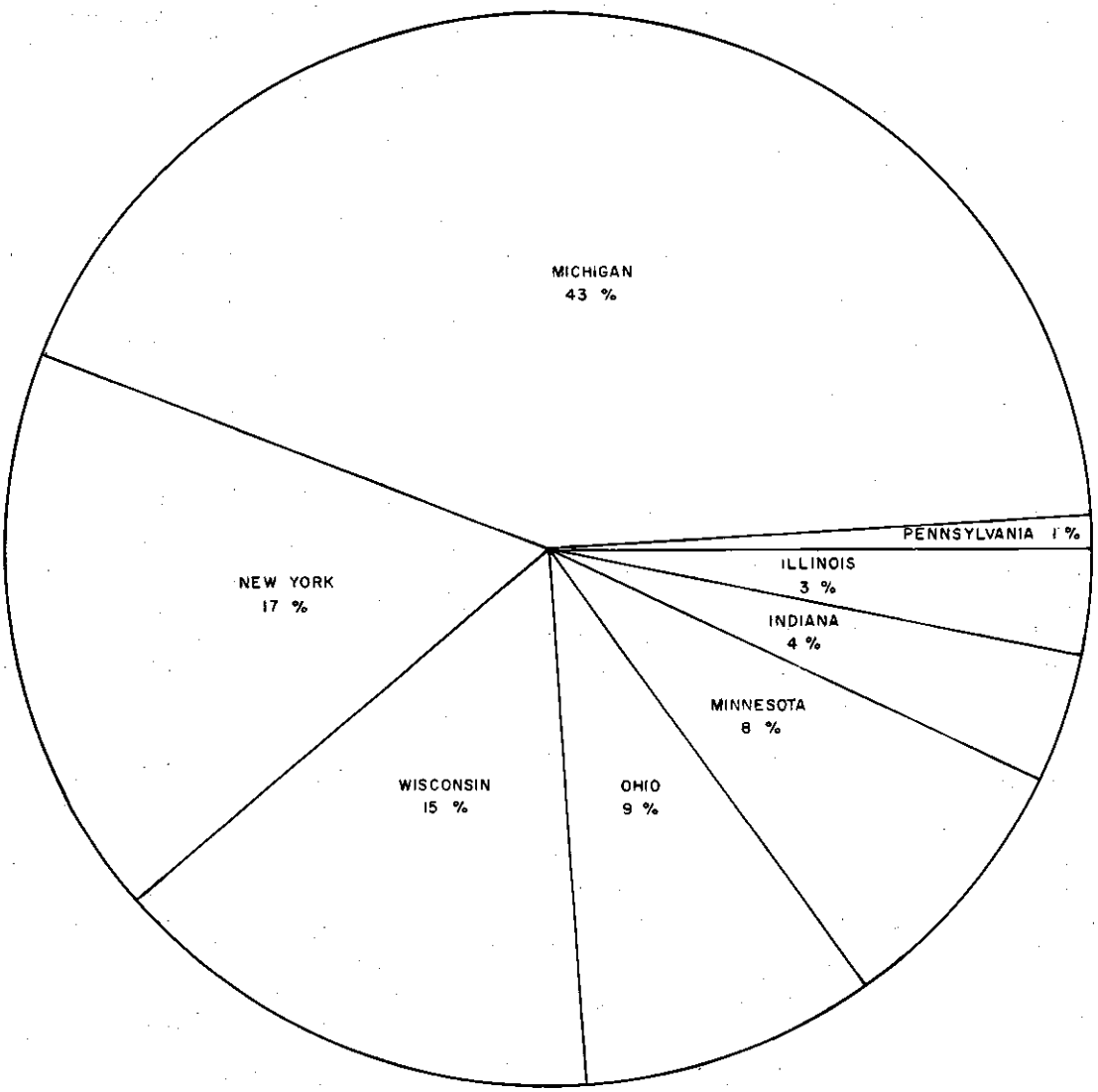
Planning Subarea State	Total Area	Rivers, Lakes and Embayments	Total Land Area
	(ACRES X 1,000)		
	Area Measurement by County Boundaries		
Planning Subarea 1.1			
Minn.	7,317.8	737.9	6,579.9
Wisc.	3,006.7	113.1	2,893.6
Planning Subarea Total	10,324.5	851.0	9,473.5
Planning Subarea 1.2			
Mich.	6,673.9	232.1	6,441.8
Planning Subarea 2.1			
Mich.	1,936.6	46.8	1,889.8
Wisc.	8,465.3	344.4	8,120.9
Planning Subarea Total	10,401.9	391.2	10,010.7
Planning Subarea 2.2			
Illinois	2,401.3	34.0	2,367.3
Indiana	1,194.2	19.9	1,174.3
Wisc.	1,720.3	49.8	1,670.5
Planning Subarea Total	5,315.8	103.7	5,212.1
Planning Subarea 2.3			
Indiana	1,608.3	27.9	1,580.4
Mich.	7,518.1	143.1	7,375.0
Planning Subarea Total	9,126.4	171.0	8,955.4
Planning Subarea 2.4			
Mich.	8,439.0	344.8	8,094.2
Planning Subarea 3.1			
Mich.	4,167.0	149.2	4,017.8
Planning Subarea 3.2			
Mich.	4,461.4	37.3	4,424.1
Planning Subarea 4.1			
Mich.	4,062.1	81.7	3,980.4

[1] Base Year 1966–1967

TABLE 13–1(continued) Total Area, Water Areas, and Total Land Area by Planning Subarea

Planning Subarea State	Total Area	Rivers, Lakes and Embayments	Total Land Area
	(ACRES X 1,000)		
	Area Measurement by County Boundaries		
Planning Subarea 4.2			
Indiana	884.5	3.9	880.6
Ohio	5,484.2	45.3	5,438.9
Planning Subarea Total	6,368.7	49.2	6,319.5
Planning Subarea 4.3			
Ohio	2,332.2	23.6	2,308.6
Planning Subarea 4.4			
Pa.	524.2	5.1	519.1
N. Y.	2,588.8	38.0	2,550.8
Planning Subarea Total	3,113.0	43.1	3,069.9
Planning Subarea 5.1			
N. Y.	2,476.8	18.1	2,458.7
Planning Subarea 5.2			
N. Y.	5,682.6	255.2	5,427.4
Planning Subarea 5.3			
N. Y.	3,561.6	176.0	3,385.6
TOTALS	86,506.9	2,927.2	83,579.7

Source: References 1, 2.



STATE	TOTAL AREA IN REGION (1,000,000 ACRES)
MICHIGAN	37.3
NEW YORK	14.3
WISCONSIN	13.2
OHIO	7.8
MINNESOTA	7.3
INDIANA	3.7
ILLINOIS	2.4
PENNSYLVANIA	0.5
STATES TOTAL	86.5

FIGURE 13–3 Percentage of Total Region Area in Each State.

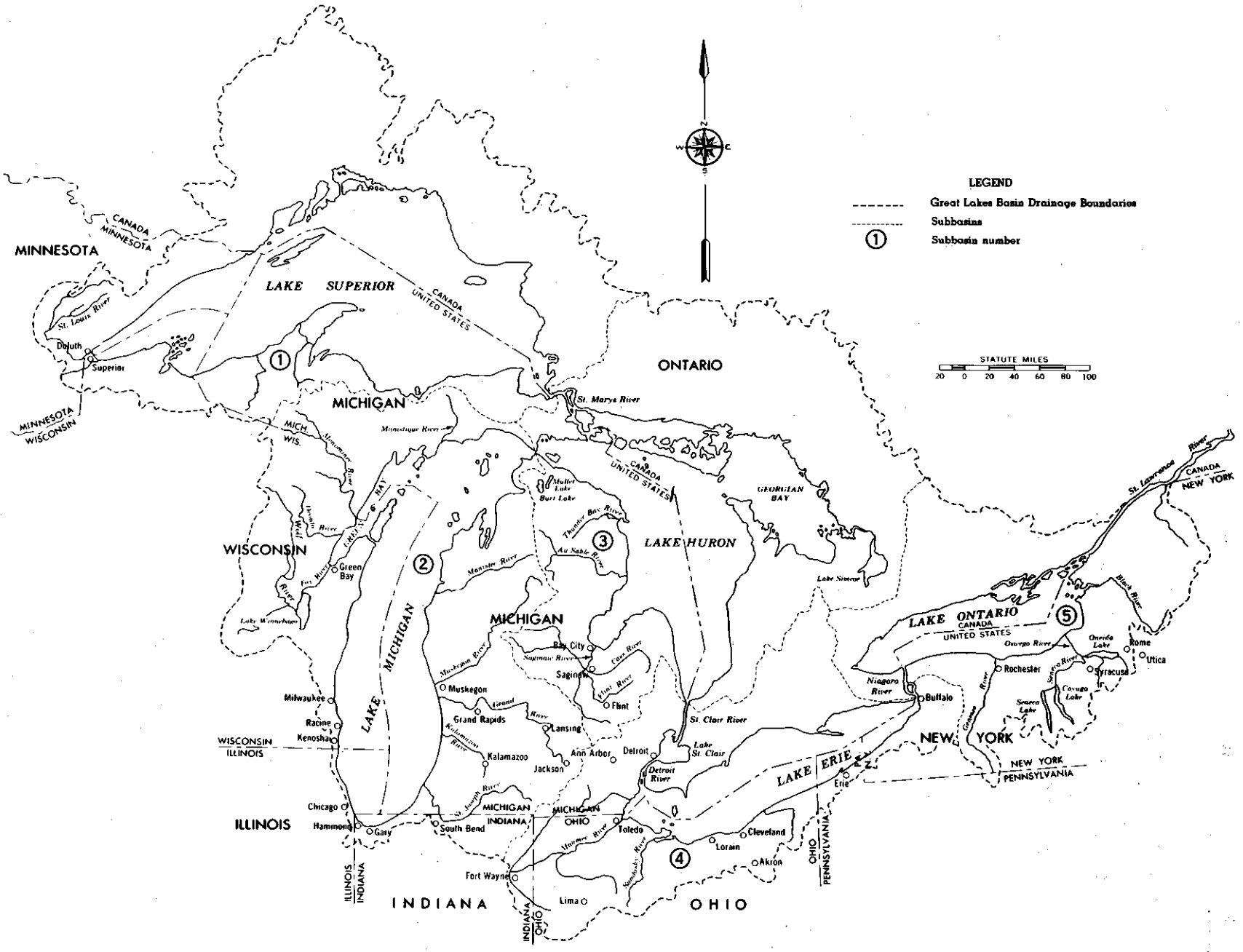


FIGURE 13–4 Lake Basins

TABLE 13–2 Drainage Area Measurement (Hydrologic)[1]

	(ACRES (X 1000)		
	Lake Basins	RBGs	Complexes
LAKE SUPERIOR BASIN	10,871		
River Basin Group 1.1		5,907	
Superior Slope Complex (Minnesota)			1,470
Saint Louis River			2,334
Minnesota 2,294			
Wisconsin 40			
Apostle Island Complex			1,269
Minnesota 167			
Wisconsin 1,102			
Bad River (Wisconsin)			637
Montreal River Complex			197
Michigan 84			
Wisconsin 113			
River Basin Group 1.2		4,964	
Porcupine Mountains Complex			672
Michigan 630			
Wisconsin 42			
Ontonagon River			872
Michigan 855			
Wisconsin 17			
Keweenaw Peninsula Complex (Michigan)			865
Sturgeon River (Michigan)			452
Huron Mountain Complex (Michigan)			622
Grand Marais Complex (Michigan)			768
Tahquamenon River (Michigan)			540
Sault Complex (Michigan)			173
LAKE MICHIGAN BASIN	29,011		
River Basin Group 2.1		10,791	
Menominee Complex (Michigan)			674
Menominee River			2,621
Michigan 1,627			
Wisconsin 994			
Peshtigo River (Wisconsin)			737
Oconto and Pennsaukee Complex (Wisconsin)			680
Saumico Complex (Wisconsin)			310
Fox River (Wisconsin)			4,225
Green Bay Complex (Wisconsin)			1,544

[1] Area measurements also include small watersheds, streams, and land areas that drain directly into Basin Lakes.

TABLE 13-2(continued) Drainage Area Measurement (Hydrologic)

	ACRES (X 1000)		
	Lake Basins	RBGs	Complexes
River Basin Group 2.2		1,392	
Chicago-Milwaukee Complex			1,392
Indiana 426			
Illinois 39 *			
Michigan 106			
Wisconsin 821			
River Basin Group 2.3		8,292	
Saint Joseph River			2,992
Indiana 1,085			
Michigan 1,907			
Black River (South Haven) Complex (Michigan)			229
Kalamazoo River (Michigan)			1,285
Black River (Ottawa Co.) Complex (Michigan)			163
Grand River (Michigan)			3,623
River Basin Group 2.4		8,536	
Muskegon River (Michigan)			1,692
Sable Complex (Michigan)			1,242
Manistee River (Michigan)			1,284
Traverse Complex (Michigan)			1,689
Seul Choix-Groscap Complex (Michigan)			352
Manistique River (Michigan)			926
Bay De Noc Complex (Michigan)			765
Escanaba River (Michigan)			586
LAKE HURON BASIN	10,358		
River Basin Group 3.1		5,208	
Les Cheneaux Complex (Michigan)			901
Cheboygan River (Michigan)			1,010
Presque Isle Complex (Michigan)			358
Thunder Bay River (Michigan)			808
Alcona Complex (Michigan)			123
Au Sable River (Michigan)			1,299
Rifle-Au Gres Complex (Michigan)			709
River Basin Group 3.2		5,150	
Kawkawlin Complex (Michigan)			248
Saginaw River (Michigan)			3,995
Thumb Complex (Michigan)			907

* Figures do not include Chicago (201) and part of the Calumet (216) Rivers which are now diverted out of the Basin.

TABLE 13-2(continued) Drainage Area Measurement (Hydrologic)

		ACRES (X 1000)		
		Lake Basins	RBGs	Complexes
LAKE ERIE BASIN		13,735		
River Basin Group 4.1			3,328	
Black River (Michigan)				446
St. Clair Complex (Michigan)				383
Clinton River (Michigan)				501
Rouge Complex (Michigan)				468
Huron River (Michigan)				543
Swan Creek Complex (Michigan)				182
Raisin River				805
Michigan	790			
Ohio	15			
River Basin Group 4.2			6,635	
Maumee River				4,229
Indiana	821			
Michigan	296			
Ohio	3,112			
Tenmile Creek				109
Michigan	32			
Ohio	77			
Toussaint-Portage Complex (Ohio)				656
Sandusky River (Ohio)				980
Huron-Vermilion Complex (Ohio)				661
River Basin Group 4.3			2,082	
Black-Rocky Complex (Ohio)				568
Cuyahoga River (Ohio)				578
Chagrin Complex (Ohio)				189
Grand River (Ohio)				525
Ashtabula-Conneaut Complex				222
Ohio	119			
Pennsylvania	103			
River Basin Group 4.4			1,690	
Erie-Chautauqua Complex				418
New York	195			
Pennsylvania	223			
Cattaraugus (New York)				355
Tonawanda Complex (New York)				917
LAKE ONTARIO BASIN		11,309		
River Basin Group 5.1			2,250	
Niagara-Orleans Complex (New York)				664
Genesee River				1,586
New York	1,525			
Pennsylvania	61			

TABLE 13-2(continued) Drainage Area Measurement (Hydrologic)

	ACRES (X 1000)		
	Lake Basins	RBGs	Complexes
River Basin Group 5.2		4,363	
Wayne-Cayuga Complex (New York)			437
Oswego River (New York)			3,252
Salmon-Perch Complex (New York)			674
River Basin Group 5.3		4,696	
Black River (New York)			1,289
St. Lawrence Complex (New York)			311
Oswegatchie (New York)			1,062
Grass-Raquette-St. Regis Complex (New York)			2,034

STATE SUMMARY

Illinois	39	New York	12,715
Indiana	2,332	Ohio	7,480
Michigan	37,138	Pennsylvania	387
Minnesota	3,931	Wisconsin	11,262
GREAT LAKES TOTAL			75,284

Source: References 1, 2.

TABLE 13-3 Area of Planning Subarea (County or Political) Compared to Area of Corresponding River Basin Group (Hydrologic)

Planning Subarea	County or Political Boundaries Acreage	River Basin Groups Acreage	Difference, County or Political Boundaries over River Basin Groups
		(Acres x 1000)	
1.1	10,324.5	5,907.0	4,417.5 +
1.2	6,673.9	4,964.0	1,709.9 +
2.1	10,401.9	10,791.0	389.1 -
2.2	5,315.8	1,392.0	3,923.8 +
2.3	9,126.4	8,292.0	834.4 +
2.4	8,439.0	8,536.0	97.0 -
3.1	4,167.0	5,208.0	1,041.0 -
3.2	4,461.4	5,150.0	688.6 -
4.1	4,062.1	3,328.0	734.1 +
4.2	6,368.7	6,635.0	266.3 -
4.3	2,332.2	2,082.0	250.2 +
4.4	3,113.0	1,690.0	1,423.0 +
5.1	2,476.8	2,250.0	226.8 +
5.2	5,682.6	4,363.0	1,319.6 +
5.3	3,561.6	4,696.0	1,134.4 -
Total	86,506.9	75,284.0	11,222.9 +

Section 2

PRESENT LAND USE AND RESOURCES

2.1 Present Land Use

2.1.1 Methodology

Acreages within the various land use categories were calculated from data in the *Conservation Needs Inventory*, and *Forest Surveys*.[3] The CNI provided estimates of urban built-up, cropland, and pasture areas, while *Forest Surveys* provided the acreage of forest land. The acreage of "other" land was the residual.

Efforts by the work group to provide a detailed breakdown of land use within the urban built-up category were not successful. The major obstacle was a lack of comparable data across the Region. Urban land use studies

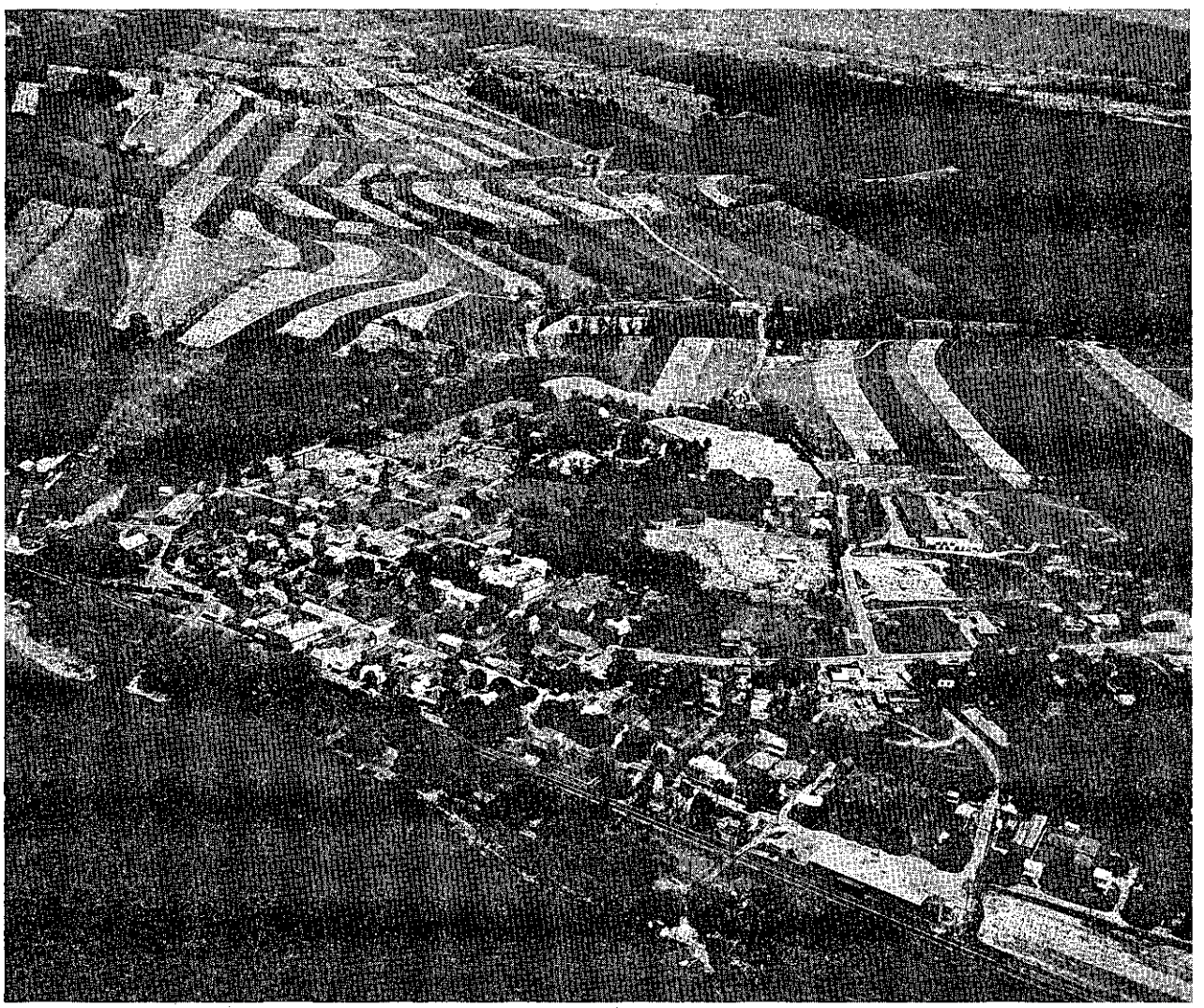


FIGURE 13–5 Land Use Patterns. The Great Lakes Region has a diverse land use pattern.

have been prepared in many parts of the Basin, but most cover relatively small municipal or county areas. Several multi-county and small regional inventories have been completed, but even these are not well suited to our purposes. Their base year and projection periods are not uniform, and there is not complete coverage of the Region. While some assistance was obtained from the U.S. Department of Housing and Urban Development, the agency currently does not compile urban land use data in a usable form. Because time and budget limitations for the work group precluded the development of primary data, the CNI was used as the most uniformly reliable source of information for the Region as a whole.

2.1.2 Summary of Present Land Use

The total land area of the Great Lakes Region is 83,579,700 acres, including 6,987,700 acres of urban built-up areas, 28,609,000 acres of cropland, 3,505,800 acres of pasture, 39,624,700 acres of forest, and 4,852,500 acres of other land (Table 13–4). More than 47 percent of the Region is forest, and more than 38 percent is agricultural (cropland and pasture). Urban built-up areas cover 8.4 percent of the

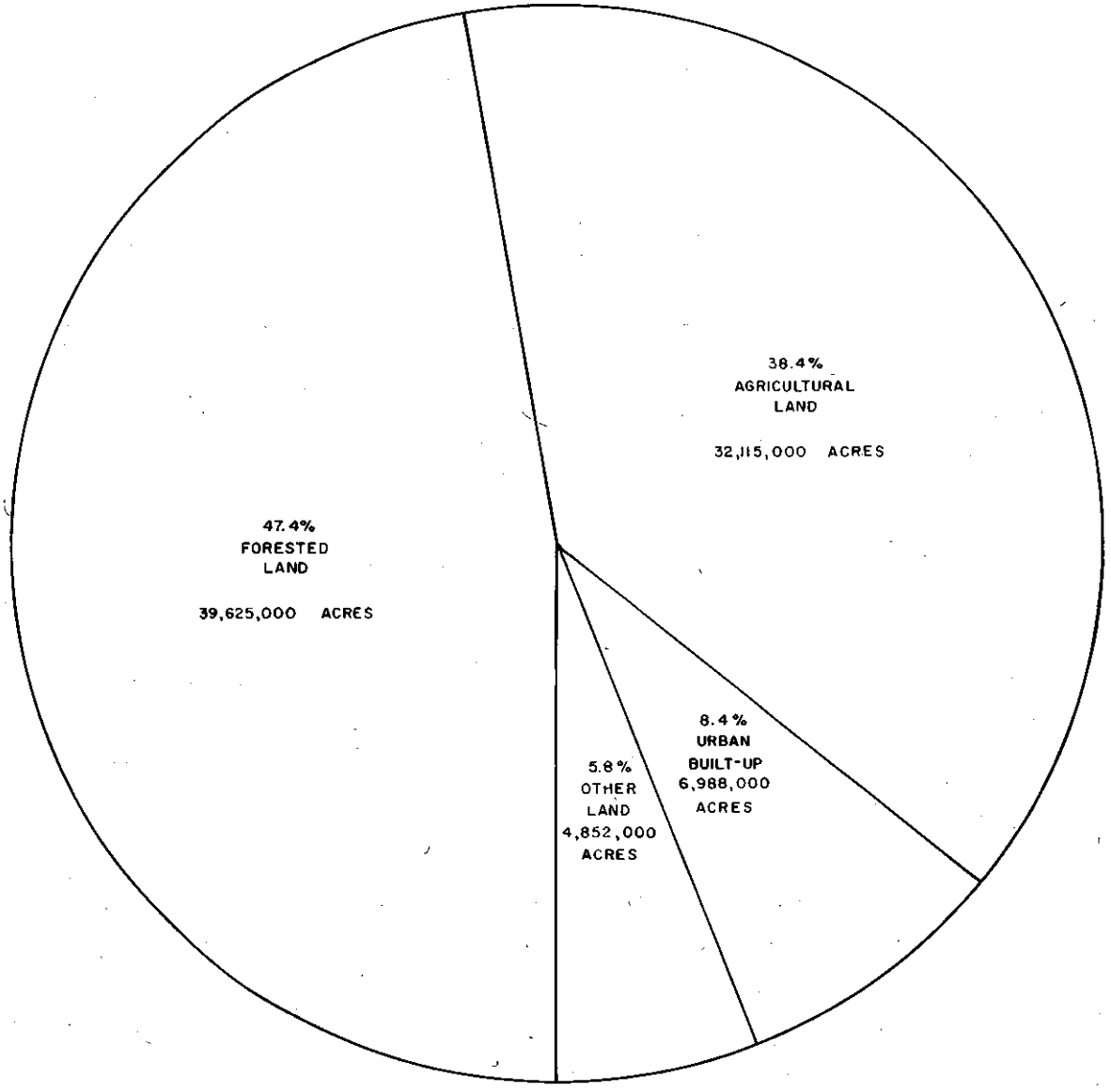


FIGURE 13–6 Distribution of Total Land Area by Land Use

TABLE 13–4 Water Area and Present Land Use[1]

Planning Subarea State	Total Area	Rivers Lakes and Embayments	Total Land Area	Urban Built-Up	Cropland	Pasture Range	Forest Land	Other
	Area Measurement by County Boundaries							
	(Acres x 1,000)							
Planning Subarea 1.1								
Minn.	7,317.8	737.9	6,579.9	162.5	258.3	62.0	5,981.5	115.6
Wisc.	3,006.7	113.1	2,893.6	122.0	171.8	37.5	2,373.4	188.9
Total	10,324.5	851.0	9,473.5	284.5	430.1	99.5	8,354.9	304.5
Planning Subarea 1.2								
Mich.	6,673.9	232.1	6,441.8	137.8	262.8	65.8	5,909.6	65.8
Planning Subarea 2.1								
Mich.	1,936.6	46.8	1,889.8	52.0	133.6	21.7	1,664.5	18.0
Wisc.	8,465.3	344.4	8,120.9	412.0	3,182.8	335.0	3,452.0	739.1
Total	10,401.9	391.2	10,010.7	464.0	3,316.4	356.7	5,116.5	757.1
Planning Subarea 2.2								
Illinois	2,401.3	34.0	2,367.3	678.0	1,249.6	98.7	93.0	248.0
Indiana	1,194.2	19.9	1,174.3	122.8	722.3	55.7	90.6	182.9
Wisc.	1,720.3	49.8	1,670.5	409.7	871.5	83.0	157.1	149.2
Total	5,315.8	103.7	5,212.1	1,210.5	2,843.4	237.4	340.7	580.1
Planning Subarea 2.3								
Indiana	1,608.3	27.9	1,580.4	156.4	1,031.3	106.8	140.1	145.8
Mich.	7,518.1	143.1	7,375.0	662.1	4,343.5	352.6	1,564.6	452.2
Total	9,126.4	171.0	8,955.4	818.5	5,374.8	459.4	1,704.7	598.0
Planning Subarea 2.4								
Mich.	8,439.0	344.8	8,094.2	414.8	1,481.5	351.8	5,434.3	411.8
Planning Subarea 3.1								
Mich.	4,167.0	149.2	4,017.8	179.6	531.2	173.6	2,914.3	219.1
Planning Subarea 3.2								
Mich.	4,461.4	37.3	4,424.1	389.0	2,370.0	185.2	1,194.7	285.2
Planning Subarea 4.1								
Mich.	4,062.1	81.7	3,980.4	759.5	2,215.6	117.7	665.7	221.9
Planning Subarea 4.2								
Indiana	884.5	3.9	880.6	102.2	638.9	40.6	71.9	27.0
Ohio	5,484.2	45.3	5,438.9	465.6	4,096.2	173.2	381.5	322.3
Total	6,368.7	49.2	6,319.5	567.8	4,735.1	213.8	453.4	349.4
Planning Subarea 4.3								
Ohio	2,332.2	23.6	2,308.6	609.0	741.3	131.3	538.8	288.2
Planning Subarea 4.4								
Pa.	524.2	5.1	519.1	49.1	142.2	41.2	223.7	62.9
N. Y.	2,588.8	38.0	2,550.8	435.9	716.5	211.4	1,140.8	46.1
Total	3,113.0	43.1	3,069.9	485.0	858.7	252.6	1,364.5	109.1
Planning Subarea 5.1								
N. Y.	2,476.8	18.1	2,458.7	271.1	1,055.1	162.9	871.5	98.1
Planning Subarea 5.2								
N. Y.	5,682.6	255.2	5,427.4	250.7	1,759.1	443.7	2,545.7	428.2
Planning Subarea 5.3								
N. Y.	3,561.6	176.0	3,385.6	145.9	633.9	254.4	2,215.4	136.0
TOTALS	86,506.9	2,927.2	83,579.7	6,987.7	28,609.0	3,505.8	39,624.7	4,852.5

[1] Base Year 1966-1967

Source: References 1, 2, 3.

Region, and 5.8 percent is other land (Table 13–5, Figure 13–6). Michigan, with 36,223,100 acres, has the largest land area within the Region, while Pennsylvania, with 519,100 acres, has the smallest area (Table 13–6).

2.2 Land Capability and Land Use

2.2.1 Land Capability Classification

CNI has classified the soil resource base according to eight land capability classes based on suitability for agricultural production. Land classes I through IV are grouped according to their potentialities and limitations for sustained production of common cultivated crops that do not require specialized site conditioning or site treatment. Class V soils have limitations that restrict the kinds of plants that can be grown and prevent normal tillage of cultivated crops. Land classes VI through VIII are grouped according to their potentialities and limitations for the production of permanent vegetation and according to their risks of soil damage if mismanaged.

The agricultural land in the Region is well adapted to the production of cultivated crops. More than 25 million acres, or slightly more than one-third of the area, is in land classes I and II (Table 13–7, Figure 13–7). An additional 32.4 million acres, or 46 percent, is in classes III and IV and is suitable for cultivation if careful soil management practices are followed. Nearly 18 percent of the land is in classes V, VI, VII, and VIII and is not suitable for cultivation.

Planning Subarea 4.2, with nearly 5.7 million acres of classes I, II, III, and IV land, has the highest proportion of cultivable land among the planning subareas (Table 13–8). Planning Subarea 2.2 has the highest proportion of class I land, while Planning Subarea 1.1 has no class I land.

2.2.2 Land Use Related to Land Capability

Land capability classification describes the potentialities of the land for various agricultural purposes on the basis of physical soil limitations. In practice the use of land often varies from the optimum prescribed by the land capability classification. We must examine how land is used as well as how it is classified.

For the Region as a whole, land use is fairly consistent with its capabilities. More than 23 million acres of cropland are on land in capability classes I through IV (Tables 13–9 to 13–23). Thus 96 percent of the cropland is on land best suited to crop production. Seventy-two percent of class I land and 63 percent of class II land is cropland. Within class III only 37 percent is cropland and only 40 percent of class IV is cropland.

The distribution in the planning subareas

TABLE 13–5 Percentage of Total Land Area by Present Land Use

Planning Subarea	Total Land Area	Urban Built-Up	Cropland	Pasture Range	Forest Land	Other
	(Acres x 1,000)		(Percentage)			
1.1	9,473.5	3.0	4.5	1.0	88.3	3.2
1.2	6,441.8	2.2	4.1	1.0	91.7	1.0
2.1	10,010.7	4.6	33.1	3.6	51.1	7.6
2.2	5,212.1	23.3	54.6	4.5	6.5	11.1
2.3	8,955.4	9.1	60.0	5.1	19.0	6.8
2.4	8,094.2	5.1	18.3	4.3	67.2	5.1
3.1	4,017.8	4.5	13.2	4.3	72.5	5.5
3.2	4,424.1	8.8	53.6	4.2	27.0	6.4
4.1	3,980.4	19.1	55.7	3.0	16.7	5.5
4.2	6,319.5	9.0	75.0	3.4	7.1	5.5
4.3	2,308.6	26.4	32.1	5.7	23.3	12.5
4.4	3,069.9	15.8	28.0	8.2	44.4	3.6
5.1	2,458.7	11.0	42.9	6.6	35.5	4.0
5.2	5,427.4	4.6	32.4	8.2	46.9	7.9
5.3	3,385.6	4.3	18.8	7.6	65.5	3.8
Totals	83,579.7	8.4	34.3	4.1	47.4	5.8

TABLE 13–6 State Summary of Water Area and Present Land Use

Planning Subarea State	Total Area	Rivers, Lakes and Embayments	Total Land Area	Urban Built-Up	Cropland	Pasture Range	Forest Land	Other
				(Acres x 1,000)				
State Summary								
Illinois	2,401.3	34.0	2,367.3	678.0	1,249.6	98.7	93.0	248.0
Indiana	3,687.0	51.7	3,635.3	381.4	2,392.5	203.1	302.6	355.7
Michigan	37,258.1	1,035.0	36,223.1	2,594.8	11,338.2	1,268.4	19,347.7	1,674.0
Minnesota	7,317.8	737.9	6,579.9	162.5	258.3	62.0	5,981.5	115.6
New York	14,309.8	487.3	13,822.5	1,103.6	4,164.6	1,072.4	6,773.4	708.5
Ohio	7,816.4	68.9	7,747.5	1,074.6	4,837.5	304.5	920.3	610.6
Pennsylvania	524.2	5.1	519.1	49.1	142.2	41.2	223.7	62.9
Wisconsin	13,192.3	507.3	12,685.0	943.7	4,226.1	455.5	5,982.5	1,077.2
Great Lakes Total	86,506.9	2,927.2	83,579.7	6,987.7	28,609.0	3,505.8	39,624.7	4,852.5

varies somewhat, but in general there are no major conflicts between land use and capability classifications. Conditions such as those in Planning Subarea 2.4, where 17 percent of the cropland is in classes VI and VII, may require more detailed study. In Planning Subarea 4.3, 60 percent of class I is forest land, while 14 percent of class VI is cropland. This suggests that some shifts in land use should be considered. Such relationships will become more important in the future as the needs for crop production increase, along with those for forest-based goods and services including recreation.

2.3 Types of Farming Areas

Wide variations in climate, soil types, and markets are found within the Basin. Farmers find it advantageous to follow types of farming best adapted to their particular local conditions. The resulting pattern determines the agricultural industry and land use of the Basin.

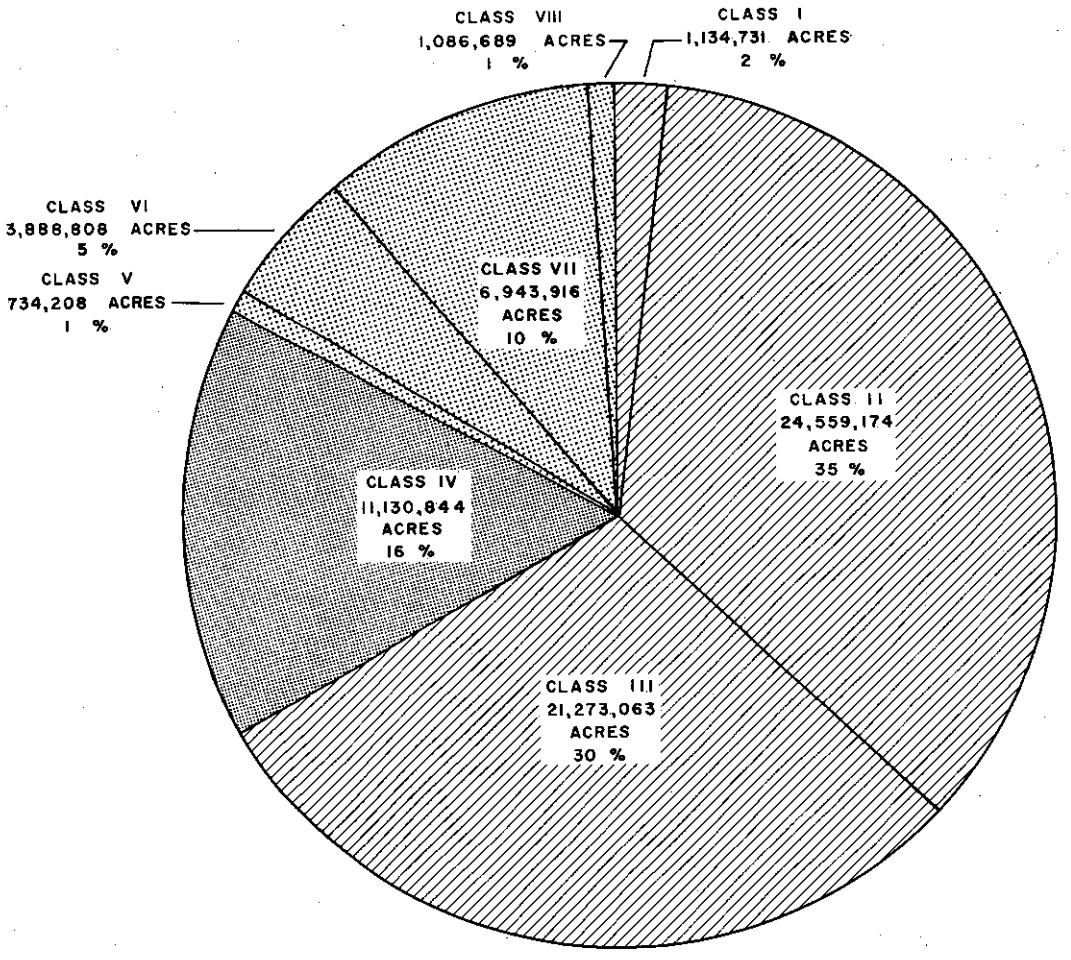
Farming areas are typed according to the source of farm income and the prevailing kinds of crops and livestock. In order for a farm to be designated a certain type, the product or groups of products have to be 50 percent or more of the value of all products sold. Within each area most of the larger or commercial farms have a high degree of similarity with respect to crop and livestock enterprises.

The Region includes a wide variety of farm types, from forestry, dairying, and potatoes, to truck and fruit crops (Figure 13–8). The divisions between the areas are not so definite as the boundary lines would indicate. The transition from one area to the next is usually gradual. In addition, there are some variations in types of farms within each area. For example, in Type-of-Farming Area 3, "fruit, dairy, and truck," there are many dairy farms and also some general farms without any fruit.

2.4 Forest Regions and Types

Forest land, which covers nearly one-half of the Region, is concentrated in the northwestern portion (Figure 13–9c).

From the standpoint of water and land resources management, the forest areas of the Region can be divided in terms of whether conifers (softwoods) or hardwoods predominate. Conifers have needle-like leaves and, with few exceptions, are in leaf all year long. Hardwoods have broad leaves and retain their leaves only during the growing season. These two kinds of forests differ structurally, in the climatic regions they occupy, in applicable management methods, and in soils on which they occur. These differences have certain hydrologic implications that should be recognized.



	ACRES	PERCENT
LAND SUITABLE FOR CULTIVATION:	46,966,968	66
LAND SUITABLE FOR OCCASIONAL CULTIVATION:	11,130,844	16
LAND NOT SUITED FOR CULTIVATION:	12,653,621	18

EXCLUDES FEDERAL AND URBAN BUILT-UP LAND

FIGURE 13–7 Land Area by Land Capability Class

TABLE 13–7 Land Capability Classes

Class	Description	Acres (x 1000)	Percent
I	Soils that have few or no conditions that limit their use. They are nearly level, generally well drained, and suited for intensive cultivation with ordinary management.	1,135	2
II	Soils that have some natural condition that limits the kinds of plants they can produce or that calls for some easily applied conservation practice when they are cultivated.	24,559	35
III	Soils that have more serious or more numerous limitations than those in Class II and are more restricted in the crops they can produce or, when cultivated, call for conservation practices more difficult to install or to keep working efficiently.	21,273	30
IV	Soils that have a very severe hazard that limits their use for cultivated crops. They require very careful management, including special conservation practices when cultivated.	11,131	16
V	Soils that have little or no erosion hazards but have other problems such as frequent overflow, ponding, or rockiness, which make them impractical for cultivation.	734	1
VI	Soils that have severe hazards that make them generally unsuited for cultivation. It is practical to apply pasture improvement. Some soils in this class can be safely used for cultivated crops but will require unusually intensive management, including special conservation practices.	3,889	5
VII	Soils that have very severe limitations that make them unsuitable for cultivation. It is usually impractical to apply pasture improvement practices. Their use is restricted largely to woodland and wildlife, or in some cases, limited grazing.	6,945	10
VIII	Soils and landforms that have limitations that prevent their use for commercial plan production and that restrict their use to recreation, water supply or wildlife food and cover with careful protections.	1,087	1
	TOTAL	70,751	100

Source: Reference 2

TABLE 13–8 Land Capability Classes by Planning Subarea

Planning Subarea	Land Capability Classes I	II	III	IV	V	VI	VII	VIII	Total[1]
				(Thousand Acres)					
1.1	-----	1,077.9	1,678.2	1,955.9	403.6	353.8	1,222.6	124.2	6,816.3
1.2	9.5	1,067.5	1,779.6	979.1	-----	372.5	803.6	201.8	5,213.5
2.1	49.7	3,809.9	2,349.8	1,503.7	73.0	407.7	487.5	128.5	8,808.8
2.2	373.1	2,268.6	720.6	293.9	67.2	136.0	54.2	48.0	3,961.4
2.3	96.1	3,682.7	2,865.4	870.3	-----	275.8	300.5	36.9	8,127.8
2.4	48.3	655.6	1,996.7	1,665.4	-----	515.4	1,711.2	122.1	6,714.6
3.1	9.3	583.8	972.5	651.1	2.7	171.6	991.9	54.4	3,437.4
3.2	16.7	1,997.1	1,294.5	405.5	0.2	61.0	240.6	9.8	4,025.5
4.1	84.2	1,805.7	949.5	251.0	-----	82.5	61.4	0.4	3,234.7
4.2	108.5	4,006.4	1,474.3	97.4	-----	30.5	18.4	-----	5,735.5
4.3	21.1	400.1	976.6	169.7	4.8	80.5	28.1	-----	1,680.8
4.4	93.1	578.1	1,110.5	407.5	22.8	221.2	102.5	0.7	2,536.4
5.1	107.8	642.2	825.7	361.2	28.1	106.2	85.0	17.7	2,174.2
5.2	113.0	1,568.0	1,498.0	1,019.5	61.6	445.5	419.9	32.2	5,157.8
5.3	4.2	415.7	780.9	499.7	70.3	629.6	416.2	310.0	3,126.7
REGION TOTAL	1,134.7	24,559.2	21,273.1	11,130.8	734.2	3,888.8	6,943.9	1,086.7	70,751.4

[1] Excludes Federal land and urban built-up areas; total may not add due to rounding.

Source: Reference 2

TABLE 13–9 Present Land Use and Land Use Distribution—Planning Subarea 1.1

Land Use	Land Capability Class I	II	III	IV	V	VI	VII	VIII	Total
				1000 Acres[1]					
Cropland	-	118.6	216.7	86.4	2.8	5.1	.5	-----	430.1
Pasture	-	21.5	52.4	18.6	0.1	3.4	3.6	-----	99.5
Forest	-	917.6	1,347.4	1,805.1	368.8	335.5	1,205.1	48.0	6,027.5
Other	-	20.3	61.7	45.7	32.0	9.9	13.4	76.2	259.1
Total	-	1,077.9	1,678.2	1,955.9	403.6	353.8	1,222.6	124.2	6,816.3
	Percent Distribution Within Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	-	11	13	4	b[2]	1	b	---	6
Pasture	-	2	3	1	b	b	b	---	2
Forest	-	85	80	92	91	95	98	39	88
Other	-	2	4	2	8	3	1	61	4
Total	-	100	100	100	100	100	100	100	100
	Percent Distribution by Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	-	28	50	20	b	b	b	--	100
Pasture	-	22	53	19	b	3	3	--	100
Forest	-	15	22	30	6	6	20	b	100
Other	-	8	24	18	12	4	5	29	100
Total	-	16	25	28	6	5	18	2	100

[1] Total may not add due to rounding
[2] Less than 1 percent

TABLE 13–10 Present Land Use and Land Use Distribution—Planning Subarea 1.2

Land Use	Land Capability Class I	II	III	IV	V	VI	VII	VIII	Total
				1000 Acres[1]					
Cropland	4.5	59.0	156.0	24.2	-	5.9	11.5	1.4	262.8
Pasture	.3	15.1	36.4	4.4	-	4.1	5.5	-	65.8
Forest	3.6	978.8	1,543.9	938.7	-	351.1	759.7	186.5	4,762.3
Other	.6	14.6	43.3	11.8	-	11.4	27.0	13.9	122.6
Total	9.5	1,067.5	1,779.6	979.1	-	372.5	803.6	201.8	5,213.5
	Percent Distribution Within Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	52	6	9	2	-	2	1	b	5
Pasture	3	1	2	b	-	1	b	-	1
Forest	38	92	87	96	-	94	96	92	91
Other	7	1	2	1	-	3	3	7	2
Total	100	100	100	100	-	100	100	100	100
	Percent Distribution by Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	2	22	59	9	-	2	4	b	100
Pasture	b	23	55	7	-	6	8	-	100
Forest	b	20	32	20	-	7	16	4	100
Other	b	12	35	10	-	9	22	11	100
Total	b	20	34	19	-	7	15	4	100

[1] Total may not add due to rounding
[2] Less than 1 percent

TABLE 13–11 Present Land Use and Land Use Distribution—Planning Subarea 2.1

Land Use	Land Capability Class I	II	III	IV	V	VI	VII	VIII	Total
				1000 Acres[1]					
Cropland	41.5	2,179.8	628.1	358.8	2.7	68.2	44.7	1.2	3,324.9
Pasture	.8	164.7	83.4	57.8	5.0	23.0	20.1	1.7	356.6
Forest	6.0	1,267.8	1,448.3	986.7	54.8	302.9	398.5	84.8	4,549.7
Other	1.4	197.7	190.0	100.4	10.6	12.5	24.2	40.8	577.7
Total	49.7	3,809.9	2,349.8	1,503.7	73.0	406.7	487.5	128.5	8,808.8
	Percent Distribution Within Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	83	57	27	24	4	17	9	b[2]	38
Pasture	2	4	3	4	7	6	4	1	4
Forest	12	33	62	66	75	74	82	66	52
Other	3	5	8	6	14	3	5	32	6
Total	100	100	100	100	100	100	100	100	100
	Percent Distribution by Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	1	65	19	11	b	2	1	b	100
Pasture	b	46	23	16	1	6	6	b	100
Forest	b	28	32	22	1	6	9	2	100
Other	b	34	33	17	2	2	4	7	100
Total	b	43	27	17	1	5	5	1	100

[1] Total may not add due to rounding
[2] Less than 1 percent

TABLE 13–12 Present Land Use and Land Use Distribution—Planning Subarea 2.2

Land Use	Land Capability Class I	II	III	IV	V	VI	VII	VIII	Total
				1000 Acres[1]					
Cropland	324.9	1,788.5	485.2	177.5	17.5	39.3	10.2	----	2,843.2
Pasture	9.3	111.4	50.4	19.8	11.9	27.3	6.4	1.3	237.7
Forest	16.8	116.0	63.1	53.3	6.2	44.0	23.9	1.5	324.9
Other	22.1	252.7	121.9	43.3	31.5	25.3	13.7	45.2	555.7
Total	373.1	2,268.6	720.6	293.9	67.2	136.0	54.2	48.0	3,961.4
	Percent Distribution Within Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	87	79	67	60	26	29	19	-	72
Pasture	2	5	7	7	18	20	12	3	6
Forest	5	5	9	18	9	32	44	3	8
Other	6	11	17	15	47	19	25	94	14
Total	100	100	100	100	100	100	100	100	100
	Percent Distribution by Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	11	63	17	6	b[2]	1	b	-	100
Pasture	4	47	21	8	5	11	3	b	100
Forest	5	36	19	16	2	14	7	b	100
Other	4	45	22	8	6	5	2	8	100
Total	9	57	18	7	2	4	2	1	100

[1]Total may not add due to rounding
[2]Less than 1 percent

TABLE 13–13 Present Land Use and Land Use Distribution—Planning Subarea 2.3

Land Use	Land Capability Class I	II	III	IV	V	VI	VII	VIII	Total
				1000 Acres[1]					
Cropland	64.8	2,840.3	1,759.5	506.4	-	123.9	74.2	1.2	5,370.4
Pasture	6.1	164.3	180.8	51.1	-	38.7	23.1	2.5	466.6
Forest	17.4	455.2	678.9	235.1	-	82.1	173.0	16.2	1,657.8
Other	7.8	222.9	246.2	77.7	-	31.1	30.2	17.0	632.9
Total	96.1	3,682.7	2,865.4	870.3	-	275.8	300.5	36.9	8,127.8
	Percent Distribution Within Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	68	77	61	58	-	45	25	3	66
Pasture	6	5	6	6	-	14	8	6	6
Forest	18	12	24	27	-	30	57	45	20
Other	8	6	9	9	-	11	10	46	8
Total	100	100	100	100	-	100	100	100	100
	Percent Distribution by Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	1	53	33	9	-	2	1	b[2]	100
Pasture	1	35	39	11	-	8	5	b	100
Forest	1	28	41	14	-	5	10	1	100
Other	1	35	39	12	-	5	5	3	100
Total	1	45	35	11	-	3	4	1	100

[1]Total may not add due to rounding
[2]Less than 1 percent

TABLE 13–14 Present Land Use and Land Use Distribution—Planning Subarea 2.4

Land Use	Land Capability Class I	II	III	IV	V	VI	VII	VIII	Total
				1000 Acres[1]					
Cropland	12.3	286.3	601.9	327.4	-	95.4	157.3	.6	1,481.3
Pasture	1.6	53.0	122.8	72.8	-	40.2	58.8	2.8	352.6
Forest	32.3	295.4	1,153.4	1,154.3	-	349.5	1,427.0	100.9	4,512.8
Other	2.2	20.8	118.6	111.0	-	30.2	68.1	17.7	368.5
Total	48.3	655.6	1,996.7	1,665.4	-	515.4	1,711.2	122.1	6,714.6
	Percent Distribution Within Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	25	44	30	20	-	18	9	b[2]	22
Pasture	3	8	6	4	-	8	3	2	5
Forest	67	45	58	69	-	68	84	83	67
Other	5	3	6	7	-	6	4	14	6
Total	100	100	100	100	-	100	100	100	100
	Percent Distribution by Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	b	19	41	22	-	6	11	b	100
Pasture	b	15	35	21	-	11	17	1	100
Forest	b	7	25	25	-	8	31	2	100
Other	b	6	32	30	-	8	18	5	100
Total	b	10	30	25	-	8	25	2	100

[1] Total may not add due to rounding
[2] Less than 1 percent

TABLE 13–15 Present Land Use and Land Use Distribution—Planning Subarea 3.1

Land Use	Land Capability Class I	II	III	IV	V	VI	VII	VIII	Total
				1000 Acres[1]					
Cropland	4.6	219.8	205.6	70.5	---	14.6	15.5	.2	530.8
Pasture	2.3	53.2	60.7	30.1	---	6.4	20.2	1.5	174.4
Forest	2.4	278.1	667.3	507.3	2.7	143.1	922.3	35.2	2,558.2
Other	---	32.7	39.0	43.2	---	7.5	33.9	17.6	173.9
Total	9.3	583.8	972.5	651.1	2.7	171.6	991.9	54.4	3,437.4
	Percent Distribution Within Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	49	38	21	11	---	9	2	b[2]	15
Pasture	25	9	6	5	---	4	2	3	74
Forest	26	48	69	78	100	83	93	65	6
Other	---	5	4	6	---	4	3	32	5
Total	100	100	100	100	100	100	100	100	100
	Percent Distribution by Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	b	41	39	13	-	3	4	b	100
Pasture	b	31	35	17	-	4	11	b	100
Forest	b	11	26	20	-	5	36	1	100
Other	-	19	22	25	b	4	20	10	100
Total	b	17	28	19	-	5	29	2	100

[1] Total may not add due to rounding
[2] Less than 1 percent

TABLE 13–16 Present Land Use and Land Use Distribution—Planning Subarea 3.2

Land Use	Land Capability Class I	II	III	IV	V	VI	VII	VIII	Total
				1000 Acres[1]					
Cropland	12.3	1,592.3	593.3	119.1	--	26.4	24.9	1.7	2,370.0
Pasture	.2	57.9	87.8	37.1	--	5.4	10.2	---	198.6
Forest	2.3	210.8	526.5	221.7	.2	23.4	182.1	5.3	1,172.3
Other	1.9	136.1	87.0	27.7	--	5.9	23.4	2.7	248.6
Total	16.7	1,997.1	1,294.5	405.5	.2	61.0	240.6	9.8	4,025.5
	Percent Distribution Within Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	74	80	46	29	---	43	10	-	59
Pasture	1	3	7	9	---	9	4	-	5
Forest	14	10	41	55	100	38	76	-	29
Other	11	7	6	7	---	10	10	-	7
Total	100	100	100	100	100	100	100	-	100
	Percent Distribution by Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	b[2]	67	25	5	-	1	1	-	100
Pasture	b	29	44	19	-	3	5	-	100
Forest	b	18	45	19	b	2	16	-	100
Other	b	58	31	10	-	22	8	-	100
Total	b	50	32	10	b	1	6	-	100

[1]Total may not add due to rounding
[2]Less than 1 percent

TABLE 13–17 Present Land Use and Land Use Distribution—Planning Subarea 4.1

Land Use	Land Capability Class I	II	III	IV	V	VI	VII	VIII	Total
				1000 Acres[1]					
Cropland	62.3	1,425.6	543.9	125.4	-	40.2	18.8	.4	2,215.6
Pasture	2.9	46.1	45.9	9.5	-	5.6	7.6	--	117.7
Forest	13.9	212.9	269.0	92.7	-	29.3	25.9	--	643.7
Other	6.1	121.1	90.7	23.4	-	7.3	9.1	--	257.8
Total	84.2	1,805.7	949.5	251.0	-	82.5	61.4	.4	3,234.7
	Percent Distribution Within Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	73	79	57	50	-	49	31	100	68
Pasture	3	2	5	4	-	7	12	---	4
Forest	17	12	28	37	-	35	42	---	20
Other	7	7	10	9	-	9	15	---	8
Total	100	100	100	100	-	100	100	100	100
	Percent Distribution by Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	3	64	24	5	-	2	b[2]	b	100
Pasture	3	39	37	8	-	5	6	-	100
Forest	2	33	42	14	-	5	4	-	100
Other	2	47	35	9	-	3	4	-	100
Total	3	56	29	8	-	2	2	b	100

[1]Total may not add due to rounding
[2]Less than 1 percent

TABLE 13–18 Present Land Use and Land Use Distribution—Planning Subarea 4.2

Land Use	Land Capability Class I	II	III	IV	V	VI	VII	VIII	Total
				1000 Acres[1]					
Cropland	68.5	3,431.1	1,157.6	66.8	-	7.2	3.9	-	4,735.1
Pasture	9.4	118.4	65.3	7.3	-	9.7	3.8	-	213.8
Forest	23.2	295.9	162.9	15.8	-	8.8	8.7	-	515.3
Other	7.3	161.0	88.6	7.5	-	4.8	2.0	-	271.2
Total	108.5	4,006.4	1,474.3	97.4	-	30.6	18.4	-	5,735.5
	Percent Distribution Within Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	63	86	79	69	-	24	21	-	83
Pasture	9	3	4	7	-	32	21	-	4
Forest	21	7	11	16	-	29	47	-	9
Other	7	4	6	8	-	15	11	-	4
Total	100	100	100	100	-	100	100	-	100
	Percent Distribution by Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	1	72	24	1	-	b[2]	b	-	100
Pasture	5	55	31	3	-	4	2	-	100
Forest	4	57	32	3	-	2	2	-	100
Other	3	59	33	3	-	2	b	-	100
Total	2	70	26	17	-	b	b	-	100

[1] Total may not add due to rounding
[2] Less than 1 percent

TABLE 13–19 Present Land Use and Land Use Distribution—Planning Subarea 4.3

Land Use	Land Capability Class I	II	III	IV	V	VI	VII	VIII	Total
				1000 Acres[1]					
Cropland	4.3	182.6	478.8	62.5	---	11.2	1.8	-	741.3
Pasture	2.2	32.4	73.2	11.9	.9	9.5	1.2	-	131.3
Forest	12.8	112.2	273.5	66.1	3.4	43.1	23.6	-	534.6
Other	1.8	72.8	151.2	29.2	.4	16.7	1.5	-	273.7
Total	21.1	400.1	976.6	169.7	4.8	80.5	28.1	-	1,680.8
	Percent Distribution Within Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	21	46	49	37	---	14	6	-	44
Pasture	10	8	7	7	20	12	4	-	8
Forest	60	28	28	39	71	53	84	-	32
Other	9	18	16	17	9	21	6	-	16
Total	100	100	100	100	100	100	100	-	100
	Percent Distribution By Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	b[2]	25	64	8	-	2	b	-	100
Pasture	2	25	56	9	b	7	b	-	100
Forest	2	21	51	12	b	8	4	-	100
Other	1	26	55	11	b	6	b	-	100
Total	1	24	58	10	b	5	1	-	100

[1] Total may not add due to rounding
[2] Less than 1 percent

TABLE 13–20 Present Land Use and Land Use Distribution—Planning Subarea 4.4

Land Use	Land Capability Class I	II	III	IV	V	VI	VII	VIII	Total
				1000 Acres[1]					
Cropland	65.6	229.4	420.3	92.6	3.0	5.4	1.9	.5	818.7
Pasture	6.0	54.7	121.8	40.5	5.3	16.8	3.1	--	248.2
Forest	15.7	227.9	491.1	250.8	12.8	197.4	92.2	--	1,287.9
Other	93.1	578.1	1,110.5	407.5	22.8	221.2	102.5	.2	2,535.9
Total	180.4	1,090.1	2,143.7	791.4	43.9	440.8	199.7	.7	4,890.7
	Percent Distribution Within Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	70	40	38	23	13	2	2	71	32
Pasture	7	10	11	10	23	8	3	---	10
Forest	17	39	44	62	56	89	90	---	51
Other	6	11	7	5	8	b	5	29	7
Total	100	100	100	100	100	100	100	100	100
	Percent Distribution by Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	8	28	51	11	b[2]	b	b	b	100
Pasture	3	22	49	16	2	7	1	-	100
Forest	1	18	38	20	1	15	7	--	100
Other	3	36	43	13	b	b	3	b	100
Total	3	23	44	16	b	9	4	b	100

[1] Total may not add due to rounding
[2] Less than 1 percent

TABLE 13–21 Present Land Use and Land Use Distribution—Planning Subarea 5.1

Land Use	Land Capability Class I	II	III	IV	V	VI	VII	VIII	Total
				1000 Acres[1]					
Cropland	76.2	439.4	375.0	130.3	4.0	12.4	3.6	3.1	1,044.1
Pasture	7.5	33.2	69.9	26.7	5.1	13.9	5.9	.8	162.9
Forest	11.9	136.8	339.3	188.2	15.1	76.2	69.8	12.5	849.8
Other	12.2	32.7	41.6	16.1	3.9	3.6	6.1	1.3	117.5
Total	107.8	642.2	825.8	361.2	28.1	106.2	85.3	17.7	2,174.2
	Percent Distribution Within Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	71	69	45	36	14	12	4	17	48
Pasture	7	5	9	7	18	13	7	5	8
Forest	11	21	41	52	54	72	82	71	39
Other	11	5	5	5	14	3	7	7	5
Total	100	100	100	100	100	100	100	100	100
	Percent Distribution by Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	7	42	36	12	b[2]	1	b	b	100
Pasture	5	20	43	16	3	9	4	b	100
Forest	1	16	40	22	2	9	8	2	100
Other	10	28	36	14	3	3	5	1	100
Total	5	30	38	17	1	5	4	b	100

[1] Total may not add due to rounding
[2] Less than 1 percent

TABLE 13–22 Present Land Use and Land Use Distribution—Planning Subarea 5.2

Land Use	Land Capability Class I	II	III	IV	V	VI	VII	VIII	Total
				1000 Acres[1]					
Cropland	66.7	851.4	538.4	230.2	3.3	45.9	23.0	.1	1,759.1
Pasture	11.0	116.1	140.9	87.0	10.9	53.7	23.2	.9	443.7
Forest	14.8	429.2	681.8	640.1	42.9	338.9	356.8	24.9	2,529.4
Other	20.5	171.3	136.9	62.2	4.6	6.9	16.9	6.3	425.6
Total	113.0	1,568.0	1,498.0	1,019.5	61.6	445.5	419.9	32.2	5,157.8
	Percent Distribution Within Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	59	54	36	23	5	10	5	b[2]	34
Pasture	10	7	9	8	18	12	6	3	9
Forest	13	28	46	63	70	76	85	77	49
Other	18	11	9	6	7	2	4	20	8
Total	100	100	100	100	100	100	100	100	100
	Percent Distribution by Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	4	48	31	13	b	3	1	b	100
Pasture	2	26	32	20	2	12	5	b	100
Forest	b	17	27	25	2	13	14	1	100
Other	5	40	32	15	1	2	4	1	100
Total	2	30	29	20	1	9	8	1	100

[1] Total may not add due to rounding
[2] Less than 1 percent

TABLE 13–23 Present Land Use and Land Use Distribution—Planning Subarea 5.3

Land Use	Land Capability Class I	II	III	IV	V	VI	VII	VIII	Total
				1000 Acres[1]					
Cropland	2.2	191.7	285.0	90.3	3.0	25.0	16.3	21.4	634.9
Pasture	.4	39.2	66.3	39.7	2.2	37.2	24.1	43.1	252.2
Forest	1.3	155.9	388.4	353.1	62.2	564.3	361.0	240.6	2,126.9
Other	.3	28.9	41.2	16.6	3.0	3.1	14.8	4.9	112.7
Total	4.2	415.7	780.9	500.0	70.3	629.6	416.2	310.0	3,126.7
	Percent Distribution Within Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	51	46	37	18	4	4	4	7	20
Pasture	9	9	8	8	3	6	6	14	8
Forest	32	38	50	71	89	90	87	78	68
Other	8	7	5	3	4	b	3	1	4
Total	100	100	100	100	100	100	100	100	100
	Percent Distribution by Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	b[2]	30	45	14	b	4	3	3	100
Pasture	b	16	26	16	b	15	9	17	100
Forest	b	7	18	17	3	26	17	11	100
Other	b	26	36	15	3	3	13	4	100
Total	1	13	25	16	3	20	13	10	100

[1] Total may not add due to rounding
[2] Less than 1 percent

TABLE 13–24 Present Land Use and Land Use Distribution—Region Total

Land Use	Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	Total
				1000 Acres[1]					
Cropland	810.0	15,835.8	8,445.2	2,468.5	36.2	526.4	408.3	31.9	28,562.3
Pasture	60.1	1,081.2	1,258.0	514.2	41.3	294.9	216.7	54.7	3,521.1
Forest	174.4	6,090.5	10,034.7	7,508.7	569.0	2,889.6	6,029.5	756.4	34,052.8
Other	90.3	1,551.7	1,535.1	639.3	87.7	177.9	289.4	243.8	4,615.2
Total	1,134.7	24,559.2	21,273.1	11,130.8	734.2	3,888.8	6,943.9	1,086.7	70,751.4
	Percent Distribution Within Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	72	64	40	22	5	14	6	3	40
Pasture	5	5	6	5	6	8	3	5	5
Forest	15	25	47	67	77	74	87	70	48
Other	8	6	7	6	12	4	4	22	7
Total	100	100	100	100	100	100	100	100	100
	Percent Distribution by Land Capability Class								
	I	II	III	IV	V	VI	VII	VIII	
Cropland	3	55	29	9	b	2	1	b	100
Pasture	2	31	36	15	1	8	6	1	100
Forest	b[2]	18	29	22	2	8	18	2	100
Other	2	34	33	14	2	4	6	5	100
Total	2	35	30	16	1	5	10	1	100

[1]
[2]Total may not add due to rounding
Less than 1 percent

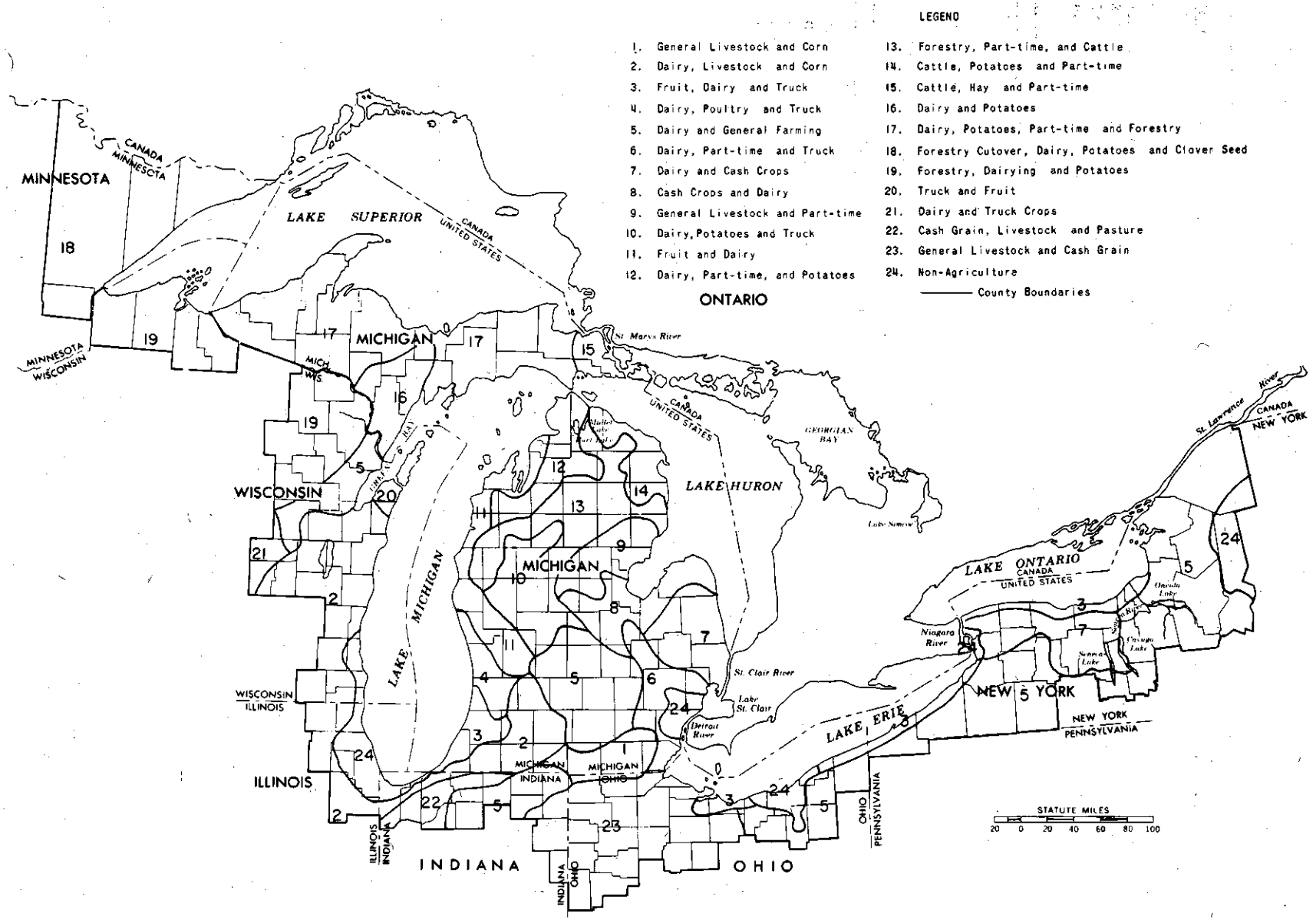


FIGURE 13-8 Types of Farming Areas (Areas on a Natural Line Basis)

2.4.1 Hardwood Forests

Two hardwood forests encompass the major component (76 percent) of the Region's forest land (Table 13–25). They are designated as northern hardwood and eastern hardwood and differ in species, in growing conditions, and hydrologic characteristics.

The northern hardwood region occupies the most northern and elevated portions of the Basin and makes up 70 percent of the hardwood forest. It merges imperceptibly into the conifer forest as the growing season becomes shorter and plant growth is limited by temperature rather than moisture availability. It also merges into the eastern hardwood region as the growing season becomes longer and a variable supply of soil moisture is available during the growing season. The major forest types are the maple-beech-birch type and the aspen-birch type (Figure 13–10c).

The eastern hardwood region makes up 30 percent of the hardwood forests and covers a great range in growing conditions. In the north and at higher elevations in the east its range is limited by low temperatures. There is a great variety in the natural vegetation, and the growing season is long with abundant rainfall. A great number of tree species can be found in this region. In the high land of the region the oak-hickory type is present. The elm-ash-cottonwood forest type is dominant in the low land.

2.4.2 Confier Forests

The conifers or softwoods represent only 24 percent of the forest land in the Basin. There are two distinct softwood forest types: spruce-fir and pine. Their distinction has hydrologic significance.

The spruce-fir type, which makes up 64 percent of the conifer forests, is variable in composition, depending primarily upon soil drainage conditions. This type dominates the poorly drained soils, but on well-drained areas it can be found mixed with northern hardwoods. The spruce-fir produces a dense growth, with openings present where swamp waters are deep or where large areas of bare rock are exposed. The climate in which it is found is humid, and temperature, rather than moisture availability, limits plant growth.

The pine type, including white, red, and jack pine, is scattered throughout the northern portions of the Basin. The climate over their range is cool and humid. This type is usually most closely associated with well-drained, sandy soils and usually possesses a single-storied crown and open spaces beneath.

2.5 Land Ownership Pattern

2.5.1 Private Land

The present land area of the Region is approximately 83,600,000 acres. Private ownership comprises 80.4 percent of the land area, or 67,200,000 acres (Figure 13–11). Large ownerships of more than 5,000 acres in size are prevalent in the Upper Peninsula of Michigan, and in Wisconsin and Minnesota. Privately-owned agricultural land is primarily located in eastern Wisconsin, northern Indiana, northern Ohio, and southern Michigan. The forest land is mainly concentrated in northern Minnesota, Michigan, Wisconsin, and New York. The private commercial forest land is divided between forest industrial ownership (3.1 million acres) and farmer-owned and miscellaneous private ownerships (21.7 million acres) (Table 13–26).

2.5.2 Public Land

The Federal government owns approximately 6,200,000 acres, or 7.4 percent of the Region's land area. Federal ownership consists principally of 5,114,700 acres of forest lands, most of which are national forests (Figure 13–12c, Tables 13–26, 13–27).

State and local governments own 10,200,000 acres, or 12.2 percent of the land area, consisting primarily of forests, parks, and recreational land. The public commercial forests (12.9 million acres) include 5.2 million acres of State lands, most of which is State forest, 4.7 million acres of national forests, 2.6 million acres of other public lands, most of which is county forest, and 0.4 million acres of Indian and other Federal lands. Management and sale of timber products on public lands make this resource readily available for purchase and use on a continuing basis. Public lands also provide most of the outdoor recreation opportunities, particularly in the northern portion of the Region. They also provide land and water resources that are significant to private and commercial recreation enterprises.

TABLE 13–25 Area of Commercial Forest Land by Forest Type, 1967

Plan Area and Planning Subarea	State	All Types	Softwood			Hardwood				
			Total	Pine	Spruce-Fir	Total	Oak-Hickory	Elm-Ash Cottonwood	Maple-Beech W. Birch	Aspen-Birch
Lake Superior		(Thousand Acres)								
1.1	Minn.	5347.6	2347.5	672.3	1675.2	300.1	12.9	299.9	280.0	2407.3
	Wis.	2355.6	482.5	224.8	257.7	1873.1	137.0	134.2	501.8	1100.1
	Total	7703.2	2830.0	897.1	1932.9	4873.2	149.9	434.1	781.8	3507.4
1.2	Mich.	5605.7	1674.6	440.2	1234.4	3931.1	66.8	335.7	2430.6	1098.0
TOTAL		13308.9	4504.6	1337.3	3167.3	8804.3	216.7	769.8	3212.4	4605.4
Lake Michigan										
2.1	Mich.	1657.1	557.0	78.3	478.7	1100.1	17.4	98.0	524.5	460.2
	Wis.	3420.0	747.0	255.7	491.3	2673.0	352.4	351.1	899.4	1070.1
	Total	5077.1	1304.0	334.0	970.0	3773.1	369.3	449.1	1423.9	1530.3
2.2	Ill.	64.1	----	---	----	64.1	37.5	25.8	.4	.4
	Ind.	87.5	.5	.5	----	87.0	45.9	20.1	19.8	1.2
	Wis.	157.1	19.3	5.8	13.5	137.8	48.0	33.0	41.3	15.5
	Total	308.7	19.8	6.3	13.5	288.9	131.4	78.9	61.5	17.1
2.3	Ind.	136.9	.5	.5	----	136.4	61.7	33.8	40.2	.7
	Mich.	1554.7	90.6	65.0	25.6	1464.1	570.7	392.0	295.9	205.5
	Total	1691.6	91.1	65.5	25.6	1600.5	632.4	425.8	336.1	206.2
2.4	Mich.	5369.8	1394.3	651.5	742.8	3975.5	829.0	442.0	1262.8	1441.7
TOTAL		12447.2	2809.2	1057.3	1751.9	9638.0	1962.6	1395.8	3084.3	3195.3
Lake Huron										
3.1	Mich.	2889.6	793.8	470.8	323.0	2095.8	485.3	263.2	426.0	921.3
3.2	Mich.	1182.0	97.3	41.1	56.2	1084.7	190.1	241.1	199.8	453.7
TOTAL		4071.6	891.1	511.9	379.2	3180.5	675.4	504.3	625.8	1375.0
Lake Erie										
4.1	Mich.	641.3	31.6	18.8	12.8	609.7	245.7	164.0	104.9	95.1
4.2	Ind.	71.0	0.2	0.2	----	70.8	27.8	25.3	17.4	0.3
	Ohio	379.9	8.4	8.4	----	371.5	182.7	109.8	79.0	----
	Total	450.9	8.6	8.6	----	442.3	210.5	135.1	96.4	0.3
4.3	Ohio	520.8	16.6	10.9	5.7	504.2	201.5	155.2	141.8	5.7
4.4	N.Y.	1075.1	107.0	41.6	65.4	968.1	82.3	240.2	568.2	77.4
	Pa.	223.1	11.7	11.7	----	211.4	65.6	50.5	42.5	52.8
	Total	1298.2	118.7	53.3	65.4	1179.5	147.9	290.7	610.7	130.2
TOTAL		2911.2	175.5	91.6	83.9	2735.7	805.6	745.0	953.8	231.3
Lake Ontario										
5.1	N.Y.	835.9	72.8	25.4	47.4	763.1	58.1	242.6	409.9	52.5
5.2	N.Y.	2206.9	249.3	101.7	147.6	1957.6	98.9	648.2	1042.8	167.7
5.3	N.Y.	1961.3	404.7	129.0	275.7	1556.6	28.4	421.7	826.2	280.3
TOTAL		5004.1	726.8	256.1	470.7	4277.3	185.4	1312.5	2278.9	500.5
GLB TOTAL		37743.0	9107.2	3254.2	5853.0	28635.8	3845.7	4727.4	10155.2	9907.5

Source: Adjusted to the updated January 1, 1968, State Forest Survey figures, North Central Forest Experiment Station and Northeastern Forest Experiment Station, U.S. Forest Service. Keyed to Economic Subareas, Great Lakes Basin Commission, 1968.

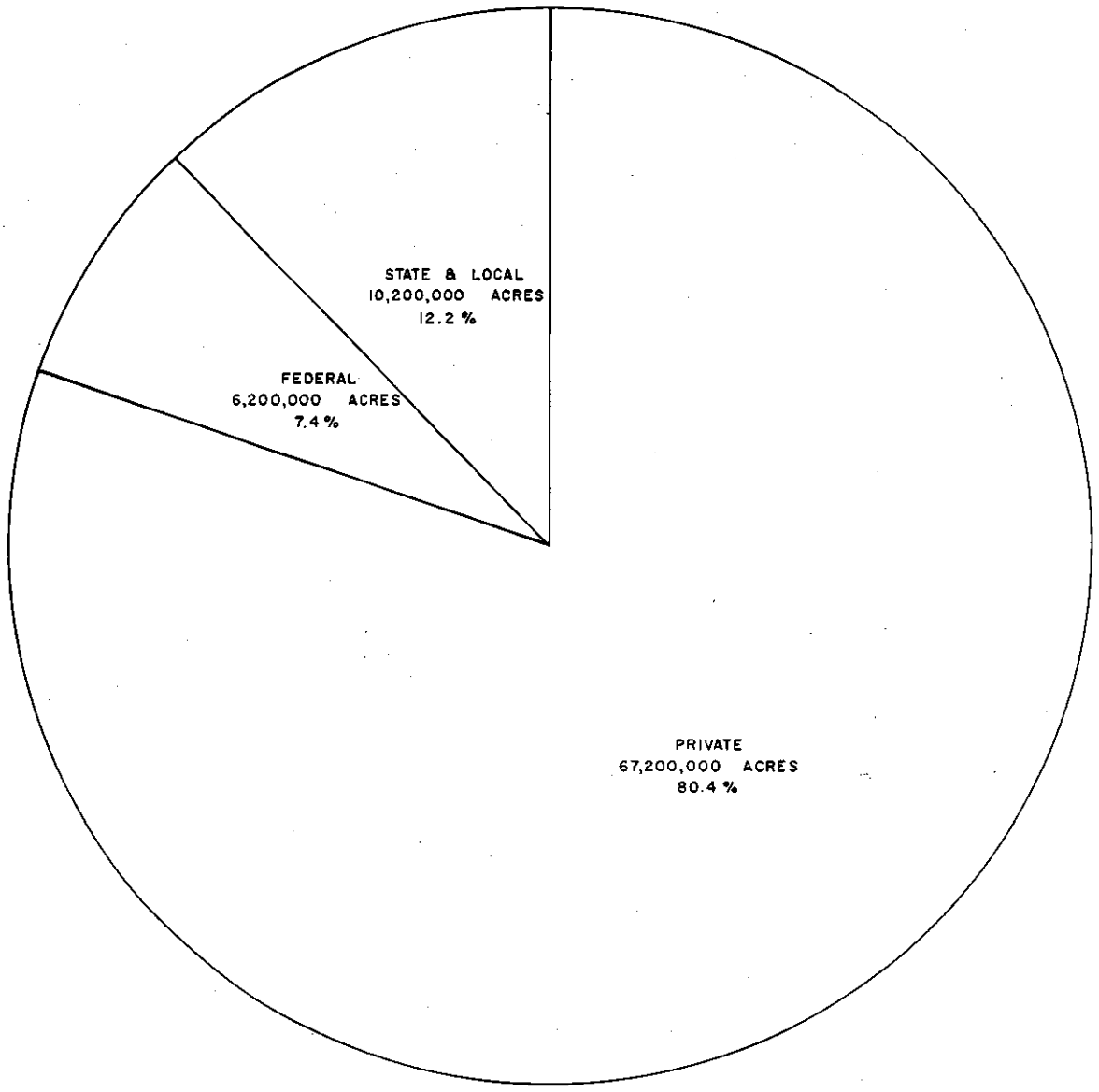


FIGURE 13–11 Ownership of Land Area

TABLE 13–26 Area of Commercial Forest Land by Ownership, 1967

Plan Area and Planning Subarea	State	Total	Public				Private	
			National Forest	Other Federal	State	Other Public	Forest Industry	Farmer-Owned & Misc. Private
Lake Superior								
1.1	Minn.	5,347.6	1,561.5	69.5	759.4	1,213.9	342.2	1,401.1
	Wis.	2,355.6	248.6	61.2	84.8	647.8	155.5	1,157.7
	Total	7,703.2	1,810.1	130.7	844.2	1,861.7	497.7	2,558.8
1.2	Mich.	5,605.7	975.3	20.3	881.2	79.8	1,451.6	2,197.5
TOTAL		13,308.9	2,785.4	151.0	1,725.4	1,941.5	1,949.3	4,756.3
Lake Michigan								
2.1	Mich.	1,657.1	157.2	2.8	380.1	4.6	418.1	694.3
	Wis.	3,420.0	481.0	178.9	163.1	490.3	312.2	1,794.5
	Total	5,077.1	638.2	181.7	543.2	494.9	730.3	2,488.8
2.2	Ind.	87.5	--	1.9	1.1	.1	.3	84.1
	Ill.	64.1	--	.8	.3	---	.3	62.7
	Wis.	157.1	--	.8	5.8	3.0	2.3	145.2
	Total	308.7	--	3.5	7.2	3.1	2.9	292.0
2.3	Mich.	1,554.7	1.3	3.1	85.4	10.9	17.1	1,436.9
	Ind.	136.9	---	3.0	1.8	.1	.4	131.6
	Total	1,691.6	1.3	6.1	87.2	11.0	17.5	1,568.5
2.4	Mich.	5,369.8	838.6	41.5	1,322.9	48.9	316.6	2,751.3
TOTAL		12,447.2	1,528.1	232.8	1,960.5	557.9	1,067.3	7,100.6
Lake Huron								
3.1	Mich.	2,889.6	401.7	---	879.9	2.5	36.3	1,569.2
3.2	Mich.	1,182.0	-----	1.4	196.1	7.6	7.2	969.7
TOTAL		4,071.6	401.7	1.4	1,076.0	10.1	43.5	2,538.9
Lake Erie								
4.1	Mich.	641.3	--	---	35.3	4.5	--	601.5
4.2	Ind.	71.0	--	1.6	.9	.1	.2	68.2
	Ohio	379.9	--	---	9.4		--	370.5
	Total	450.9	--	1.6	10.3	.1	.2	438.7
4.3	Ohio	520.8	--	3.0	7.5	1.4	----	508.9
4.4	Pa.	223.1	--	---	----	6.3	1.0	215.8
	N.Y.	1,075.1	--	---	51.4	10.2	12.6	1,000.9
	Total	1,298.2	--	---	51.4	16.5	13.6	1,216.7
TOTAL		2,911.2	--	4.6	104.5	22.5	13.8	2,765.8
Lake Ontario								
5.1	N.Y.	835.9	--	5.4	46.3	4.6	11.4	768.2
5.2	N.Y.	2,206.9	--	---	150.6	36.0	187.8	1,828.2
5.3	N.Y.	1,961.3	--	---	148.7	35.1	335.7	1,441.8
TOTAL		5,004.1	--	9.7	345.6	75.7	534.9	4,038.2
GREAT LAKES BASIN TOTAL		37,743.0	4,715.2	399.5	5,212.0	2,607.7	3,608.8	21,199.8

Source: Adjusted to updated Jan. 1, 1968, State Forest Survey figures, North Central Forest Experiment Station and Northeastern Forest Experiment Station, U.S. Forest Service. Keyed to Economic Subareas, Great Lakes Basin Commission, 1968.

TABLE 13-27 Area Under National Forest Administration as of June 30, 1969, by State and National Forest

	Gross Area	Net Area (Ownership)
	(Acres)	
MINNESOTA		
Superior N.F.[1]		
Planning Subarea 1.1	3,028,778	2,042,719
P.U. Area[2]		
Planning Subarea 1.1	556,152	91,338
State Total	3,584,930	2,134,057
WISCONSIN		
Chequamegon N.F.		
Planning Subarea 1.1	527,867	282,070
Nicolet N.F.		
Planning Subarea 2.1	852,450	591,456
L.U. Areas[3]		
Planning Subarea 1.1	40	40
Planning Subarea 2.1	190	190
State Total	1,380,547	873,756
MICHIGAN		
Hiawatha N.F.		
Planning Subarea 1.2	524,538	338,592
Planning Subarea 2.4	736,569	511,292
Planning Subarea 3.1	32	32
Total	1,261,139	849,916
Huron N.F.		
Planning Subarea 2.4	40	40
Planning Subarea 3.1	691,405	415,610
Total	691,445	415,650
Manistee N.F.		
Planning Subarea 2.3	10,296	1,401
Planning Subarea 2.4	1,302,073	477,542
Total	1,312,369	478,943
Ottawa N.F.		
Planning Subarea 1.2	1,255,004	743,867
Planning Subarea 2.1	267,531	171,362
Total	1,522,535	915,229

TABLE 13-27(continued) Area Under National Forest Administration as of June 30, 1969, by State and National Forest

	Gross Area	Net Area (Ownership)
	(Acres)	
L.U. Areas		
Planning Subarea 2.3	2,558	2,558
Planning Subarea 2.4	1,240	1,240
Planning Subarea 3.1	2	2
Total	3,800	3,800
P.U. Areas		
Planning Subarea 2.4	3,878	2,422
State Total	4,795,166	2,665,960
NEW YORK		
Hector L.U. Area		
Planning Subarea 5.2	13,259	13,259
L.U. Area		
Planning Subarea 5.2	520	520
State Total	13,779	13,779
REGION TOTAL	9,774,422	5,687,552

[1] N.F.--National Forest

[2] P.U.--Purchase Units--portions of approved N.F. acquisition areas established by the Secretary of Agriculture, with the concurrence of N.F. Reservation Commission, located outside designated or proclaimed N.F. boundaries.

[3] L.U.--Land Utilization Projects--land administered by the Forest Service for programs of land utilization and adjustment under Title III of the Bankhead-Jones Farm Tenant Act.

Source: U.S. Forest Service, National Forest System

2.6 Urban Influences and Land Use

2.6.1 Introduction

A study of land use is much more than a static inventory of physical conditions. It must also consider the dynamic socioeconomic factors that interact with the physical resource base and determine its utilization for human needs.

Land use and management problems have historically been related to agricultural and forestry interests. This was due to land use and ownership patterns and the historical distribution of population in rural areas. Although agricultural and forest lands now make up more than 85 percent of the land area of the Great Lakes Region, the population has become increasingly urbanized. Since land use decisions are made by and for the people, we can expect them to be heavily influenced by urban interests.

2.6.2 Urban Orientation Pattern

There is wide variation across the Region in urban orientation (Figure 13–13c), which is defined in terms of population density (population per square mile) and the percentage of urban population.[4] Metropolitan counties are those with 85 percent or more urban population and a density of 100 persons or more, or 50 percent or more urban population and density more than 500. Urban counties are those with less than 85 percent urban population and density between 100 and 500. Semi-isolated urban counties have 50 percent or more urban population and a density of less than 100. Densely-settled rural counties have less than 50 percent urban population and a density between 50 and 100. Sparsely-settled rural counties have less than 50 percent urban population and a density of less than 50.

The southern portion of the Region along the Great Lakes is highly urban. Planning Subareas 2.2, 4.1, and 4.3 are dominated by urban and metropolitan population centers. Even some counties in Planning Subareas 1.1 and 1.2 are influenced by urban population pressures.

This pattern, based on 1960 census data, has undoubtedly been modified somewhat in the intervening period. Urban pressures have intensified in some counties and spread to others, affecting land use and management conditions.

2.6.3 Land Use Within SMSAs

A study of present land use patterns within Standard Metropolitan Statistical Areas (SMSAs) provides another insight to urban influences on land use. An SMSA is a geographic area recognized as an integrated economic and social unit with a large population nucleus. The area included in an SMSA is essentially metropolitan in character and integrated with the central city.

There are 29 SMSAs in the Great Lakes Region (Figure 13–14). These areas encompass 26,667,500 acres or approximately one-third of the total land in the Region (Table 13–28). They include more than one-third of the total cropland and nearly one-fourth of all forest land and contain more than 82 percent of the Region's total population (Table 13–29).

On a planning subarea basis, the influence of SMSAs is varied. There are no SMSAs identified in Planning Subarea 1.2 or 3.1, while more than 80 percent of the land in Planning Subarea 2.2 is within SMSAs. Care must be exercised in interpreting these data. For example, in Planning Subarea 1.1, 50 percent of the land is in an SMSA, but given the relative sizes and population densities, urban influence is much less pervasive in Planning Subarea 1.1 than in Planning Subarea 2.3 where 38 percent of the land is in SMSAs.

By the year 2020 SMSAs will contain more than 84 percent of the Region's total population. We may assume that the major share of future urban development will take place within these SMSAs, and the future course of development will bring many interactions between the urban and rural sectors.

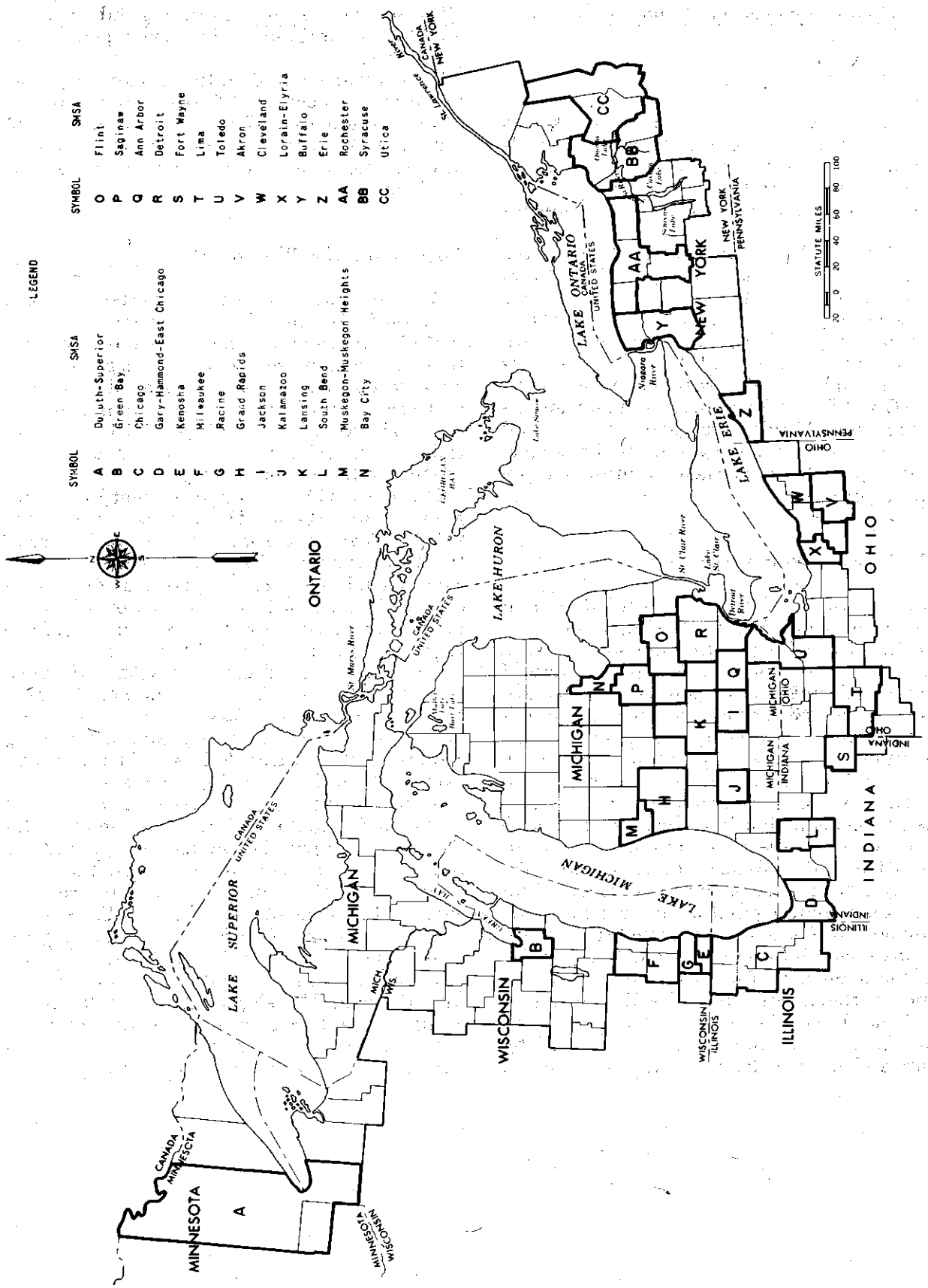


FIGURE 13–14 Standard Metropolitan Statistical Areas Within the Great Lakes Region

TABLE 13–28 Present Land Use in Standard Metropolitan Statistical Areas

Planning Subarea		Total Land	Urban Built-up	Cropland	Pasture	Forest	Other
1.1	Area in SMSAs[1]	4,697.7	192.6	207.7	49.9	4,101.2	46.2
	SMSAs as Percent of Total PSA	50	68	48	50	49	15
1.2	No SMSAs in the Planning Subarea						
2.1	Area in SMSAs[1]	335.6	53.1	214.3	18.8	44.6	4.8
	SMSAs as Percent of Total PSA	b[2]	11	6	5	b[2]	b[2]
2.2	Area in SMSAs[1]	4,282.6	1,130.2	2,227.9	195.7	254.4	474.4
	SMSAs as Percent of Total PSA	82	93	78	82	75	82
2.3	Area in SMSAs[1]	3,374.7	405.0	1,924.4	167.3	601.2	276.8
	SMSAs as Percent of Total PSA	38	48	36	36	35	46
2.4	Area in SMSAs[1]	319.7	78.5	61.6	6.4	170.0	3.2
	SMSAs as Percent of Total PSA	4	19	4	2	3	b[2]
3.1	No SMSAs in the Planning Subarea						
3.2	Area in SMSAs[1]	1,633.7	233.0	920.7	38.4	287.3	154.2
	SMSAs as Percent of Total PSA	37	60	39	21	24	54
4.1	Area in SMSAs[1]	1,695.3	612.2	622.3	39.8	323.5	97.5
	SMSAs as Percent of Total PSA	43	81	28	34	49	44
4.2	Area in SMSAs[1]	2,242.3	290.7	1,638.6	41.0	145.5	126.5
	SMSAs as Percent of Total PSA	35	69	35	19	32	34
4.3	Area in SMSAs[1]	1,860.9	551.0	598.3	107.0	417.1	187.4
	SMSAs as Percent of Total PSA	81	90	81	81	77	65
4.4	Area in SMSAs[1]	1,526.6	423.9	476.3	69.2	488.0	69.2
	SMSAs as Percent of Total PSA	50	87	55	27	36	63
5.1[3]	Area in SMSAs[1]	1,089.9	210.5	548.9	44.4	243.8	42.4
	SMSAs as Percent of Total PSA	44	78	52	27	28	43
5.2[3]	Area in SMSAs[1]	3,618.6	181.8	878.1	336.8	1,921.9	299.9
	SMSAs as Percent of Total PSA	67	73	50	76	75	70
5.3	No SMSAs in the Planning Subarea						
REGION TOTAL	Area in SMSAs[4]	26,667.5	4,362.6	10,319.0	1,114,704	8,998.5	1,782.6
	SMSAs as Percent of Total Region	32	62	36	32	23	37

[1] 1,000 Acres
[2] Less than 1 Percent
[3] Wayne County, New York excluded from Rochester SMSA and included in PSA 5.2.
[4] 1,000 Acres; totals may not add due to rounding.

Source: County CNI land use data summarized by SMSA.

TABLE 13–29 Share of Total Population Located in Standard Metropolitan Statistical Areas, 1960 and Projections for 1980, 2000 and 2020

Planning Subarea	Year			
	1960	1980	2000	2020
	(Percent)			
1.1	77.1	76.9	77.6	78.5
1.2	----	----	----	----
2.1	14.0	16.4	18.6	21.3
2.2	98.1	98.0	97.3	96.6
2.3	60.3	62.0	63.6	64.2
2.4	33.1	38.9	43.3	47.1
3.1	----	----	----	----
3.2	76.2	80.0	88.7	82.8
4.1	91.7	91.7	91.1	90.1
4.2	63.6	65.9	67.1	70.1
4.3	96.7	96.8	97.2	97.2
4.4	87.4	87.9	87.7	89.7
5.1	91.9	93.8	95.1	97.1
5.2	72.4	72.2	72.1	71.6
5.3	----	----	----	----
Total Basin	82.5	83.6	84.2	84.2

Source: Based on SMSA population projections from the GLBC, and total Basin population projections from Office of Business Economics.

Section 3

LAND USE PROJECTIONS

3.1 Urban Land

3.1.1 Methodology

Urban expansion is expected to continue to claim an increasing share of the total land area, but the lack of detailed urban land use data prevented the development of detailed projections. An aggregate estimate of urban expansion by planning subarea was computed to estimate depletion to the agricultural and forest land base associated with urban growth.

Major components of depletion to the agricultural resource base are urban and built-up areas and transportation. Urban and built-up area estimates are based on a regression equation in which variables projected by the Office of Business Economics (OBE), U.S. Department of Commerce, were used. Of six variables used, population, population change, and employment were found significantly related to expansion of urban and built-up areas. An equation was fitted with 1960 data for these variables. Future values were obtained by inserting values for the independent variables projected by OBE into the fitted equation. The results were tempered by judgment. Transportation land requirements were estimated on the basis of 15 acres per 1,000 increase in population.

Recreation land within urban areas is implicitly included in future projections of urban expansion. The implied proportion of recreation land is the same as in the base period. Requirements for nonurban recreation should be met from the adjusted base.

Total depletions of the agricultural base were allocated to major land uses in proportion to the distribution of that use in a given planning subarea. For example, if urban expansion was estimated at 10,000 acres between 1967 and 1980 and the base planning subarea composition was 50 percent cropland, 25 percent pasture, 20 percent forest, and 5 percent other, the depletion in each class of land would be 5,000 acres cropland, 2,500 acres pasture, 2,000 acres forest, and 500 acres from other land.

3.1.2 Estimated Urban Land Requirements

Total land in urban and built-up areas in the Region will nearly double by 2020 from the 1966–67 base period (Table 13–30). The impact of urban expansion will vary widely among planning subareas. Little change is expected in Planning Subareas 1.1 and 1.2, while a dramatic change is anticipated in others such as Planning Subareas 2.2, 4.1, and 4.2.

3.2 Nonurban Resource Base

3.2.1 Total Resource Base

The total nonurban resource base is expected to decline by more than five million acres from the 1966–67 base period to 2020 (Table 13–31 to 13–38). These estimates reflect changes to the 1967 resource base after projected urban and built-up and transportation requirements are met. The nonurban use values are not estimates of land requirements to meet projected needs. They represent an adjusted extension of the 1967 resource base, and as such are an inventory of acreage available for food and fiber production.

3.2.2 Agricultural Production

Base projections of future cropping patterns have been developed using linear programming. The projections are based on the existing land resource base, and assume no other resource development beyond that currently existing (Tables 13–19 to 13–54). Subsequent analysis will show the ramifications of further resource development. This analysis is discussed in Appendix 16, *Drainage.*

The detailed projections of cropping pat-

terns have been summarized according to intensity of land cultivation (Table 13–55). These aggregate estimates indicate the amount of land required to produce the Great Lakes Basin's share of national food requirements. As noted, total cropland requirements decline slightly between 1970 and 2000, but then increase as increasing food requirements place more pressure on the resource base.

Care should be exercised in the interpretation of the acreage in the idle cropland category. It is not a pool of land available in total for permanent conversion to nonagricultural uses. In 1970 the category included, by definition, land temporarily idle, land in conservation use only, and open land formerly farmed. These categories form a pool of land available for future use as food requirements increase. While it is probable that some of this land may shift from agricultural to other uses, there will be a continuing requirement to maintain some idle land for agricultural purposes.

3.2.3 Forest Land

The area of forest land is projected to decline steadily. It is expected to decrease three percent to 38.4 million acres by 2020 due to urban development. Each planning subarea varies in its trend (Tables 13–31 to 13–38).

TABLE 13–30 Total Land in Urban and Built-Up Areas, 1966–67 and Projections for 1980, 2000, and 2020

Planning Subarea	Total Urban and Built-Up Area			
	1966-67	1980	2000	2020
			(1,000 Acres)	
1.1	284.5	285.2	293.0	307.9
1.2	137.8	137.8	138.8	142.0
2.1	464.0	487.0	530.2	583.5
2.2	1,210.5	1,726.2	2,397.7	2,902.6
2.3	818.5	923.5	1,083.2	1,279.9
2.4	414.8	429.9	458.7	492.0
3.1	179.6	187.9	198.8	212.4
3.2	389.0	441.1	517.1	569.1
4.1	759.4	1,053.9	1,471.0	1,747.3
4.2	567.8	630.5	732.1	838.9
4.3	609.0	749.4	1,009.6	1,227.8
4.4	485.0	537.6	630.4	716.1
5.1	271.1	301.3	341.9	393.3
5.2	250.7	322.9	414.0	512.0
5.3	145.9	146.7	153.8	161.8
Total	6,987.6	8,360.9	10,370.3	12,086.6

TABLE 13–31 1966–67 Land Use, Projected Urban & Urban Built-Up and Implied Changes to the Land Resource Base, 1980, 2000, and 2020—Planning Subareas 1.1, 1.2

Land Use	1966-67	1980		2000		2020
			1000 Acres			
Planning Subarea 1.1						
Total land area[1]	9,473.5		9,473.5		9,473.5	9,473.5
Total urban and urban build-up	284.5	.7	285.2	7.8	293.0	14.9	307.9
Total nonurbanized land	9,189.0		9,188.3		9,180.5		9,165.6
Resource Base:							
Cropland	430.1	(*)[2]	430.1	(.4)	429.7	(.7)	429.0
Pasture	99.5	(*)	99.5	(.1)	99.4	(.2)	99.2
Forest Land	8,354.9	(.7)	8,354.2	(7.0)	8,347.2	(13.5)	8,333.7
Other Land	304.5	(*)	304.5	(.3)	304.2	.5	303.7
Total[3]	9,189.0	(.7)	9,188.3	(7.8)	9,180.5	(14.9)	9,165.6
Planning Subarea 1.2							
Total land area[1]	6,441.8		6,441.8		6,441.8		6,441.8
Total urban and urban build-up	137.8		137.8	1.0	138.8	3.2	142.0
Total nonurbanized land	6,304.0		6,304.0		6,303.0		6,299.8
Resource Base:							
Cropland	262.8		262.8	(*)	262.8	(.1)	262.7
Pasture	65.8		65.8	(*)	65.8	(*)	65.8
Forest Land	5,909.6		5,909.6	(1.0)	5,908.6	(3.1)	5,905.5
Other Land	65.8		65.8	(*)	65.8	(*)	65.8
Total[3]	6,304.0		6,304.0	1.0	6,303.0	(3.2)	6,299.8

[1]Total land area = total area - water area, and is assumed constant for projection periods.
[2]Bracket figures represent urban depletions for 1967-1980, 1980-2000, and 2000-2020.
[3]Detail may not add to total due to rounding.
*Indicates < 50 ac. depletion.
Source: Economic Research Service, U.S. Department of Agriculture, East Lansing, Mich.

TABLE 13–32 1966–67 Land Use, Projected Urban & Urban Built-Up and Implied Changes to the Land Resource Base, 1980, 2000, and 2020—Planning Subareas 2.1, 2.2

Land Use	1966-67	1980		2000		2020
			1,000 Acres			
Planning Subarea 2.1						
Total land area[1]	10,010.7		10,010.7		10,010.7	10,010.7
Total urban and urban build-up	464.0	23.0	487.0	43.2	530.2	53.3	583.5
Total nonurbanized land	9,546.7		9,523.7		9,480.5		9,427.2
Resource Base:							
Cropland	3,316.4	(8.0)[2]	3,308.4	(15.0)	3,293.4	(18.5)	3,274.9
Pasture	356.7	(.9)	355.8	(1.6)	354.2	(2.0)	352.2
Forest Land	5,116.6	(12.3)	5,104.2	(23.2)	5,081.0	(28.6)	5,052.4
Other Land	757.1	(1.8)	755.3	(3.4)	751.9	(4.2)	747.7
Total[3]	9,546.7	(23.0)	9,523.7	(43.2)	9,480.5	(53.3)	9,427.2
Planning Subarea 2.2							
Total land area[1]	5,212.1		5,212.1		5,212.1	5,212.1
Total urban and urban build-up	1,210.5	515.7	1,726.2	671.5	2,397.7	504.9	2,902.6
Total nonurbanized land	4,001.6		3,485.9		2,814.4		2,309.5
Resource Base:							
Cropland	2,843.4	(366.4)	2,477.0	(477.2)	1,999.8	(358.8)	1,641.0
Pasture	237.4	(30.6)	206.8	(39.8)	167.0	(29.9)	137.1
Forest Land	340.7	(43.9)	296.8	(57.1)	239.7	(43.0)	196.7
Other Land	580.1	(74.8)	505.3	(97.4)	407.9	(73.2)	334.7
Total[3]	4,001.6	(515.7)	3,485.9	(671.5)	2,814.4	(504.9)	2,309.5

(See Table 13-31 for footnotes.)

TABLE 13–33 1966–67 Land Use, Projected Urban & Urban Built-Up and Implied Changes to the Land Resource Base, 1980, 2000, and 2020—Planning Subareas 2.3, 2.4

Land Use	1966–67	1980		2000		2020	
				1,000 Acres			
Planning Subarea 2.3							
Total land area[1]	8,955.4		8,955.4		8,955.4		8,955.4
Total urban and urban build-up	818.5	105.0	923.5	159.7	1,083.2	196.7	1,279.9
Total nonurbanized land	8,136.9		8,031.9		7,872.2		7,675.5
Resource Base:							
Cropland	5,374.8	(69.4)[2]	5,305.4	(105.5)	5,199.9	(129.9)	5,070.0
Pasture	459.4	(5.9)	453.5	(9.0)	444.5	(11.1)	433.4
Forest Land	1,704.7	(22.0)	1,682.7	(33.5)	1,649.2	(41.2)	1,608.0
Other Land	598.0	(7.7)	590.3	(11.7)	578.6	(14.5)	564.1
Total[3]	8,136.9	(105.0)	8,031.9	(159.7)	7,872.2	(196.7)	7,675.5
Planning Subarea 2.4							
Total land area[1]	8,094.2		8,094.2		8,094.2		8,094.2
Total urban and urban build-up	414.8	15.1	429.9	28.8	458.7	33.3	492.0
Total nonurbanized land	7,679.4		7,644.3		7,635.5		7,602.2
Resource Base:							
Cropland	1,481.5	(2.9)	1,478.6	(5.6)	1,473.0	(6.4)	1,466.6
Pasture	351.8	(.7)	351.1	(1.3)	349.8	(1.5)	348.3
Forest Land	5,434.3	(10.7)	5,423.6	(20.4)	5,403.2	(23.6)	5,379.6
Other Land	411.8	(.8)	411.0	(1.5)	409.5	(1.8)	407.7
Total[3]	7,679.4	(15.1)	7,664.3	(28.8)	7,635.5	(33.3)	7,602.2

(See Table 13-31 for footnotes.)

TABLE 13–34 1966–67 Land Use, Projected Urban & Urban Built-Up and Implied Changes to the Land Resource Base, 1980, 2000, and 2020—Planning Subareas 3.1, 3.2

Land Use	1966–67	1980		2000		2020	
				1,000 Acres			
Planning Subarea 3.1							
Total land area[1]	4,017.8		4,017.8		4,017.8		4,017.8
Total urban and urban build-up	179.6	8.3	187.9	10.9	198.8	13.6	212.4
Total nonurbanized land	3,838.2		3,829.9		3,819.0		3,805.4
Resource Base:							
Cropland	531.2	(1.1)[2]	530.1	(1.5)	528.6	(1.9)	526.7
Pasture	173.6	(.4)	173.2	(.5)	172.7	(.6)	172.1
Forest Land	2,914.3	(6.3)	2,908.0	(8.3)	2,899.7	(10.3)	2,889.4
Other Land	219.1	(15)	218.6	(.6)	218.0	(.8)	217.2
Total[3]	3,838.2	(8.3)	3,829.0	(10.9)	3,819.0	(13.6)	3,805.4
Planning Subarea 3.2							
Total land area[1]	4,424.1		4,424.1		4,424.1		4,424.1
Total urban and urban build-up	389.0	52.1	441.1	76.0	517.1	52.0	569.1
Total nonurbanized land	4,035.1		3,983.0		3,907.0		3,855.0
Resource Base:							
Cropland	2,370.0	(30.6)	2,339.4	(44.6)	2,294.8	(30.5)	2,264.3
Pasture	185.2	(2.4)	182.8	(3.5)	179.3	(2.4)	176.9
Forest Land	1,194.7	(15.4)	1,179.3	(22.5)	1,156.8	(15.4)	1,141.4
Other Land	285.2	(3.7)	281.5	(5.4)	276.1	(52.0)	3,855.0
Total[3]	4,035.1	(52.1)	3,983.0	(76.0)	3,907.0	(52.0)	3,855.0

(See Table 13-31 for footnotes.)

TABLE 13–35 1966–67 Land Use, Projected Urban & Urban Built-Up and Implied Changes to the Land Resource Base, 1980, 2000, and 2020—Planning Subareas 4.1, 4.2

Land Use	1966–67	1980		2000		2020	
				1,000 Acres			
Planning Subarea 4.1							
Total land area[1]	3,980.4		3,980.4		3,980.4		3,980.4
Total urban and urban build-up	759.4	294.5	1,053.9	417.1	1,471.0	276.3	1,747.3
Total nonurbanized land	3,221.0		2,926.5		2,509.4		2,233.1
Resource Base:							
Cropland	2,215.6	(202.6)[2]	2,013.0	(287.0)	1,726.0	(190.1)	1,535.9
Pasture	117.7	(10.7)	107.0	(15.2)	91.8	(10.1)	81.7
Forest Land	665.7	(60.9)	604.8	(86.2)	518.6	(57.1)	461.5
Other Land	222.0	(20.3)	201.7	(28.7)	173.0	(19.0)	154.0
Total[3]	3,221.0	(294.5)	2,926.5	(417.1)	2,509.4	(276.3)	2,233.1
Planning Subarea 4.2							
Total land area[1]	6,319.4		6,319.4		6,319.4		6,319.4
Total urban and urban build-up	567.8	62.7	630.5	101.6	732.1	106.8	838.9
Total nonurbanized land	5,751.6		5,688.9		5,587.3		5,480.5
Resource Base:							
Cropland	4,735.1	(51.7)	4,683.4	(83.6)	4,599.8	(87.9)	4,511.9
Pasture	213.8	(2.3)	211.5	(3.8)	207.7	(4.0)	203.7
Forest Land	453.4	(4.9)	448.5	(8.0)	440.5	(8.4)	432.1
Other Land	349.3	(3.8)	345.5	(6.2)	339.3	(6.5)	332.8
Total[3]	5,751.6	(62.7)	5,688.9	(101.6)	5,587.3	(106.8)	5,480.5

(See Table 13-31 for footnotes.)

TABLE 13–36 1966–67 Land Use, Projected Urban & Urban Built-Up and Implied Changes to the Land Resource Base, 1980, 2000, and 2020—Planning Subareas 4.3, 4.4

Land Use	1966–67	1980		2000		2020	
				1,000 Acres			
Planning Subarea 4.3							
Total land area[1]	2,308.6		2,308.6		2,308.6		2,308.6
Total urban and urban build-up	609.0	140.4	749.4	260.2	1,009.6	218.2	1,227.8
Total nonurbanized land	1,699.6		1,559.2		1,299.0		1,080.8
Resource Base:							
Cropland	741.3	(61.3)[2]	680.0	(113.5)	566.5	(95.2)	471.3
Pasture	131.3	(10.8)	120.5	(20.1)	100.4	(16.8)	83.6
Forest Land	538.8	(44.5)	494.3	(82.5)	411.8	(69.2)	342.6
Other Land	288.2	(23.8)	264.4	(44.1)	220.3	(37.0)	183.3
Total[3]	1,699.6	(140.4)	1,559.2	(260.2)	1,299.0	(218.2)	1,080.8
Planning Subarea 4.4							
Total land area[1]	3,069.9		3,069.9		3,069.9		3,069.9
Total urban and urban build-up	485.0	52.6	537.6	92.8	630.4	85.7	716.1
Total nonurbanized land	2,584.9		2,532.3		2,439.5		2,353.8
Resource Base:							
Cropland	858.7	(17.5)	841.2	(30.8)	810.4	(28.5)	781.9
Pasture	252.6	(5.1)	247.5	(9.1)	238.4	(8.4)	230.0
Forest Land	1,364.5	(27.8)	1,336.7	(49.0)	1,287.7	(45.2)	1,242.5
Other Land	109.1	(2.2)	106.9	(3.9)	103.0	(3.6)	99.4
Total[3]	2,584.9	(52.6)	2,532.3	(92.8)	2,439.5	(85.7)	2,353.8

(See Table 13-31 for footnotes.)

TABLE 13–37 1966–67 Land Use, Projected Urban & Urban Built-Up and Implied Changes to the Land Resource Base, 1980, 2000, and 2020—Planning Subareas 5.1, 5.2

Land Use	1966–67	1980		2000		2020	
				1,000 Acres			
Planning Subarea 5.1							
Total land area[1]	2,458.7		2,458.7		2,458.7		2,458.7
Total urban and urban build-up	271.1	30.2	301.3	40.6	341.9	51.4	393.3
Total nonurbanized land	2,187.6		2,157.4		2,116.8		2,065.4
Resource Base:							
Cropland	1,055.1	(14.6)[2]	1,040.5	(19.6)	1,020.9	(24.8)	996.1
Pasture	162.9	(2.2)	160.7	(3.0)	157.7	(3.8)	153.9
Forest Land	871.5	(12.0)	859.5	(16.2)	843.3	(20.5)	822.8
Other Land	98.1	(1.4)	96.7	(1.8)	94.9	(2.3)	92.6
Total[3]	2,187.6	(30.2)	2,157.4	(40.6)	2,116.8	(51.4)	2,065.5
Planning Subarea 5.2							
Total land area[1]	5,427.4		5,427.4		5,427.4		5,427.4
Total urban and urban build-up	250.7	72.2	322.9	91.1	414.0	98.0	512.0
Total nonurbanized land	5,176.7		5,104.5		5,013.4		4,915.4
Resource Base:							
Cropland	1,759.1	(24.5)	1,734.6	(31.0)	1,703.6	(33.3)	1,670.3
Pasture	443.7	(6.2)	437.5	(7.8)	429.7	(8.4)	421.3
Forest Land	2,545.7	(35.5)	2,510.2	(44.8)	2,465.4	(48.2)	2,417.2
Other Land	428.2	(6.0)	422.2	(7.5)	414.7	(8.1)	406.6
Total[3]	5,176.7	(72.2)	5,104.5	(91.1)	5,013.4	(98.0)	4,915.4

(See Table 13–31 for footnotes.)

TABLE 13–38 1966–67 Land Use, Projected Urban & Urban Built-Up and Implied Changes to the Land Resource Base, 1980, 2000, and 2020—Planning Subarea 5.3, Region Total

Land Use	1966–67	1980		2000		2020	
				1,000 Acres			
Planning Subarea 5.3							
Total land area[1]	3,385.6		3,385.6		3,385.6		3,385.6
Total urban and urban build-up	145.9	.8	146.7	7.1	153.8	8.0	161.8
Total nonurbanized land	3,239.7		3,238.9		3,231.8		3,223.8
Resource Base:							
Cropland	633.9	(.2)[2]	633.7	(1.4)	632.3	(1.6)	630.7
Pasture	254.4	(.1)	254.3	(.6)	253.7	(.6)	253.1
Forest Land	2,215.4	(.5)	2,214.9	(4.8)	2,210.1	(5.5)	2,204.6
Other Land	136.0	(*)	136.0	(.3)	135.7	(.3)	135.4
Total[3]	3,239.7	(.8)	3,238.9	(7.1)	3,231.8	(8.0)	3,223.8
Region Total	83,579.6		83,579.6		83,579.6		83,579.6
Total urban and urban build-up	6,987.6	1,373.3	8,360.9	2,009.4	10,370.3	1,716.3	12,086.6
Total nonurbanized land	76,592.0		75,218.7		73,209.3		71,493.0
Resource Base:							
Cropland	28,609.0	(850.8)	27,758.2	(1,216.7)	26,541.5	(1,008.2)	25,533.3
Pasture	3,505.8	(78.3)	3,427.5	(115.4)	3,312.1	(99.8)	3,212.3
Forest Land	39,624.7	(297.4)	39,327.3	(464.5)	38,862.8	(432.8)	38,430.0
Other Land	4,852.5	(146.8)	4,705.7	(212.8)	4,492.9	(175.5)	4,317.4
Total Acres[3]	76,592.0	(1,373.3)	75,218.7	(2,009.4)	73,209.3	(1,716.3)	71,493.0

(See Table 13–31 for footnotes.)

TABLE 13–39 Crop Acreage and Production, Current Normal and Projections for 1980, 2000, 2020—Great Lakes Region Total

Crop	Prod. Unit	Current Normal Acres	Current Normal Prod.	1980 Acres	1980 Prod.	2000 Acres	2000 Prod.	2020 Acres	2020 Prod.
				(1,000 Units)					
Wheat	Bu.	1,756.3	65,142	1,970.0	96,400	1,862.4	111,800	1,966.6	133,600
Oats	Bu.	1,695.9	100,135	1,868.2	154,375	1,604.4	143,500	1,046.0	105,813
Rye	Bu.	59.8	1,739	59.1	1,902	68.7	2,516	86.7	3,386
Barley	Bu.	44.7	2,089	95.5	5,917	85.6	6,042	71.1	5,625
Misc. Sm. Grains	Bu.	42.6	NA	NA	NA	NA	NA	NA	NA
Corn for grain	Bu.	4,369.2	349,759	3,629.6	383,357	3,969.1	506,679	4,856.4	675,071
Corn Silage	Ton	1,220.7	14,962	896.8	16,374	1,010.2	21,904	1,278.7	28,912
Soybeans	Bu.	2,604.2	65,426	3,427.8	107,440	3,416.2	135,048	3,766.4	174,176
Dry Edible Beans	CWT	755.8	6,352	729.8	11,376	818.9	15,029	992.9	20,171
Sugar Beets	Ton	128.4	1,599	221.9	3,218	241.1	5,280	259.3	8,178
Potatoes	CWT	151.7	17,987	71.3	21,180	69.7	28,988	89.9	40,404
Fruits	Tons	600.2	1,104	398.2	1,458	406.6	2,097	456.2	2,996
Comm. Vegetables	CWT	520.4	46,093	526.0	72,380	558.1	99,295	659.4	137,171
Commercial Sod	#	52.7		52.7		52.7		52.7	
Alfalfa Hay	Ton	3,699.2	8,991	2,794.2	9,763	2,449.6	10,084	2,419.6	10,982
Cl-Tim-Oth-Hay	Ton	1,921.3	3,070	1,330.1	3,385	1,069.8	3,099	897.4	3,018
Cropland Pasture	*	1,041.6	NA	748.9	1,446	667.2	1,653	713.6	2,289
Idle Cropland		7,947.3	0	8,939.2	0	8,194.2	0	5,920.4	0
TOTAL CROPLAND		28,609.0		27,758.2		26,541.5		25,533.3	
Improved Pasture	*	934.1		908.8	1,922	872.0	2,212	839.2	2,402
Improvable Past.	*	2,242.7		2,193.8	4,236	2,123.1	2,729	2,057.5	3,013
N-Imprv. Pasture	*	329.0		324.9	184	317.0	207	315.6	231
TOTAL PASTURE		3,505.8		3,427.5		3,312.1		3,212.3	
TOTAL AG. LAND[1]		32,114.8		31,185.7		29,853.6		28,745.6	

[1]Totals may not add due to rounding
** Less than 50 units
* Alfalfa hay equivalents (tons)
# Sod is reported in acres only
NA Data not available

Source: Developed by Economic Research Service U.S. Department of Agriculture, East Lansing, Michigan

TABLE 13–40 Crop Acreage and Production, Current Normal and Projections for 1980, 2000, 2020—Planning Subarea 1.1

Crop	Prod. Unit	Current Normal Acres	Current Normal Prod.	1980 Acres	1980 Prod.	2000 Acres	2000 Prod.	2020 Acres	2020 Prod.
				(1,000 Units)					
Wheat	Bu.	.8	20	0.5	19	.8	36	.8	45
Oats	Bu	26.5	889	37.5	2,612	18.3	1,363	18.1	1,501
Rye	Bu	0.1	1	0.1	2	**	**	**	**
Barley	Bu	0.7	18	2.5	118	2.8	151	2.9	169
Misc. Sm. Grains	Bu	2.9	NA	NA	NA	NA	NA	NA	NA
Corn for grain	Bu	0.2	8	**	**				
Corn Silage	Ton	2.8	22	1.7	23	2.7	45	4.2	79
Soybeans	Bu	0	0	0	0				
Dry Edible Beans	CWT	0	0	0	0	0	0	0	0
Sugar Beets	Ton	0	0	0	0	0	0	0	0
Potatoes	CWT	1.0	107	0.6	105	.5	116	.5	121
Fruits	Tons	0.7	3	1.1	4	1.0	5	1.4	8
Comm. Vegetables	CWT	0.5	41	0.5	51	.3	50	.2	41
Commercial Sod	#	0.1		0.1		0.1		0.1	
Alfalfa Hay	Ton	47.3	64	28.4	81	23.6	79	28.4	111
Cl-Tim-Oth-Hay	Ton	141.2	199	112.9	241	84.7	202	77.6	200
Cropland Pasture	*	31.4	NA	17.3	27	12.6	28	12.6	37
Idle Cropland		174.2		225.9		282.4		281.4	
TOTAL CROPLAND		430.1		430.1		429.7		429.0	
Improved Pasture	*	18.5		18.5	33	18.4	42	18.4	48
Improvable Past.	*	52.6		52.6	58	52.5	58	52.4	68
N-Imprv. Pasture	*	28.5		28.5	16	28.4	22	28.4	26
TOTAL PASTURE		99.5		99.5	107	99.4		99.2	142
TOTAL AG. LAND[1]		529.6		529.6		529.1		528.2	

(See Table 13-39 for footnotes.)

TABLE 13–41 Crop Acreage and Production, Current Normal and Projections for 1980, 2000, 2020—Planning Subarea 1.2

Crop	Prod. Unit	Current Normal Acres	Current Normal Prod.	1980 Acres	1980 Prod.	2000 Acres	2000 Prod.	2020 Acres	2020 Prod.
				(1,000 Units)					
Wheat	Bu	0.8	31	0.3	11	.4	19	.4	25
Oats	Bu	12.3	431	18.3	1,207	6.4	494	6.1	525
Rye	Bu	.1	3	0.3	8	.5	13	.7	20
Barley	Bu	0.2	7	0.9	41	1.1	60	1.2	73
Misc. Sm. Grains	Bu	1.6	NA	NA	NA	NA	NA	NA	NA
Corn for grain	Bu	**	*	**	**	**	**	**	**
Corn Silage	Ton	0.4	4	0.2	3	.4	6	1.4	26
Soybeans	Bu	0	0	0	0				
Dry Edible Beans	CWT	0	0	0	0	0	0	0	0
Sugar Beets	Ton	0	0	0	0	0	0	0	0
Potatoes	Cwt	4.9	446	1.1	318	.8	290	1.0	404
Fruits	Tons	2.1	1	0.1	**	.1	*	.1	1
Comm. Vegetables	CWT	0.2	25	0.2	29	.2	30	.1	27
Commercial Sod	#	0		0		0		0	
Alfalfa Hay	Ton	12.6	21	7.6	21	6.9	25	6.9	29
Cl-Tim-Oth-Hay	Ton	61.8	76	40.2	81	27.8	58	25.4	62
Cropland Pasture	*	39.7	NA	16.0	23	13.2	29	13.2	34
Idle Cropland		126.1		177.6		204.9		204.9	
TOTAL CROPLAND		262.8		262.8		262.8		262.8	
Improved Pasture	*	14.8		14.8	26	14.8	32	14.8	38
Improvable Past.	*	51.0		51.0		51.0	60	51.0	70
N-Imprv. Pasture	*				61				
TOTAL PASTURE		65.8		65.8	88	65.8		65.8	108
TOTAL AG. LAND[1]		328.6		328.6		328.6		328.6	

(See Table 13-39 for footnotes.)

TABLE 13–42 Crop Acreage and Production, Current Normal and Projections for 1980, 2000, 2020—Planning Subarea 2.1

Crop	Prod. Unit	Current Normal Acres	Current Normal Prod.	1980 Acres	1980 Prod.	2000 Acres	2000 Prod.	2020 Acres	2020 Prod.
				(1,000 Units)					
Wheat	Bu	11.4	427	14.2	732	17.1	1,072	19.9	1,448
Oats	Bu	509.6	32,509	624.6	55,453	581.1	52,596	480.1	50,790
Rye	Bu	3.8	81	8.8	175	7.7	200	7.8	220
Barley	Bu	8.7	467	9.7	592	7.7	544	5.7	450
Misc. Sm. Grains	Bu	1.2	NA	NA	NA	NA	NA	NA	NA
Corn for grain	Bu	236.3	18,215	189.1	18,830	220.8	27,060	354.5	48,402
Corn Silage	Ton	305.2	3,577	213.6	3,634	244.1	5,136	305.2	7,117
Soybeans	Bu	9.0	193	13.5	432	12.3	433	15.8	628
Dry Edible Beans	CWT	0	0	0	0	0	0	0	0
Sugar Beets	Ton	0	0	0	0	0	0	0	0
Potatoes	CWT	26.4	4,110	15.3	4,427	17.3	6,231	21.0	8,930
Fruits	Tons	14.8	49	10.7	39	10.8	56	12.0	79
Comm. Vegetables	CWT	120.0	10,478	153.6	21,503	181.9	32,746	227.0	47,667
Commercial Sod	#	0.7		0.7		0.7		0.7	
Alfalfa Hay	Ton	923.3	2,440	784.8	3,121	646.3	3,124	540.4	2,884
Cl-Tim-Oth-Hay	Ton	161.7	301	129.4	405	105.1	403	88.9	395
Cropland Pasture	*	266.0	NA	172.9	386	172.9	495	172.9	685
Idle Cropland		718.3		967.5		1,067.6		1,023.0	
TOTAL CROPLAND		3,316.4		3,308.4		3,293.4		3,274.9	
Improved Pasture	*	99.6		99.2	237	98.9	281	98.3	312
Improvable Past.	*	203.8		203.2	351	202.4	297	201.1	330
N-Imprv. Pasture	*	53.3		53.4	33	52.9	38	52.8	43
TOTAL PASTURE		356.7		355.8	621	354.2		352.2	685
TOTAL AG. LAND[1]		3,673.1		3,664.2		3,647.6		3,627.1	

(See Table 13-39 for footnotes.)

TABLE 13–43 Crop Acreage and Production, Current Normal and Projections for 1980, 2000, 2020—Planning Subarea 2.2

Crop	Prod. Unit	Current Normal Acres	Current Normal Prod.	1980 Acres	1980 Prod.	2000 Acres	2000 Prod.	2020 Acres	2020 Prod.
					(1,000 Units)				
Wheat	Bu	116.0	4,701	145.0	7,640	100.1	6,348	75.4	5,432
Oats	Bu	163.0	11,041	87.9	7,908	116.1	10,885	65.2	6,875
Rye	Bu	2.9	77	4.9	171	6.3	226	8.2	305
Barley	Bu	6.8	354	10.9	698	7.1	520	3.6	293
Misc. Sm. Grains	Bu	9.5	NA	NA	NA	NA	NA	NA	NA
Corn for grain	Bu	900.0	87,270	766.9	92,918	784.9	119,174	650.1	111,358
Corn Silage	Ton	138.3	1,985	117.2	2,524	69.1	1,747	69.1	1,797
Soybeans	Bu	411.0	12,035	593.0	20,026	495.2	21,012	497.3	24,818
Dry Edible Beans	CWT	0	0	0	0	0	0	0	0
Sugar Beets	Ton	0	0	0	0	0	0	0	0
Potatoes	CWT	9.3	1,672	5.1	1,694	5.2	2,174	5.7	2,828
Fruits	Tons	8.1	21	3.1	11	3.2	16	3.5	22
Comm. Vegetables	CWT	55.4	5,157	48.3	6,514	39.7	6,951	33.5	6,859
Commercial Sod	#	13.4		13.4		13.4		13.4	
Alfalfa Hay	Ton	382.6	1,145	249.0	1,015	136.9	658	114.8	599
Cl-Tim-Oth-Hay	Ton	58.4	130	46.8	145	26.3	100	20.4	89
Cropland Pasture	*	91.5	NA	64.1	150	32.0	92	27.5	103
Idle Cropland		477.2		321.4		164.3		53.3	
TOTAL CROPLAND		2,843.4		2,477.0		1,999.8		1,641.0	
Improved Pasture	*	87.0		75.8	191	61.2	182	50.1	167
Improvable Past.	*	119.9		104.4	201	84.3	134	69.1	122
N-Imprv. Pasture	*	30.5		26.6	23	21.5	22	17.4	20
TOTAL PASTURE		237.4		206.8	42	167.0		137.1	309
TOTAL AG. LAND[1]		3,080.8		2,683.8		2,166.8		1,778.1	

(See Table 13-39 for footnotes.)

TABLE 13–44 Crop Acreage and Production, Current Normal and Projections for 1980, 2000, 2020—Planning Subarea 2.3

Crop	Prod. Unit	Current Normal Acres	Current Normal Prod.	1980 Acres	1980 Prod.	2000 Acres	2000 Prod.	2020 Acres	2020 Prod.
					(1,000 Units)				
Wheat	Bu	452.3	16,186	565.4	25,182	623.2	34,663	754.4	48,785
Oats	Bu	185.4	9,777	278.1	20,746	181.6	15,742	101.1	9,649
Rye	Bu	15.6	410	15.2	532	20.6	743	28.0	1,037
Barley	Bu	13.6	586	21.3	1,342	19.7	1,421	17.0	1,377
Misc. Sm. Grains	Bu	18.2	NA	NA	NA	NA	NA	NA	NA
Corn for grain	Bu	1,075.3	75,636	1,043.2	103,533	1,191.5	137,768	1,666.5	208,064
Corn Silage	Ton	159.2	1,851	135.3	2,197	175.1	3,395	222.9	4,381
Soybeans	Bu	251.0	5,357	294.3	7,938	332.1	11,340	439.2	16,832
Dry Edible Beans	CWT	116.7	698	119.8	1,797	141.9	2,555	183.5	3,671
Sugar Beets	Ton	.7	31	0	0	0	0	0	0
Potatoes	CWT	22.9	2,775	9.6	3,177	11.4	4,783	14.1	7,071
Fruits	Tons	199.0	337	139.9	513	142.8	738	160.2	1,055
Comm. Vegetables	CWT	59.8	4,894	51.7	7,238	57.9	10,426	73.5	15,432
Commercial Sod	#	14.6		14.6		14.6		14.6	
Alfalfa Hay	Ton	513.6	1,177	462.2	1,384	462.2	1,672	462.2	1,892
Cl-Tim-Oth-Hay	Ton	164.9	254	148.4	323	148.4	341	131.9	363
Cropland Pasture	*	155.1	NA	147.3	262	131.8	315	147.3	419
Idle Cropland		1,956.9		1,859.1		1,545.1		653.6	
TOTAL CROPLAND		5,374.8		5,305.4		5,199.9		5,070.0	
Improved Pasture	*	115.3		113.8	211	111.5	254	108.7	280
Improvable Past.	*	344.1		339.7	429	333.0	404	324.7	455
N-Improv. Pasture	*								
TOTAL PASTURE		459.4		453.5	640	444.5		433.4	735
TOTAL AG. LAND[1]		5,834.2		5,758.9		5,644.4		5,503.4	

(See Table 13-39 for footnotes.)

TABLE 13-45 Crop Acreage and Production, Current Normal and Projections for 1980, 2000, 2020—Planning Subarea 2.4

Crop	Prod. Unit	Current Normal Acres	Current Normal Prod.	1980 Acres	1980 Prod.	2000 Acres	2000 Prod.	2020 Acres	2020 Prod.
					(1,000 Units)				
Wheat	Bu	33.2	1,022	33.7	1,471	41.5	2,214	49.8	3,082
Oats	Bu	39.5	1,384	31.6	2,151	23.4	1,760	22.3	1,872
Rye	Bu	5.5	105	6.8	156	5.2	176	5.2	196
Barley	Bu	.7	25	3.2	178	3.3	211	3.1	225
Misc. Sm. Grains	Bu	NA	NA	NA	NA	NA	NA	NA	NA
Corn for grain	Bu	64.7	3,367	51.8	3,798	32.4	2,803	58.0	5,849
Corn Silage	Ton	50.7	445	35.5	477	60.8	1,001	103.9	1,860
Soybeans	Bu	0.4	7	0	0				
Dry Edible Beans	CWT	3.5	31	2.3	34	1.7	30	1.0	20
Sugar Beets	Ton	0	0	0	0	0	0	0	0
Potatoes	CWT	13.5	1,172	1.5	424	1.2	435	1.0	404
Fruits	Tons	145.9	211	101.2	371	103.3	534	115.9	763
Comm. Vegetables	CWT	25.3	1,522	19.5	2,533	20.4	3,475	24.0	4,801
Commercial Sod	#	0		0		0		0	
Alfalfa Hay	Ton	211.3	367	137.3	387	158.4	553	200.7	814
Cl-Tim-Oth-Hay	Ton	67.6	82	57.5	114	50.7	106	43.9	100
Cropland Pasture	*	52.7	NA	34.3	52	42.2	91	47.4	139
Idle Cropland		766.2		963.3		929.8		790.4	
TOTAL CROPLAND		1,481.5		1,478.6		1,473.0		1,466.6	
Improved Pasture	*	83.3		83.1	134	82.8	171	82.4	198
Improvable Past.	*	268.2		267.7	282	266.6	297	265.5	345
N-Imprv. Pasture	*								
TOTAL PASTURE		351.8		351.1	416	349.8		348.3	543
TOTAL AG. LAND[1]		1,833.3		1,829.7		1,822.8		1,814.9	

(See Table 13-39 for footnotes.)

TABLE 13-46 Crop Acreage and Production, Current Normal and Projections for 1980, 2000, 2020—Planning Subarea 3.1

Crop	Prod. Unit	Current Normal Acres	Current Normal Prod.	1980 Acres	1980 Prod.	2000 Acres	2000 Prod.	2020 Acres	2020 Prod.
					(1,000 Units)				
Wheat	Bu	18.3	619	22.7	1,049	22.9	1,334	27.4	1,867
Oats	Bu	21.2	908	28.5	1,984	14.7	1,162	13.6	1,206
Rye	Bu	2.0	43	1.1	25	.7	25	.9	34
Barley	Bu	0.9	30	2.1	118	1.9	121	1.6	113
Misc. Sm. Grains	Bu	1.4	NA	NA	NA	NA	NA	NA	NA
Corn for grain	Bu.	11.5	673	9.2	697	5.8	514	9.5	994
Corn Silage	Ton	18.2	164	13.7	189	19.1	337	28.2	533
Soybeans	Bu	0.6	11	0	0				
Dry Edible Beans	CWT	12.6	43	11.0	171	16.4	301	24.8	504
Sugar Beets	Ton	1.3	15	2.4	36	2.7	59	2.9	91
Potatoes	CWT	4.7	850	2.1	530	1.8	580	1.6	606
Fruits	Tons	2.9	7	0.6	2	0.6	3	0.6	4
Comm. Vegetables	CWT	1.6	73	0.8	109	.7	119	.7	137
Commercial Sod	#	0.2		0.2		0.2		0.2	
Alfalfa Hay	Ton	113.8	202	79.7	227	85.4	310	102.5	433
Cl-Tim-Oth-Hay	Ton	22.5	29	20.3	41	21.4	45	27.0	63
Cropland Pasture	*	46.5	NA	32.6	49	27.9	57	41.9	130
Idle Cropland		251.9		303.3		306.9		244.2	
TOTAL CROPLAND		531.2		530.1		528.6		526.7	
Improved Pasture	*	36.9		36.7	661	36.7	83	36.6	97
Improvable Past.	*	136.0		135.6	137	135.3	145	134.9	168
N-Imprv. Pasture	*								
TOTAL PASTURE		173.6		173.2	203	172.7		172.1	265
TOTAL AG. LAND[1]		704.8		703.3		701.3		698.8	

(See Table 13-39 for footnotes.)

TABLE 13–47 Crop Acreage and Production, Current Normal and Projections for 1980, 2000, 2020—Planning Subarea 3.2

Crop	Prod. Unit	Current Normal Acres	Current Normal Prod.	1980 Acres	1980 Prod.	2000 Acres	2000 Prod.	2020 Acres	2020 Prod.
					(1,000 Units)				
Wheat	Bu	238.2	9,930	296.0	15,576	324.0	20,749	366.0	26,270
Oats	Bu	88.0	5,288	132.0	11,190	103.2	9,536	37.1	3,802
Rye	Bu	5.7	164	5.2	200	7.0	289	9.6	423
Barley	Bu	3.8	188	13.4	876	13.9	1,027	13.6	1,125
Misc. Sm. Grains	Bu	NA	NA	NA	NA	NA	NA	NA	NA
Corn for grain	Bu	273.2	19,048	214.1	21,803	224.0	27,129	293.9	37,937
Corn Silage	Ton	89.1	978	66.8	1,118	93.6	1,912	115.8	2,262
Soybeans	Bu	96.2	1,970	130.7	3,659	156.9	5,402	201.9	7,934
Dry Edible Beans	CWT	482.3	4,481	447.9	7,166	506.4	9,469	607.1	12,507
Sugar Beets	Ton	69.7	980	136.8	2,121	153.9	3,479	168.4	5,389
Potatoes	CWT	14.8	1,452	8.9	2,224	10.1	3,189	12.2	4,647
Fruits	Tons	11.0	7	1.9	7	2.0	10	2.3	14
Comm. Vegetables	CWT	9.0	1,917	20.1	2,714	23.3	4,071	35.1	7,201
Commercial Sod	#	2.5		2.5		2.5		2.5	
Alfalfa Hay	Ton	258.1	568	206.4	603	219.3	773	232.2	923
Cl-Tim-Oth-Hay	Ton	46.7	68	35.0	71	39.7	92	42.0	113
Cropland Pasture	*	71.6	NA	57.3	93	60.8	124	68.0	173
Idle Cropland		610.2		564.4		354.2	0	56.6	0
TOTAL CROPLAND		2,370.0		2,339.4		2,294.8		2,264.3	
Improved Pasture	*	31.0		30.6		30.0	67	29.4	74
Improvable Past.	*	154.2		152.2		149.2	161	147.5	184
N-Imprv. Pasture	*								
TOTAL PASTURE		185.2		182.8		179.3		176.9	258
TOTAL AG. LAND[1]		2,555.2		2,522.2		2,474.1		2,441.2	

(See Table 13-39 for footnotes.)

TABLE 13–48 Crop Acreage and Production, Current Normal and Projections for 1980, 2000, 2020—Planning Subarea 4.1

Crop	Prod. Unit	Current Normal Acres	Current Normal Prod.	1980 Acres	1980 Prod.	2000 Acres	2000 Prod.	2020 Acres	2020 Prod.
					(1,000 Units)				
Wheat	Bu	183.4	6,625	210.5	10,286	196.0	11,702	213.9	14,427
Oats	Bu	88.0	5,538	77.4	6,367	79.7	6,723	35.2	3,288
Rye	Bu	4.7	134	3.3	127	3.7	151	4.2	186
Barley	Bu	2.2	90	4.6	296	3.4	242	2.0	169
Misc. Sm. Grains	Bu	NA	NA	NA	NA	NA	NA	NA	NA
Corn for grain	Bu	340.8	25,205	255.6	24,537	232.0	26,608	294.5	35,202
Corn Silage	Ton	92.6	999	69.5	1,121	60.2	1,184	64.9	1,188
Soybeans	Bu	258.8	6,031	371.3	11,833	313.2	12,648	383.4	17,201
Dry Edible Beans	CWT	52.1	446	62.8	910	69.9	1,202	93.1	1,815
Sugar Beets	Ton	19.5	136	22.9	344	25.7	565	28.2	875
Potatoes	CWT	13.8	913	3.0	847	2.4	1,015	3.0	1,212
Fruits	Tons	19.9	41	5.8	21	6.1	31	6.8	44
Comm. Vegetables	CWT	43.1	3,145	34.9	4,705	31.2	5,461	33.4	6,859
Commercial Sod	#	17.2		17.2		17.2		17.2	
Alfalfa Hay	Ton	213.8	479	171.0	495	117.6	427	128.3	529
Cl-Tim-Oth-Hay	Ton	67.8	102	50.9	99	30.5	67	17.0	44
Cropland Pasture	*	12.7	NA	10.2	19	7.0	17	7.6	22
Idle Cropland		785.1		642.1		530.2		203.2	
TOTAL CROPLAND		2,215.5		2,013.0		1,726.0		1,535.9	
Improved Pasture	*	30.3		27.5	49	23.6	50	19.8	47
Improvable Past.	*	87.3		79.5	85	68.2	68	61.9	67
N-Imprv. Pasture	*								
TOTAL PASTURE		117.7		107.0	134	91.8		81.7	114
TOTAL AG. LAND[1]		2,333.3		2,120.0		1,817.8		1,617.6	

(See Table 13-39 for footnotes.)

TABLE 13–49 Crop Acreage and Production, Current Normal and Projections for 1980, 2000, 2020—Planning Subarea 4.2

Crop	Prod. Unit	Current Normal Acres	Current Normal Prod.	1980 Acres	1980 Prod.	2000 Acres	2000 Prod.	2020 Acres	2020 Prod.
					(1,000 Units)				
Wheat	Bu	509.5	18,805	546.3	27,975	388.1	25,045	254.8	18,397
Oats	Bu	207.2	12,590	142.2	12,454	209.7	19,140	82.9	7,747
Rye	Bu	9.1	270	7.1	272	8.9	366	11.2	491
Barley	Bu	2.5	111	8.3	533	7.4	544	6.2	506
Misc. Sm. Grains	Bu	NA	NA	NA	NA	NA	NA	NA	NA
Corn for grain	Bu	1,201.0	101,121	900.5	97,411	1,129.6	148,297	1,313.9	198,760
Corn Silage	Ton	66.7	902	70.0	1,404	93.4	2,197	120.1	2,669
Soybeans	Bu	1,526.2	38,755	1,964.2	61,880	2,034.1	81,776	2,165.9	104,266
Dry Edible Beans	CWT	0	0	0	0	0	0	0	0
Sugar Beets	Ton	33.6	353	59.8	717	58.8	1,177	59.7	1,823
Potatoes	CWT	4.3	602	3.8	1,059	3.0	1,449	5.0	2,020
Fruits	Tons	10.9	26	4.0	18	5.3	26	5.8	37
Comm. Vegetables	CWT	44.4	3,951	45.2	6,333	52.4	9,433	66.9	14,060
Commercial Sod	#	0.9		0.9		0.9		0.9	
Alfalfa Hay	Ton	258.4	582	232.6	697	219.6	722	219.6	789
Cl-Tim-Oth-Hay	Ton	185.9	286	167.3	333	120.8	263	74.4	172
Cropland Pasture	*	92.9	NA	92.9	169	83.6	198	88.2	240
Idle Cropland		581.6		437.4		184.2		36.4	
TOTAL CROPLAND		4,735.1		4,683.4		4,599.8		4,511.9	
Improved Pasture	*	81.3		80.4		79.0	170	77.5	190
Improvable Past.	*	132.5		131.1		128.7	144	126.2	164
N-Imprv. Pasture	*								
TOTAL PASTURE		213.8	2,138	211.5		207.7		203.7	354
TOTAL AG. LAND[1]		4,948.9		4,894.9		4,807.5		4,715.6	

(See Table 13-39 for footnotes.)

TABLE 13–50 Crop Acreage and Production, Current Normal and Projections for 1980, 2000, 2020—Planning Subarea 4.3

Crop	Prod. Unit	Current Normal Acres	Current Normal Prod.	1980 Acres	1980 Prod.	2000 Acres	2000 Prod.	2020 Acres	2020 Prod.
					(1,000 Units)				
Wheat	Bu	46.6	1,533	35.2	1,594	37.9	2,063	45.5	2,797
Oats	Bu	32.1	1,769	48.2	3,637	26.1	2,116	12.8	1,189
Rye	Bu	1.5	40	0.7	25	.6	25	.8	34
Barley	Bu	.5	20	2.1	118	1.9	121	1.6	113
Misc. Sm. Grains	Bu	1.4	NA	NA	NA	NA	NA	NA	NA
Corn for grain	Bu	80.6	6,043	60.4	5,609	55.5	6,150	85.5	9,996
Corn Silage	Ton	32.1	349	12.8	220	14.4	285	19.3	420
Soybeans	Bu	50.1	1,012	59.8	1,657	71.8	2,419	62.4	2,479
Dry Edible Beans	CWT	0	0	0	0	0	0	0	0
Sugar Beets	Ton	0	0	0	0	0	0	0	0
Potatoes	CWT	7.0	608	2.2	678	1.7	928	2.6	1,293
Fruits	Tons	15.6	38	8.9	31	8.8	44	10.2	64
Comm. Vegetables	CWT	13.0	737	8.4	1,086	7.0	1,192	6.9	1,372
Commercial Sod	#	2.6		2.6		2.6		2.6	
Alfalfa Hay	Ton	47.3	108	23.7	68	16.6	57	21.3	87
Cl-Tim-Oth-Hay	Ton	181.8	144	72.7	129	54.5	100	36.4	77
Cropland Pasture	*	29.3	NA	14.6	25	8.8	17	8.8	24
Idle Cropland		199.8		327.7		258.3		155.0	
TOTAL CROPLAND		741.3		680.0		566.5		471.3	
Improved Pasture	*	45.7		41.9		34.9	72	29.0	68
Improvable Past.	*	85.6		78.6		65.5	75	54.6	72
N-Imprv. Pasture	*								
TOTAL PASTURE		131.3		120.5		100.4		83.6	140
TOTAL AG. LAND[1]		872.6		800.5		666.9		554.9	

(See Table 13-39 for footnotes.)

TABLE 13–51 Crop Acreage and Production, Current Normal and Projections for 1980, 2000, 2020—Planning Subarea 4.4

Crop	Prod. Unit	Current Normal Acres	Current Normal Prod.	1980 Acres	1980 Prod.	2000 Acres	2000 Prod.	2020 Acres	2020 Prod.
				(1,000 Units)					
Wheat	Bu	25.5	866	12.8	594	12.7	725	14.8	1,020
Oats	Bu	61.3	3,420	55.2	4,402	35.1	3,210	24.5	2,476
Rye	Bu	2.2	66	1.6	89	1.8	75	2.3	102
Barley	Bu	.8	32	1.5	57	1.1	73	.7	56
Misc. Sm. Grains	Bu	NA	NA	NA	NA	NA	NA	NA	NA
Corn for grain	Bu	35.1	2,349	26.3	2,663	17.5	2,088	14.0	1,995
Corn Silage	Ton	49.0	692	29.4	644	34.3	912	44.1	1,317
Soybeans	Bu	**	**	**	**				
Dry Edible Beans	CWT	0.6	24	1.6	23	1.8	30	2.1	40
Sugar Beets	Ton	0	0	0	0	0	0	0	0
Potatoes	CWT	5.7	1,151	3.8	1,207	3.0	1,652	4.7	2,303
Fruits	Tons	67.7	150	50.4	185	51.7	267	57.8	381
Comm. Vegetables	CWT	38.8	3,034	37.5	5,067	39.7	6,951	46.8	9,602
Commercial Sod	#								
Alfalfa Hay	Ton	89.9	242	49.5	201	40.5	192	31.5	162
Cl-Tim-Oth-Hay	Ton	189.0	376	94.5	301	75.5	284	66.1	288
Cropland Pasture	*	45.6	NA	27.4	55	22.8	55	22.8	82
Idle Cropland		247.5		449.7		472.9		450.0	
TOTAL CROPLAND		858.7		841.2		810.4		781.9	
Improved Pasture	*	84.7		82.9		17.1	241	77.2	259
Improvable Past.	*	149.9		146.8		141.4	211	136.6	228
N-Imprv. Pasture	*	17.0		14.8		79.9	11	16.2	12
TOTAL PASTURE		252.6		247.5		238.4		230.0	
TOTAL AG. LAND[1]		1,111.3		1,088.7		1,048.8		1,011.9	

(See Table 13-39 for footnotes.)

TABLE 13–52 Crop Acreage and Production, Current Normal and Projections for 1980, 2000, 2020—Planning Subarea 5.1

Crop	Prod. Unit	Current Normal Acres	Current Normal Prod.	1980 Acres	1980 Prod.	2000 Acres	2000 Prod.	2020 Acres	2020 Prod.
				(1,000 Units)					
Wheat	Bu	55.0	2,036	27.5	1,355	27.5	1,617	51.8	3,656
Oats	Bu	75.6	4,431	56.7	4,527	54.4	5,039	30.2	3,090
Rye	Bu	2.5	87	1.5	57	2.1	88	3.1	135
Barley	Bu	1.2	63	3.7	237	3.0	224	2.4	197
Misc. Sm. Grains	Bu	NA	NA	NA	NA	NA	NA	NA	NA
Corn for grain	Bu	54.3	4,021	40.7	4,228	27.1	3,325	21.7	3,124
Corn Silage	Ton	58.6	828	38.1	842	43.9	1,184	52.7	1,583
Soybeans	Bu	0.1	4	**	**				
Dry Edible Beans	CWT	35.1	778	41.7	592	40.6	691	42.0	807
Sugar Beets	Ton				0				
Potatoes	CWT	11.8	2,040	7.4	2,330	5.8	3,189	9.1	4,444
Fruits	Tons	30.4	60	17.2	63	17.4	90	19.6	129
Comm. Vegetables	CWT	46.2	5,121	54.3	7,600	57.9	10,426	68.6	14,403
Commercial Sod	#	0.4		0.4		0.4		0.4	
Alfalfa Hay	Ton	172.1	460	111.8	453	94.6	461	103.2	553
Cl-Tim-Oth-Hay	Ton	101.0	185	80.8	262	50.1	193	45.4	203
Cropland Pasture	*	13.3	NA	9.3	22	8.0	20	8.6	33
Idle Cropland		397.5		549.4		588.1		537.3	
TOTAL CROPLAND		1,055.1		1,040.5		1,020.9		996.1	
Improved Pasture	*	46.8		46.1		45.2	133	44.1	144
Improvable Past.	*	116.1		114.6		112.5	167	109.8	182
N-Imprv. Pasture	*								
TOTAL PASTURE		162.9		160.7		157.7		153.9	
TOTAL AG. LAND[1]		1,218.0		1,201.2		1,178.6		1,150.0	

(See Table 13-39 for footnotes.)

TABLE 13–53 Crop Acreage and Production, Current Normal and Projections for 1980, 2000, 2020—Planning Subarea 5.2

Crop	Prod. Unit	Current Normal Acres	Current Normal Prod.	1980 Acres	1980 Prod.	2000 Acres	2000 Prod.	2020 Acres	2020 Prod.
					(1,000 Units)				
Wheat	Bu	63.4	2,296	59.4	2,902	69.6	4,194	90.4	6,296
Oats	Bu	133.1	7,562	199.6	15,869	123.8	11,206	95.6	9,832
Rye	Bu	4.1	143	2.5	95	3.4	138	4.6	203
Barley	Bu	1.8	86	10.1	651	10.3	755	8.9	731
Misc. Sm. Grains	Bu	6.4	NA	NA	NA	NA	NA	NA	NA
Corn for grain	Bu	95.0	6,712	71.2	7,300	47.5	5,732	93.9	13,363
Corn Silage	Ton	122.2	1,637	73.3	1,589	79.4	2,089	103.8	3,034
Soybeans	Bu	2.1	51	.5	15	.5	18	.5	184
Dry Edible Beans	CWT	52.4	1,124	42.7	683	40.2	751	39.2	807
Sugar Beets	Ton	0	0	0	0	0	0	0	0
Potatoes	CWT	11.5	2,257	6.7	2,118	5.3	2,899	8.2	4,040
Fruits	Tons	71.0	144	52.3	192	53.4	276	59.9	394
Comm. Vegetables	CWT	63.2	5,968	50.9	6,876	45.4	7,944	42.4	8,683
Commercial Sod	#	0.1		0.1		0.1		0.1	
Alfalfa Hay	Ton	334.9	848	184.2	751	167.5	786	167.5	870
Cl-Tim-Oth-Hay	Ton	222.6	410	149.3	483	122.4	470	89.0	387
Cropland Pasture	*	63.3	NA	38.0	83	31.6	85	34.8	126
Idle Cropland		512.0		793.8		903.2		831.5	
TOTAL CROPLAND		1,759.1		1,734.6		1,703.6		1,670.3	
Improved Pasture	*	119.0		117.4		115.3	339	113.0	371
Improvable Past.	*	272.5		268.6		263.7	406	258.6	446
N-Imprv. Pasture	*	52.2		51.6		50.7	43	49.7	47
TOTAL PASTURE		443.7		437.6		429.7		421.3	
TOTAL AG. LAND[1]		2,202.8		2,172.1		2,133.3		2,091.6	

(See Table 13–39 for footnotes.)

TABLE 13–54 Crop Acreage and Production, Current Normal and Projections for 1980, 2000 2020—Planning Subarea 5.3

Crop	Prod. Unit	Current Normal Acres	Current Normal Prod.	1980 Acres	1980 Prod.	2000 Acres	2000 Prod.	2020 Acres	2020 Prod.
					(1,000 Units)				
Wheat	Bu	1.9	45	0.4	15	.5	17	1.0	53
Oats	Bu	53.1	2,598	50.4	3,868	30.7	2,528	21.2	1,970
Rye	Bu	**	**	**	**	**	**	**	**
Barley	Bu	0.3	12	0.6	30	.6	30	.5	28
Misc. Sm. Grain	Bu	NA	NA	NA	NA	NA	NA	NA	NA
Corn for grain	Bu	1.5	91	0.4	29	.4	28	.3	27
Corn Silage	Ton	35.7	529	19.6	389	19.6	473	23.2	646
Soybeans	Bu								
Dry Edible Beans	CWT	0	0	0	0	0	0	0	0
Sugar Beets	Ton	0	0	0	0	0	0	0	0
Potatoes	CWT	0.1	71	0.2	42	0.2	58	.2	81
Fruits	Tons	0.1	**	0.1	*	0.1	**	0.1	*
Comm. Vegetables	CWT			0.2	22	0.1	20	.1	27
Commercial Sod	#								
Alfalfa Hay	Ton	120.1	288	66.1	257	54.0	244	60.1	307
Cl-Tim-Oth-Hay	Ton	248.2	428	124.1	358	111.7	377	111.7	463
Cropland Pasture	*	30.0	NA	15.0	29	12.0	30	12.0	41
Idle Cropland		142.9		356.6		402.1	0	399.6	0
TOTAL CROPLAND		633.9		633.7		632.3		630.7	
Improved Pasture	*	40.0		40.0		39.9	97	39.7	107
Improvable Past.	*	71.3		71.2		71.1	101	70.9	113
N-Imprv. Pasture	*	143.1		143.1		142.7	72	142.3	84
TOTAL PASTURE		254.4		254.3		253.7		253.1	
TOTAL AG. LAND[1]		888.3		888.0		886.0		883.8	

(See Table 13–39 for footnotes.)

TABLE 13–55 Acreage Under Cultivation by Categories of Land Use Intensity, Current Normal and Projections to 1980, 2000, and 2020[1]

Planning Subarea	Current Normal	1980	2000	2020
		1,000 Acres		
1.1				
Specialty Crops	2.2	2.2	1.8	2.1
Row Crops	3.0	1.7	2.7	4.2
Small Grains	31.0	40.6	21.9	21.8
Hay and Pasture	219.7	159.7	120.9	119.5
Total Cropland	255.9	204.2	147.3	147.6
Idled Cropland	174.2	225.9	282.4	281.4
Permanent Pasture	99.5	99.5	99.4	99.2
TOTAL	527.6	529.6	529.1	528.2
1.2				
Specialty Crops	7.2	1.4	1.1	1.1
Row Crops	.4	.2	.4	1.4
Small Grains	15.0	19.8	8.4	8.4
Hay and Pasture	114.1	63.8	48.0	47.0
Total Cropland	136.7	85.2	57.9	57.9
Idled Cropland	126.1	177.6	204.9	204.9
Permanent Pasture	65.8	65.8	65.8	65.8
TOTAL	328.6	328.6	328.6	328.6
2.1				
Specialty Crops	161.2	179.6	210.1	260.0
Row Crops	550.5	416.2	477.2	675.5
Small Grains	534.7	657.3	613.6	513.5
Hay and Pasture	1,351.7	1,087.8	924.9	802.9
Total Cropland	2,598.1	2,340.9	2,225.8	2,251.9
Idled Cropland	718.3	967.5	1,067.6	1,023.0
Permanent Pasture	356.7	355.8	354.2	352.2
TOTAL	3,673.1	3,664.2	3,647.6	3,627.1
2.2				
Specialty Crops	72.8	56.5	48.1	42.7
Row Crops	1,449.3	1,477.1	1,349.2	1,216.5
Small Grains	298.2	248.7	229.6	152.4
Hay and Pasture	545.9	373.3	208.6	176.1
Total Cropland	2,366.2	2,155.6	1,835.5	1,587.7
Idled Cropland	477.2	321.4	164.3	53.3
Permanent Pasture	237.4	206.8	167.0	137.1
TOTAL	3,080.8	2,683.8	2,166.8	1,778.1

[1]Specialty Crops: Fruits, Vegetables, Potatoes, Sugar Beets.
Row Crops: Corn, Corn Silage, Soybeans, Dry Beans.
Small Grains: Wheat, Oats, Barley, Rye, Misc. Small Grains.
Hay and Pasture: Alfalfa, Clover-Timothy, Cropland Pasture, Sod.

TABLE 13–55(continued) Acreage Under Cultivation by Categories of Land Use Intensity, Current Normal and Projections to 1980, 2000, and 2020[1]

Planning Subarea	Current Normal	1980	2000	2020
		1,000 Acres		
2.3				
Specialty Crops	282.4	201.2	212.1	247.8
Row Crops	1,602.2	1,592.6	1,840.6	2,512.1
Small Grains	685.1	880.0	845.1	900.5
Hay and Pasture	848.2	772.5	757.0	756.0
Total Cropland	3,417.9	3,446.3	3,654.8	4,416.4
Idled Cropland	1,956.9	1,859.1	1,545.1	653.6
Permanent Pasture	459.4	453.5	444.5	433.4
TOTAL	5,834.2	5,758.9	5,644.4	5,503.4
2.4				
Specialty Crops	184.7	122.2	124.9	140.9
Row Crops	119.3	89.6	94.9	162.9
Small Grains	78.9	75.3	73.4	80.4
Hay and Pasture	332.4	228.2	250.0	292.0
Total Cropland	715.3	515.3	543.2	676.2
Idled Cropland	766.2	963.3	929.8	709.4
Permanent Pasture	351.8	351.1	349.8	348.3
TOTAL	1,833.3	1,829.1	1,822.8	1,814.9
3.1				
Specialty Crops	10.5	5.9	5.8	5.8
Row Crops	42.9	33.9	41.3	62.5
Small Grains	43.8	54.4	40.2	43.5
Hay and Pasture	182.1	132.6	134.4	170.7
Total Cropland	279.3	226.8	221.7	282.5
Idled Cropland	251.9	303.3	306.9	244.2
Permanent Pasture	173.6	173.2	172.7	172.1
TOTAL	704.8	703.3	701.3	698.8
3.2				
Specialty Crops	104.5	167.6	189.3	218.0
Row Crops	940.8	859.5	980.9	1,218.7
Small Grains	335.7	446.6	448.1	426.3
Hay and Pasture	378.8	301.3	322.3	344.7
Total Cropland	1,759.8	1,775.0	1,940.6	2,207.7
Idled Cropland	610.2	564.4	354.2	56.6
Permanent Pasture	185.2	182.8	179.3	176.9
TOTAL	2,555.2	2,522.2	2,474.1	2,441.2

[1]Specialty Crops: Fruits, Vegetables, Potatoes, Sugar Beets.
Row Crops: Corn, Corn Silage, Soybeans, Dry Beans.
Small Grains: Wheat, Oats, Barley, Rye, Misc. Small Grains.
Hay and Pasture: Alfalfa, Clover-Timothy, Cropland Pasture, Sod.

TABLE 13–55(continued) Acreage Under Cultivation by Categories of Land Use Intensity, Current Normal and Projections to 1980, 2000, and 2020[1]

Planning Subarea	Current Normal	1980	2000	2020
		1,000 Acres		
4.1				
Specialty Crops	96.3	66.6	65.4	71.4
Row Crops	744.3	759.2	675.3	835.9
Small Grains	278.3	295.8	282.8	255.3
Hay and Pasture	311.5	249.3	172.3	170.1
Total Cropland	1,430.4	1,370.9	1,195.8	1,332.7
Idled Cropland	785.1	642.1	530.2	203.2
Permanent Pasture	117.8	107.0	91.8	81.7
TOTAL	2,333.3	2,120.0	1,817.8	1,617.6
4.2				
Specialty Crops	93.2	113.7	60.7	137.4
Row Crops	2,793.9	2,934.7	3,257.1	3,599.9
Small Grains	728.3	703.9	119.5	355.1
Hay and Pasture	538.1	493.7	424.9	383.1
Total Cropland	4,153.5	4,246.0	4,415.6	4,475.5
Idled Cropland	581.6	437.4	184.2	36.4
Permanent Pasture	213.8	211.5	207.7	203.7
TOTAL	4,948.9	4,894.9	4,807.5	4,715.6
4.3				
Specialty Crops	35.6	19.5	17.5	22.3
Row Crops	162.8	133.0	141.7	167.2
Small Grains	82.1	86.2	66.5	60.7
Hay and Pasture	261.0	113.6	82.5	68.7
Total Cropland	541.5	352.3	308.2	316.3
Idled Cropland	199.8	327.7	258.3	155.0
Permanent Pasture	131.3	120.5	100.4	83.6
TOTAL	872.6	800.5	666.9	554.9
4.4				
Specialty Crops	112.2	91.7	94.4	109.3
Row Crops	84.7	57.3	53.6	60.2
Small Grains	89.8	71.1	50.7	42.3
Hay and Pasture	324.5	171.4	138.8	120.1
Total Cropland	611.2	391.5	377.5	331.9
Idled Cropland	247.5	449.7	472.9	450.0
Permanent Pasture	252.6	247.5	238.4	230.0
TOTAL	1,111.3	1,088.7	1,048.8	1,011.9

[1]Specialty Crops: Fruits, Vegetables, Potatoes, Sugar Beets.
Row Crops: Corn, Corn Silage, Soybeans, Dry Beans.
Small Grains: Wheat, Oats, Barley, Rye, Misc. Small Grains.
Hay and Pasture: Alfalfa, Clover-Timothy, Cropland Pasture, Sod.

TABLE 13-55(continued) Acreage Under Cultivation by Categories of Land Use Intensity, Current Normal and Projections to 1980, 2000, and 2020[1]

Planning Subarea	Current Normal	1980	2000	2020
		1,000 Acres		
5.1				
Specialty Crops	88.4	78.9	87.0	97.3
Row Crops	148.1	120.5	111.6	116.4
Small Grains	134.3	89.4	81.1	87.5
Hay and Pasture	286.8	202.3	153.1	157.6
Total Cropland	657.6	491.1	432.8	458.8
Idled Cropland	397.5	549.4	588.1	537.3
Permanent Pasture	162.9	160.7	157.7	153.9
TOTAL	1,218.0	1,201.2	1,178.6	1,150.0
5.2				
Specialty Crops	145.7	271.6	104.1	110.5
Row Crops	271.7	187.7	167.6	237.4
Small Grains	208.8	271.6	207.1	199.5
Hay and Pasture	620.9	371.6	321.6	291.4
Total Cropland	1,247.1	940.8	800.4	838.8
Idled Cropland	512.0	793.8	903.2	831.5
Permanent Pasture	443.7	437.6	429.7	421.3
TOTAL	2,202.8	2,172.1	2,133.3	2,091.6
5.3				
Specialty Crops	.2	.5	.4	.4
Row Crops	37.2	20.0	20.0	23.5
Small Grains	55.3	51.4	31.8	22.7
Hay and Pasture	398.3	205.2	178.0	184.5
Total Cropland	491.0	277.1	230.2	231.1
Idled Cropland	142.9	356.6	402.1	399.6
Permanent Pasture	254.4	254.3	253.7	253.1
TOTAL	888.3	888.0	886.0	883.8
BASIN TOTAL				
Specialty Crops	1,400.7	1,217.4	1,275.5	1,464.8
Row Crops	8,949.9	8,684.0	9,214.4	10,894.4
Small Grains	3,599.3	3,992.8	3,621.1	3,170.4
Hay and Pasture	6,711.8	4,924.8	4,236.3	4,083.3
Total Cropland	20,661.7	18,819.0	18,347.3	19,612.9
Idled Cropland	7,947.3	8,939.2	8,194.2	5,920.4
Permanent Pasture	3,505.8	3,427.5	3,312.1	3,212.3
TOTAL	32,114.8	31,185.7	29,858.6	28,745.6

[1] Specialty Crops: Fruits, Vegetables, Potatoes, Sugar Beets.
Row Crops: Corn, Corn Silage, Soybeans, Dry Beans.
Small Grains: Wheat, Oats, Barley, Rye, Misc. Small Grains.
Hay and Pasture: Alfalfa, Clover-Timothy, Cropland Pasture, Sod.

Section 4

PROBLEMS AND NEEDS OF AGRICULTURAL AND FOREST LANDS

4.1 Introduction

Estimates of agricultural and non-Federal forest land problems and needs are based on the 1967 *National Inventory of Soil and Water Conservation Needs* (CNI). Data for the Basin States have been summarized to show acreages of cropland, pasture, other land, and forest land needing conservation treatment.

The CNI recognized many environmental factors and potential land uses that affect conservation needs. Basic assumptions regarding population growth, economic activity, and land use to 1980, developed by the USDA Land and Water Resources Policy Committee, provided guidance for determining the various conservation needs. These assumptions are similar to and compatible with those used in the *Framework Study*.

Acreage needing treatment was determined for land expected to be in each land use category in 1980, as well as for land already in that use. Local technical guides, prevailing agricultural operations on the land, and a practical system of conservation farming that would be economically feasible for the landowner were taken into consideration when determining treatment needs.

Treatment needs of cropland and other land primarily involve conservation of soil resource in terms of soil-loss tolerance. For pasture and woodland, conservation of plant cover and the soil resource was considered.

Soil-loss tolerance is specified for a particular soil type at the level at which soil-building processes compensate for the rate of erosion. Permanent high levels of productivity may be maintained by controlling erosion to within the specified limits.

Soil-loss tolerances for soils in the Basin range from one to five tons per acre per year. Conservation treatment to limit erosion to these levels varies by soil type, and has been considered in the CNI estimates presented here.

Estimates of land treatment needs that emphasize physical needs were developed independently of the economic model used to determine projected crop acreage and production for the *Framework Study*. Nevertheless, the two are related. Projections of crop yields and cropping patterns used are based on the assumption that adequate land treatment measures will be installed and maintained.

It was assumed that the level of land treatment will increase through time to the extent that increased demand for agricultural products requires increasingly intensified agricultural production. The model assumes that conservation measures compatible with maintenance and enhancement of productive capacity to meet Basin production requirements will be followed. It also assumes that the productive capacity of idle acreage will be maintained through appropriate land treatment measures.

The issue of environmental quality is important as well. Many conservation practices have beneficial effects on the natural resource base beyond those directly related to production of food and fiber. Conservation needs estimates presented here contain consideration of environmental enhancement, including reduced sedimentation in surface waters and maintenance and improvement of plant and forest cover.

4.2 Agricultural Land

The CNI identified a total of 20,451,200 acres of agricultural land needing conservation treatment. This total includes 16,746,300 acres of cropland, 2,419,600 acres of pasture land, and 1,285,300 acres of other land (Table 13–56).

4.2.1 Cropland

Of the 28,609,000 acres of cropland in the Basin, 16,746,300 acres, or 59 percent, require land treatment to reduce runoff, erosion, and sedimentation, improve drainage, and provide better cultural and water management for irrigation (Table 13–57). Adequate conservation

TABLE 13–56 Agricultural and Other Land Treatment Needs, 1970

Planning Subarea	Total Cropland Needing Treatment	Pasture Land Needing Treatment	Other Land Needing Treatment	Total Agricultural Land Needing Treatment
		(Thousand Acres)		
1.1	187.9	75.9	53.8	317.6
1.2	100.3	49.7	5.3	155.3
2.1	1,702.3	269.6	253.5	2,225.4
2.2	1,800.5	147.0	222.7	2,170.2
2.3	3,060.6	351.3	127.6	3,539.5
2.4	632.1	263.0	122.9	1,018.0
3.1	267.5	130.1	38.0	435.6
3.2	1,390.3	154.4	70.9	1,615.6
4.1	1,173.5	86.2	45.4	1,305.1
4.2	3,653.6	120.5	46.4	3,820.5
4.3	494.4	84.2	121.5	700.1
4.4	383.1	144.9	23.9	551.9
5.1	533.5	96.3	24.4	654.2
5.2	998.5	304.6	109.2	1,412.3
5.3	368.2	141.9	19.8	529.9
TOTAL	16,746.3	2,419.6	1,285.3	20,451.2

Source: Reference 2.

treatment has been applied to approximately 9,547,100 acres. Approximately 3,904,000 acres require proper crop residue use and annual cover crops. The use of sod in the cropping system is needed on approximately 2,596,000 acres. Approximately 682,000 acres require contouring to control erosion, and 2,324,000 acres require strip cropping, terraces, and diversions in order to reduce water and wind erosion. A change to a permanent cover of grass or trees is needed on 420,000 acres, as these lands are unsuited for row or grain crops. Approximately 6,218,000 acres require installation of adequate drainage systems for the removal of excess surface and internal water.

It is estimated that of the 487,500 acres of orchards, vineyards, and bush fruit in the Basin, approximately 170,000 acres require conservation treatment. Some conservation practices required on this land are crop residue and annual cover crops, sod in rotation, contouring, strip cropping, terraces and diversions, land use change to permanent cover of grass, and adequate drainage systems for the removal of excess surface and internal waters.

Approximately 2,348,000 acres are classified as open land formerly farmed. This is land that has been idle more than three years and is not purposely being converted to another use. It is estimated that 401,000 acres will require conservation treatment. The conservation practice and percentage of the total acres requiring specific treatment are: crop residue and annual cover crops, 5 percent; sod in rotation, 13 percent; contouring, 7.5 percent; change land use to permanent cover of grass or trees, 46 percent; and adequate drainage systems for the removal of excess surface and internal waters, 21.5 percent.

CNI found that 82,800 acres of cropland are being irrigated within the Region. Approximately 53,600 are adequately treated, while 21,100 acres require only cultural or management measures to maintain the proper air, water, and soil relationship. This would include crop rotations and proper use of residues to maintain soil tilth. Improved irrigation systems are needed on 4,500 acres to permit proper application of irrigation water and to prevent soil erosion. The necessary steps include reorganization of existing systems, land leveling, ditch lining, erosion control measures, and drainage. Irrigation water management is needed on 3,600 acres to control soil erosion, prevent excess water losses, and to time water application to meet crop needs.

4.2.2 Pasture

Of the 3,506,000 acres of pasture in the Basin, 2,420,000 or 69.0 percent require treatment (Table 13–58). Approximately 974,000 acres or 28 percent do not need conservation treatment. Approximately 112,000 acres cannot be feasibly treated because they cannot yield a reasonable economic return to the landowner. Approximately 200,000 acres require a change in land use, preferably to forest. Protection of plant cover is needed on 366,000 acres because of overgrazing. Only livestock management and distribution is needed to achieve recovery through natural reseeding. Approximately 723,000 acres require improvement of present plant cover because the desired type of vegetation is so thin that natural revegetation needs an application of minerals, weed controls, and mechanical measures to obtain a satisfactory stand. Encroachment of woody and noxious plants on pasture has destroyed or threatens grass cover on 220,000 acres. Brush can be eradicated by chemical or mechanical measures. Approximately 505,000 acres are in such poor condition that complete reestablishment of vegetative cover, but not brush control, is required. The desired type of vegetation must be protected from grazing damage until fully established. Approximately 406,000 acres require the same reestablishment in addition to control of undesirable brush.

TABLE 13–57 Cropland Treatment Needs by Planning Subarea[1]

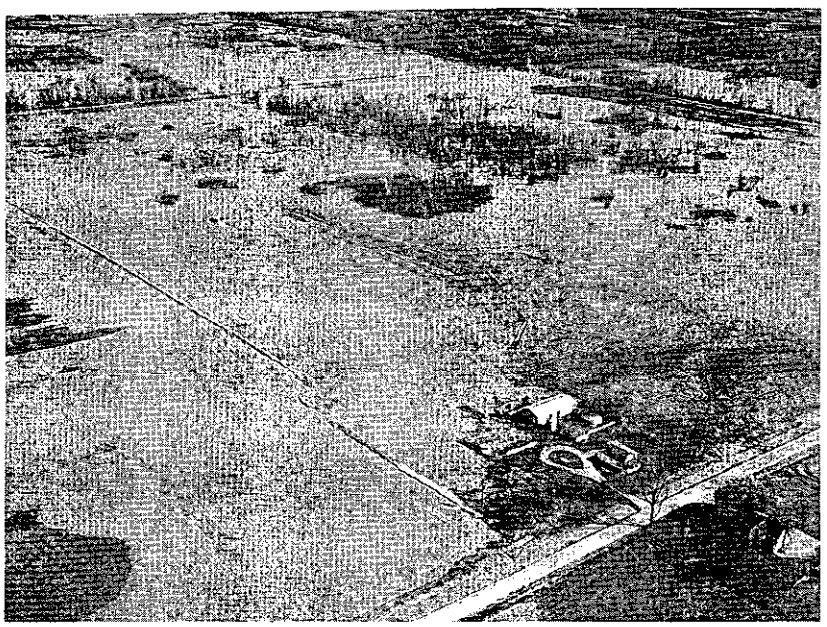
Planning Subarea	Total Cropland	Cropland in Tillage Rotation							
			Treatment Needs						
		Total	Treatment Adequate	Residue and Annual Cover	Sod in Rotation	Contour Only	Strips Terraces Diversion	Change in Use	Drainage System
				(Thousand Acres)					
1.1	430.1	365.0	193.2	33.0	38.3	3.2	8.9	3.8	84.6
1.2	262.8	221.8	121.5	20.5	23.1	5.8	16.0	2.4	32.5
2.1	3,316.4	3,128.4	1,452.0	121.0	164.9	126.9	740.3	72.2	451.1
2.2	2,843.4	2,778.5	993.9	498.9	262.9	226.0	287.7	66.7	442.4
2.3	5,374.8	4,751.3	1,796.2	968.2	821.2	113.8	383.7	90.3	577.9
2.4	1,481.5	916.7	414.6	145.7	113.2	23.6	139.0	33.0	47.6
3.1	531.2	467.4	203.2	104.3	63.0	4.1	24.1	5.4	63.3
3.2	2,370.0	2,142.4	765.7	655.5	108.7	5.7	87.0	10.8	509.0
4.1	2,215.6	1,985.3	832.0	574.3	108.6	7.5	17.3	11.2	434.4
4.2	4,735.1	4,685.1	1,068.0	411.4	520.6	49.9	94.0	16.5	2,524.7
4.3	741.3	613.0	218.6	3.9	62.7	9.7	42.8	10.0	265.3
4.4	858.7	690.1	332.1	53.4	45.5	8.1	62.1	7.1	181.8
5.1	1,055.1	846.9	342.7	157.8	53.2	27.3	112.7	5.9	147.3
5.2	1,759.1	1,532.7	599.1	142.7	114.0	62.9	297.7	65.4	250.9
5.3	633.9	567.6	214.3	13.8	96.4	7.5	10.7	19.3	205.6
TOTAL	28,609.0	25,692.2	9,547.1	3,904.4	2,596.3	682.0	2,324.0	420.0	6,218.4

Planning Subarea	Orchards - Vineyards and Bush Fruits		Open Formerly Cropped		Irrigated Land			
	Total	Treatment Needs	Total	Treatment Needs	Total	Cultural and Management	Improved System	Water Management
				(Thousand Acres)				
1.1	5.0	----	60.1	16.1				
1.2	2.0	----	39.0	----				
2.1	11.9	4.2	132.0	3.9	44.1	11.4	2.8	3.6
2.2	6.0	4.0	48.5	9.8	10.4	2.1	---	---
2.3	161.8	51.2	461.7	54.3				
2.4	117.5	41.5	447.3	88.5				
3.1	3.3	0.8	60.5	2.5				
3.2	9.2	1.5	218.4	12.1				
4.1	14.7	1.7	215.6	18.5				
4.2	8.7	5.7	36.9	26.5	4.4	4.3	---	---
4.3	11.7	3.2	112.5	94.7	4.1	1.6	0.5	---
4.4	54.9	17.4	108.4	7.3	5.3	0.4	---	---
5.1	23.1	9.7	178.5	19.6	6.6	---	---	---
5.2	57.6	29.5	161.0	33.0	7.8	1.2	1.2	---
5.3	0.1	----	66.1	14.9	0.1	---	---	---
TOTAL	487.5	170.4	2,346.5	401.7	82.8	21.0	4.5	3.6

[1] Base Year CNI, 1966-67
Source: Reference 2

IMPROPER LAND MANAGEMENT LEADS TO SHEET EROSION.

UNCONTROLLED RUNOFF FLOODS VALUABLE AGRICULTURAL LANDS.



SOIL EROSION RESULTS FROM OVERGRAZING PASTURELAND.

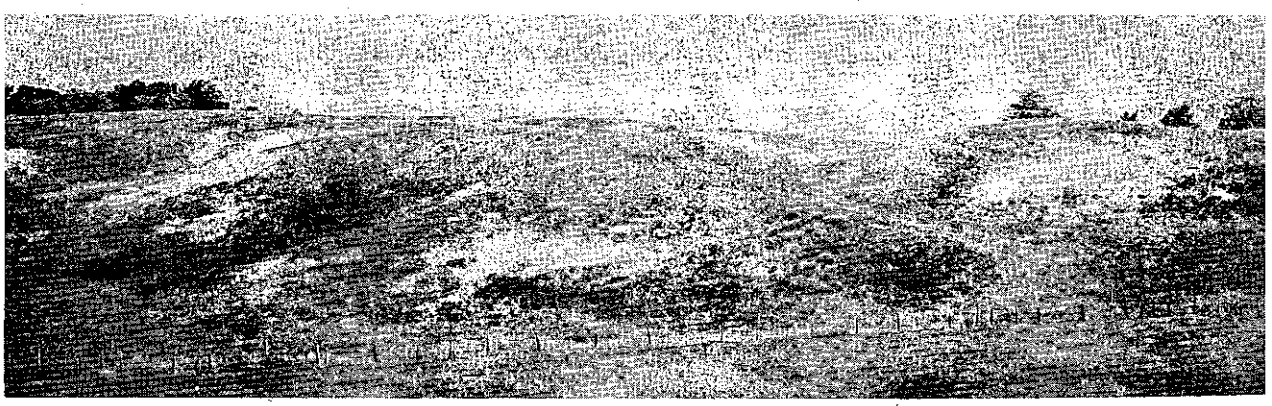


FIGURE 13–15 Agricultural Problems

WIND EROSION IS A PROBLEM ON BOTH MINERAL AND ORGANIC SOILS, RESULTING IN SOIL LOSS AND CROP DAMAGE.

UNPROTECTED WATERWAYS ARE SUBJECT TO SERIOUS EROSION.

FIGURE 13–16 Uncontrolled Wind and Water

TABLE 13–58 Pasture Treatment Needs by Planning Subarea[1]

Planning Subarea	Total Pasture Acres	No Treatment Needed	No Treatment Feasible	Pasture Treatment Needs: Change in Land Use	Needs Protection Only	Needs Improvement Only	Brush Control and Improvement	Reestablishment of Vegetative Cover	Reestablishment of Vegetative Cover and Brush Control
				(Thousand Acres)					
1.1	99.5	22.8	0.8	1.0	12.0	14.4	12.6	19.3	16.6
1.2	65.8	15.2	0.9	2.1	13.7	16.6	6.5	7.1	3.7
2.1	356.7	79.4	7.7	14.4	80.1	52.5	12.3	83.5	26.3
2.2	237.4	82.8	7.6	11.2	24.5	41.8	4.4	52.8	12.3
2.3	459.4	101.1	7.0	10.6	50.4	118.5	14.9	85.2	71.7
2.4	351.8	88.0	0.8	29.5	37.9	85.4	17.2	66.2	26.8
3.1	173.6	39.6	3.9	3.6	19.1	47.6	13.2	24.5	22.1
3.2	185.2	30.8	---	14.1	19.8	53.5	18.7	25.9	22.4
4.1	117.7	30.2	1.3	3.2	22.7	34.6	5.8	7.3	12.6
4.2	213.8	90.9	2.4	1.0	10.2	46.6	21.3	21.5	19.9
4.3	131.3	46.2	0.9	1.5	2.6	42.9	9.1	17.8	10.3
4.4	252.6	88.7	19.0	12.1	8.3	35.4	16.8	25.0	47.3
5.1	162.9	61.8	4.8	5.2	9.1	32.7	15.3	14.4	19.6
5.2	443.7	112.3	26.8	53.5	28.1	77.6	36.2	44.2	65.0
5.3	254.4	84.5	28.0	36.0	27.9	22.8	15.2	10.6	29.4
TOTAL	3505.8	974.3	111.9	199.5	366.4	722.9	219.5	505.3	406.0

[1]Base Year CNI, 1966-67
Source: Reference 2

4.2.3 Other Land

It is estimated that of the 4,852,500 acres of other land in the Basin, approximately 1,285,000 acres or 26.5 percent require conservation treatment (Table 13–59). Approximately 47 percent of the total 4,853,000 acres is land in farms. Primary conservation practices required include change in land use to perennial vegetation or trees, the establishment and improvement of present grasses, and necessary mechanical practices required to control runoff and erosion.

4.3 Forest

The long-term trend is toward a declining forest acreage as forest land gives way to highways, powerlines, reservoirs, and urban, recreational, and industrial developments. This withdrawal is only partially offset by reforestation and natural reversion of cropland and pastureland. The challenge will be to satisfy the increasing demand for goods and services from a declining forest resource base. Indications are that the present acreage of forest land is needed now and in the future for watershed protection, timber products, recreation, fish and wildlife habitat, aesthetics, or some combination of these.

Forest land supplies water, timber, recreation areas, wildlife habitat, and enhances environmental quality. Forest resource multiple-use management programs, both public and private, have the objective of producing these products, uses, and services in a compatible and balanced setting. Management efforts must be intensified to derive the optimum mixture of goods and services from the remaining forest land.

4.3.1 Non-Federal Forest Land

There are more than 34.5 million acres of non-Federal forest land in the Region (Table 13–60). Approximately 13.7 million acres are adequately treated, but the remainder require one or more land treatment measures for optimum utilization.

While most of the public and forest industry lands are under some degree of management, much of the private forest land is either unmanaged or inadequately managed. The greatest existing forest land problem is how to secure good management for this private land. The non-Federal public forests have func-

TABLE 13-59 Conservation Treatment Needs—Other Land by Planning Subarea[1]

Planning Subarea	Total Other Land	Land in Farms		Land not in Farms	
		Total	Needs Treatment	Total	Needs Treatment
		(Thousand Acres)			
1.1	304.5	63.7	16.7	240.8	37.1
1.2	65.8	21.8	2.6	44.0	2.7
2.1	757.1	483.1	157.9	274.0	95.6
2.2	580.1	267.1	118.3	283.0	104.4
2.3	598.0	341.3	76.6	256.7	51.0
2.4	411.8	111.2	41.4	300.6	81.5
3.1	219.1	83.5	9.4	135.6	28.6
3.2	285.2	143.2	45.3	142.0	25.6
4.1	221.9	88.3	18.8	133.6	26.6
4.2	349.4	269.9	37.6	79.5	8.8
4.3	288.2	133.2	38.6	155.0	82.9
4.4	109.1	30.3	6.7	78.8	17.2
5.1	98.1	51.6	12.4	46.5	12.0
5.2	428.2	107.1	32.5	321.1	76.7
5.3	136.0	52.0	13.4	84.0	6.4
TOTALS	4,852.5	2,277.3	628.2	2,575.2	657.1

[1]Base Year CNI, 1966-67
Source: Reference 2

tions, potential, and problems similar to those in the national forests, which will be discussed in the following section.

Several factors have influenced the level of management on private lands. Many of the owners of small tracts from 5 to 100 acres are not interested in managing their land for marketable forest products. Much of the private land is held by absentee owners who have moved from the land, inherited it, or acquired it for personal recreational purposes, a retirement home, or speculation. Often the landowner does not consider the need for managing his land, or if he does, lacks the ability. Frequently he is unaware of help available from public or private foresters. Furthermore, monetary returns are usually long-term, periodic, and relatively low.

An intensified information and education effort is needed to increase the productivity and value of forest land management, whether the objective is watershed protection, recreation, aesthetics, wildlife, or the production of timber.

A management plan is the first step toward improving the condition of forest land. It is estimated that nearly 21 million acres of non-Federal forest land need some type of forest management plan.

Some land is expected to shift to forest land in the future. Some idle open land needs to be reforested in order to provide protective cover and to put it back into forest production. Forest land that is less than 10 percent stocked needs to be planted with suitable tree species. Forest lands 10 to 40 percent stocked need reinforcement planting. An estimated 6.3 million acres of non-Federal forest land need reforestation with a selective approach for management objectives. Reforestation may be undertaken to maintain and improve timber inventories, help control erosion and water runoff, provide wildlife habitat, and enhance recreation and environmental aspects.

Timber stand improvement is an important component in the better use and management of forest land. Some of the measures needed on 12.7 million acres are thinnings, weedings, sanitation cuts, and pruning.

Grazing on forest land, which usually reduces growth and quality of vegetative cover, has a damaging effect on hydrologic conditions. Young trees and other ground cover are destroyed or retarded by browsing and trampling. The infiltration rate for water is reduced because the soil becomes more compact. Protection from grazing is needed on 1.5 million acres.

TABLE 13–60 Current Status of State, County, and Private Forest Land Treatment Needs

Planning Subarea	Forest Land[1]	Treatment Adequate	Needs[2]						
			Multiple-Use Plans	Reforest-ation	Forest Stand Improvement	Grazing Control	Urban Forestry	Erosion Control[3]	Improved Harvesting
			(Thousand Acres)						
1.1	6,414	2,823	3,591	1,383	1,556	115	21	12	1,729
1.2	4,914	2,121	2,793	645	1,844	46	4	2	2,305
2.1	4,296	2,426	1,870	766	1,064	213	64	8	1,289
2.2	337	125	212	64	125	67	144	5	61
2.3	1,703	473	1,230	575	642	118	97	17	676
2.4	4,504	1,465	3,039	888	2,087	133	55	30	2,252
3.1	2,513	1,244	1,269	522	721	124	25	3	1,244
3.2	1,194	413	781	378	390	71	53	6	590
4.1	665	244	421	205	192	26	204	2	128
4.2	451	103	348	94	251	45	21	5	100
4.3	539	109	430	68	344	31	196	7	208
4.4	1,364	337	1,027	117	843	234	122	3	779
5.1	867	424	443	75	332	33	49	8	51
5.2	2,542	881	1,661	308	1,013	88	129	13	330
5.3	2,215	490	1,725	176	1,294	157	11	18	500
Total	34,518	13,678	20,840	6,264	12,698	1,501	1,195	139	12,242

[1]Acreage shown excludes national forest and other Federal lands.
[2]Individual acreages can need more than one individual treatment need.
[3]Excludes streambank erosion
Source: U.S. Forest Service and 1966-67 CNI, Reference 2

Protection of forest land from damage or destruction by fire is essential to secure maximum benefits in water, timber, recreation, and wildlife habitat. Over the years the yearly acreage burned and the number of fires have been reduced through a combination of improved State fire-fighting organizations and the cooperation of the citizens in preventing fires. At present adequate fire protection is provided in most areas during normal years by State forestry agencies in cooperation with the U.S. Forest Service under the Clarke-McNary Cooperative Fire Control Program. Cooperative agreements with local fire departments have been a key factor in fire control in recent years. The present favorable situation should not be viewed with complacency. The risk of forest fires is still great and becoming more so each year as the forests become more accessible to the public, as forests and plantations grow, and as more and more summer homes and cabins are being built in pleasant forest-water complexes.

The severity of fire protection problems in the Basin is increasing mainly in plantation and pine forest areas. The construction of more campgrounds, organization camps, homes, and cabins in these extensive, dense, highly flammable areas increases the probability of forest fires of disaster proportions.

Almost all urban and urban built-up areas have large amounts of flashy fuels, such as dry grasses and weeds, growing near homes and buildings. The ever increasing threat of brush-type wildfires presents an increasing danger to people and property.

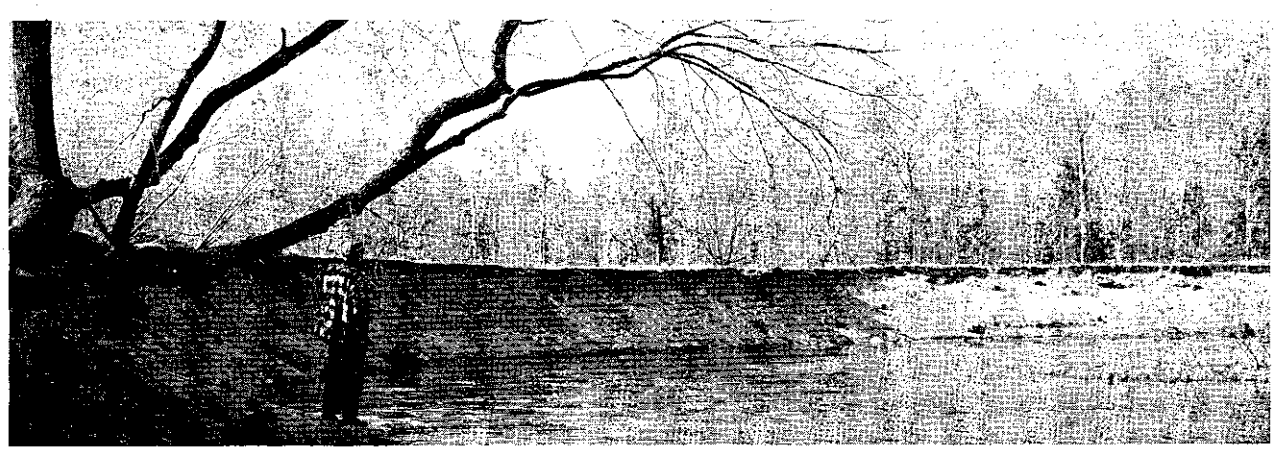
In order to meet the needs of an increasingly mobile public, methods of fire detection, initial attack, and suppression need thorough review. There is a need to incorporate present and future systems into an optimum fire protection plan. This plan should provide for a continuation and improvement of present methods, and further research and development of new techniques. There is a need for the development of facilities such as an equipment development and testing center and expansion of regional fire research. In addition, there is a need for additional brush-type wildfire equipment in volunteer fire departments, for additional prevention programs, and for training in disaster fire and wildfire fighting techniques.

Protection of forest resources from insects and diseases, which take heavy tolls in the Basin, is essential to sustained forest use. Estimated annual mortality due to diseases amounts to 172 million cubic feet, while insects destroy 41 million cubic feet.

Insects that cause the most serious losses in mortality and reduction of growth include the forest tent caterpillar on aspen and maple, the white pine weevil, jack pine budworm, spruce budworm on spruce and balsam fir, gypsy

LIVESTOCK GRAZING AND FORESTRY INTERESTS ARE NOT COMPATIBLE.

OVERSTOCKING OF FOREST LAND RESTRICTS TREE GROWTH.

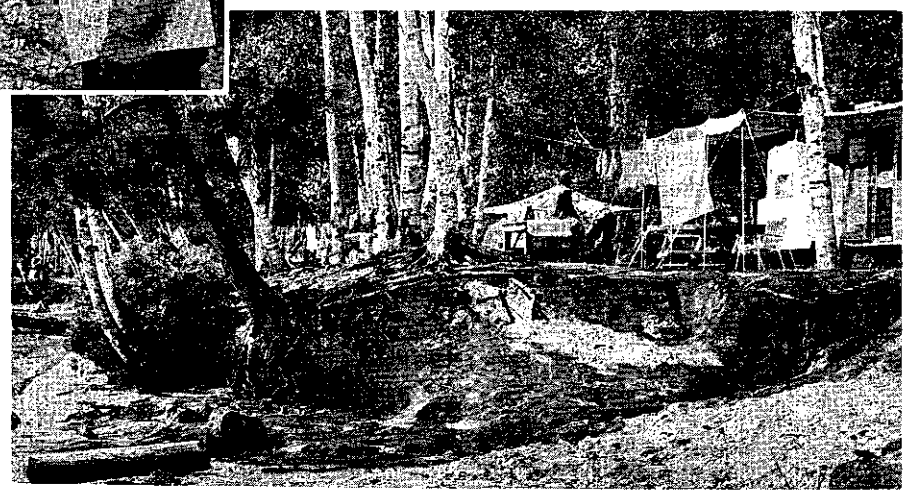


STREAMBANK EROSION DESTROYS SOIL AND FOREST RESOURCES AND CAUSES STREAM SILTATION.

FIGURE 13–17 Problems in Forest Areas

FIRE: DESTROYS TREES, WILDLIFE, AND NATURAL BEAUTY.

DISEASE: REDUCES THE QUALITY AND QUANTITY OF FOREST PRODUCTS.



OVERUSE: CAUSES ACCELERATED EROSION AND OTHER PROBLEMS THROUGH INTENSIVE USE OF FORESTED AREAS.

FIGURE 13–18 Forest Enemies

moth, oak leaf skeletonizer, and pine sawflies.

Current diseases that have the greatest potentials for damage include hypoxylon canker of aspen, Dutch elm disease in both forested and urban areas, white pine blister rust, annosus root rot, oak wilt, scleroderris canker in plantations of red pine, and diseases in Christmas tree plantations. Few direct controls are available.

The development and subsequent application of acceptable preventive or suppressive measures could increase the potential of the Basin's forest resources. Because of the erratic nature of insect and disease outbreaks, surveillance becomes exceptionally important. Early action offers an opportunity to lessen the damage. As improved methods become available, more complete biological evaluations plus more reliable information on the resources concerned will enable land managers to make decisions that provide better use and expanded benefits.

Although urban beautification in a formal manner is understood and easily developed, the management of trees and associated plants for sylvan aesthetics, microclimatic amelioration, and a large number of related benefits is not well understood. The combination of skills and the public investments needed for solving the problem are not generally available. It involves a wide variety of technical disciplines, careful planning, continuing management, and strong community action. There is a need for more research to establish basic data and information for use in this type of planning.

Technical assistance and consultive services are needed to assist conservation commissions, planning boards, and leaders of local cities and communities in forest land use planning and zoning for forest land or woodland acreages located in urban and urban built-up areas. Approximately 1.2 million acres need treatment through an urban forestry program.

Accelerated erosion is occurring on approximately 139 thousand acres of forest land. Improperly performed logging activities, grazing, and wildfires are causes of erosion from forest land. Another source of erosion occurs on land that is reverting to forest but is not yet adequately stocked with trees or protective ground cover. Erosion control measures are needed to check gullies, control sheet erosion, control logging road and skid trail erosion, and stabilize dunes and blowouts.

Private landowners need technical assistance in improving harvesting techniques. There is a need to improve aesthetics of even-aged management, reduce costs so as to permit logging in fringe areas of marginal profitability, and to find ways to efficiently regenerate wildlife food species and regenerate desirable timber species. Improper timber harvesting operations may result in denudation of large areas, severe erosion from logging roads and skid trails, and the diversion of streams from their natural channels by debris. Improved harvesting operations to minimize damages are needed on 12.2 million acres.

Forests and water are focal points for outdoor recreation, which in some cases is compatible with other forest uses. The demand for forest-based outdoor recreation is increasing steadily. Adequate facilities to handle this influx of people are lacking. Plans have been developed by the States and local governments to provide additional recreational developments, but, due to limited finances, they have been unable to satisfy the demand. The private sector must satisfy a larger portion of the needs than it does at present if these needs are to be met. Better development and use of existing recreation areas are needed as well.

The management of the Basin's forest lands can have significant effects on fish and wildlife resources, which are of considerable value to the Basin. Changing patterns of land use have created highly productive habitats for white-tailed deer and ruffed grouse. Because mature forests are less productive than young stands for these species, harvesting mature timber tends to return forest land to a desirable habitat for deer and grouse. Where the objectives of land ownership preclude harvesting of mature trees, the quality of the habitat for many species of wildlife will decrease.

Fish populations are adversely affected by sediment load in many streams, a problem due primarily to streambank erosion in sandy glacial drift areas under forest cover. Coarse materials cover spawning beds, fill pools, and destroy bottom organisms. Streambank stabilization is needed in these areas.

4.3.2 National Forests

Each national forest resource is managed with other resources to meet present and future public needs in local areas and in the nation. In order to help meet these needs, additional land treatment is required (Table 13–61).

TABLE 13–61 National Forest Land Treatment Needs

Planning Subarea[1]	Timber[2]	Wildlife[3]	Other[4]	Total
		(Thousand Acres)		
1.1	1529	473	47	2049
1.2	1447	100	50	1597
2.1	1109	60	7	1176
2.4	1451	30	43	1524
3.1	723	21	15	759
5.2	6	3	1	10
	6265	687	163	7115

[1]Refer to Table 13-27 for a listing of national forests within each planning subarea.

[2]Timber management needs include renewing old and poorly stocked stands, thinning and improving stands, releasing young growth, and reforestation.

[3]Wildlife needs include improving habitat for game and waterfowl.

[4]Other needs include forest and logging road stabilization, streambank stabilization, lakeshore restoration, and land acquisition.

Recreational use of many areas of the national forest system has doubled since 1961. Public emphasis on protection of the environment can be expected to increase as population pressures mount. The high quality and sensitive nature of the water, plus the presence of bedrock and/or proximity of recreation sites to the water, preclude the use of standard waste disposal systems in some areas. Such areas occur on the Lake Superior drainage area of the Superior and Ottawa National Forests. New methods of waste disposal must be developed to help prevent fertilization of the waters and eliminate pathogenic organism input.

Demands for outdoor recreation have increased sharply. Water-oriented and wilderness or semi-wilderness experiences are becoming more popular forms of recreation. The Superior National Forest provides both types of experiences. The large number of interconnected streams and lakes provides several thousand miles of water for canoeing. Much of the area is included in the Boundary Waters Canoe Area. The water level in many of the lakes and streams is maintained by wooden dams that were constructed in the early 1900s to facilitate timber removal. These dams have been abandoned, and many have deteriorated to the point where they must be repaired or replaced if existing water levels are to be maintained. Most of these dams are accessible only by air or canoe. An inventory is needed to determine which of these dams can and should be replaced. Approximately 50 of these dams are in the Lake Superior drainage area of the Great Lakes Basin.

Streambank and lakeshore erosion lowers water quality, thus increasing treatment costs of water and reducing its value for recreation, fisheries, and wildlife. It also results in loss of valuable property and improvements.

National forests in the Great Lakes Basin have an estimated 400 miles of eroding streambank and lakeshore.

Wood production from the national forests will continue to play an important part in maintaining a healthy economy in local communities. The most recent published projections show a deficit of high quality sawtimber by approximately the year 2000. A new analysis is under way. There is a need for continued timber management practices on the national forests.

In the past little management effort has been devoted to wetlands. This is especially true for those areas without commercial timber. There is a need to inventory wetlands within the national forest system in the Basin in order to determine management possibilities for timber, wildlife, recreation, and water.

Research on wastewater disposal on forest land within national forests has opened up a realm of favorable and unfavorable ecological relationships. Forest land's role in the future may include its use as a medium for absorbing, using, and cleaning treated sewage and other wastewater produced by society. However, certain precautions are mandatory. The quantity, quality, and timing of wastewater injection must not exceed the capacity of the resource. An adequate area of land is a primary requisite. Soils, vegetation, and climate are other factors that can limit the practicality of this technique. This practice must be designed to operate within certain ecologic parameters and environmental protection criteria that must be developed, improved, and studied over time.

4.4 Related Lands

Land along the Great Lakes shoreline and in natural areas is included in the general land use categories outlined above, but its special characteristics and problems deserve more attention.

4.4.1 Shoreline Areas

The Great Lakes shoreline provides some of the most scenic and productive wildlife habitat areas of the Basin. They comprise areas of great biological diversity and productivity. Competition for certain uses of limited shoreline is intense. Shipping is increasing, with larger vessels needing deeper channels. Required dredging creates spoil disposal problems. Expanding urban areas continue to enlarge their influence over these waters.

Industrial and residential developments compete to fill wetlands for building sites. Airport and highway construction follows and further directs growth patterns along the shoreline. The number of private vacation homes is increasing along the shorelines, and as recreation becomes more congested, available areas diminish. Public ownership of land that can be classed as recreation shoreline is small, and not all of this is accessible to the public. Although some uses of shoreline areas are undoubtedly necessary, many are not. For a complete discussion of shoreline problems, refer to Appendix 12, *Shore Use and Erosion.*

4.4.2 Natural Areas

Natural plant and animal communities perform indispensable roles in the welfare of the Basin's residents, while residents have had and will continue to have an influence on these natural areas. It is recognized that the most unique and spectacular of the areas should be protected and saved. Federal agencies are managing some of the natural lands, and State and local governments and citizens groups with an interest in the natural environment have also set aside forests, parks, and recreation and conservation areas. Their management varies from preservation to multiple use. Although Federal land management is meant to maximize public benefit instead of economic gain alone, land management agencies have been criticized for policies that overemphasize development values. As other natural areas are staked out for intensive resource development, they are bound to come into more serious conflict with preservation and recreational interests. Natural areas managed primarily for the protection of their natural characteristics and preservation of their fish and wildlife can absorb a limited amount of use. The acreage of wetlands has been reduced by draining, filling, and flooding. An inventory and classification of remaining wetlands should be made to determine management and use possibilities. Constraints should be placed on certain uses to guard against excessive crowding, timber cutting, grazing, motorized transportation, predator control, and an unbalanced wildlife program favoring game over nongame species.

Section 5

PROBLEMS AND NEEDS OF URBAN AND BUILT-UP AREAS

5.1 Introduction

In the early history of the Region, as in the whole of the United States, man struggled for survival. The wilderness was to be tamed, the trees cleared, and the soil put to crops. A large share of the wilderness is now gone, and most of what is left is distant from those living in the cities and suburbs. The landscape visible to most people in and around the cities is cluttered with traffic, neon signs, powerlines and urban sprawl. Flood plains are subjected to intense development. Open space for urban man continues to dwindle. Government spurs much of this land development by locating and designing airports and highways, insuring home loans, permitting filling of wetlands, and providing utilities. Local governments exercise primary authority over land use, but effective public influence is hampered by a lack of agreement on objectives, by misplaced economic incentives, and by failure of local governments to harmonize land use. Unfortunately, it was traditionally assumed that land is a limitless commodity, not a finite physical resource which supports a biological community.

Many land uses are compatible. It is the excess promoted by overemphasizing short-term economic gain that needs curbing or controlling. Land has been treated merely as commodity and not as a resource to be managed for compatible uses.

5.1.1 Urban Areas

Urban areas within the Basin encompass some of the most intensive concentrations of financial and human resources in the United States. Land use patterns established in the past are not always well adapted to meeting current needs.

Problems are acute in the central cities. Land and property values are declining in response to the shifting economic base and social turmoil. Public services have deteriorated as revenue sources moved to suburban locations. Housing quality has declined substantially. Urban renewal efforts have relocated problems more than solved them.

Throughout urban areas the automobile culture has dictated many aspects of the current land use pattern. Large areas are devoted solely to roadways and parking. Highway route selection strongly influences subsequent use of adjacent land. By permitting access to areas remote from urban employment, the auto has been a catalyst of urban sprawl.

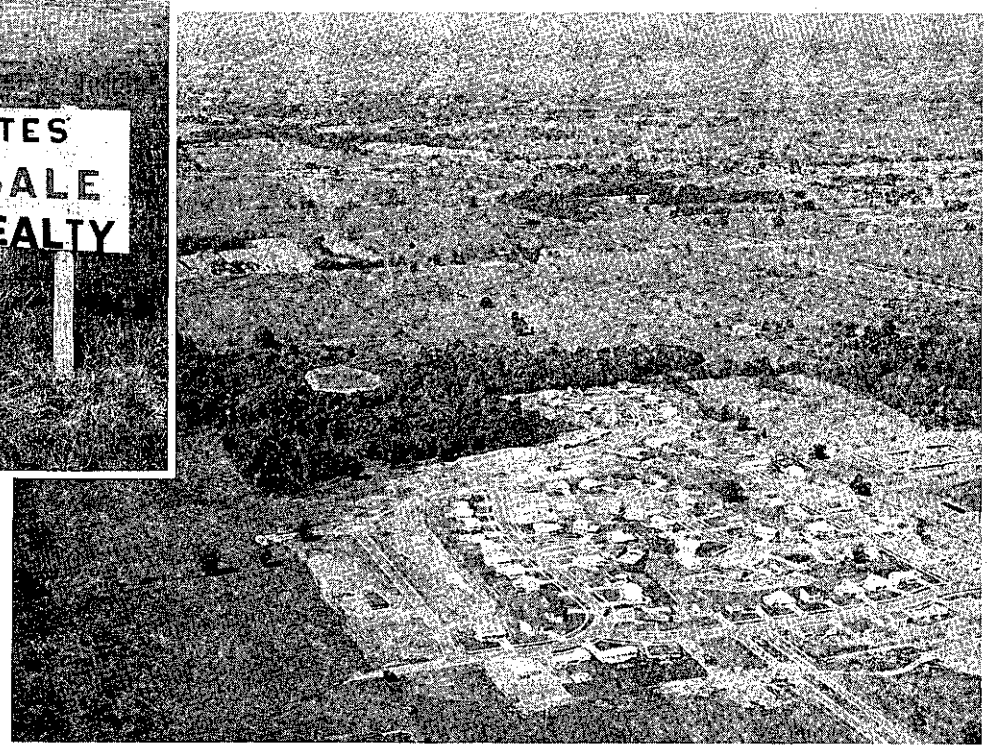
Most urban areas lack open space, particularly in areas easily accessible to the population mass. The desirability and need for open space and recreation were hardly recognized as the cities grew and land was available. It is very difficult, in most cases, to provide more open space now.

5.1.2 Suburban Areas

The suburbs are a magnet for those seeking escape from the burdens of urban life while retaining some of its advantages. The auto and freeway system has allowed a mass migration of central city dwellers to the suburbs, triggering adverse consequences. Much of the commercial development along roads and highways through suburbs is of cheap and unimaginative construction, characterized by gaudy neon signs, billboards, powerlines, and clutter. Many residential subdivisions are visually boring. They have treeless lawns, uniform setbacks, and repetitious housing designs and street layouts. Many suburban areas also lack sufficient open space and recreation areas.

Suburban areas are focal points for land use change and associated problems. Land use decisions are often based on inadequate information about the physical land base. Failure to consider the natural characteristics of the land precipitates many problems common to new developments. These include wet basements and stability problems due to seasonal high water tables, overland flooding in flood

URBAN PRESSURES AFFECT AGRICULTURAL LANDS.



URBAN SPRAWL IS INEFFICIENT USE OF LIMITED LAND RESOURCES.

ACCELERATED EROSION AND SEDIMENTATION OFTEN RESULT FROM URBAN EXPANSION.

FIGURE 13–19 Rural—Urban Transition

plain areas, increased construction and maintenance costs due to poor soil conditions, and accelerated erosion due to construction activities.

Suburban areas suffer the costs of urban sprawl. A major burden is placed on the tax base to provide utility, police, educational, and administrative services to a rapidly expanding populace. The tax system, usually inherited from an agricultural society, adapts slowly and imperfectly to the new demands. Tax assessments often act as unguided land use planning tools by forcing the premature abandonment of agricultural production. The land use changes made under these conditions are usually fragmented and unrelated to any comprehensive planning.

5.1.3 Related Rural Areas

Many of the urban land use problems revolve around interactions between the rural and urban sectors of society. The past few decades have witnessed a great exodus from small towns and rural areas to urban centers, and a more recent movement from urban areas to suburban and rural areas. The rural fringe has been swept by tides in both directions, and still reels under the impact.

Some of the problems are social and political in nature. These include taxation and assessment problems, zoning conflicts, and the often sudden injection of urban life styles into formerly conservative rural communities.

Other problems are more economic and physical. Urban expansion has led to land value appreciation, which encourages withdrawal of highly productive agricultural land for speculation or immediate conversion to residential or other uses. Accelerated erosion from urban construction activities often produces hundreds of times more sediment than did crop production on the same land.

Land in the fringe is in demand as landfill sites to receive the growing volume of solid wastes generated by modern living. Site selection is critical to protect water supplies and public health. Opposition by adjacent rural residents is common. On the horizon are proposals to use spray irrigation on agricultural land as a means of urban liquid waste disposal. Fulfillment of such plans is sure to bring many more physical, social, and institutional problems to the rural areas.

TABLE 13–62 Projected Demands on the Land Base for Urban and Built-Up Areas

Planning Subarea	Current to 1980	1980 to 2000	2000 to 2020
		(Thousand Acres)	
1.1	0.7	7.8	14.9
1.2	-----	1.0	3.2
2.1	23.0	43.2	53.3
2.2	515.7	671.5	504.9
2.3	105.0	159.7	196.7
2.4	15.1	28.8	33.3
3.1	8.3	10.9	13.6
3.2	52.1	76.0	52.0
4.1	294.5	417.1	276.3
4.2	62.7	101.6	106.8
4.3	140.4	260.2	218.2
4.4	52.6	92.8	85.7
5.1	30.2	40.6	51.4
5.2	72.2	91.1	98.0
5.3	0.8	7.1	8.0
Total	1,373.3	2,009.4	1,716.3

Source: Calculated from data provided by Economic Research Service

5.2 Urban Demands for Land

5.2.1 Magnitude of the Demand

Urban and built-up land occupies nearly seven million acres in the Region, or more than eight percent of the total land area (Tables 13–4 and 13–5). It occupies only approximately two percent of the land in Planning Subarea 1.2, but more than 20 percent in Planning Subareas 2.2 and 4.3. The area of urban built-up land is projected to increase more than 1.3 million acres by 1980, more than two million acres between 1980 and 2000, and more than 1.7 million acres between 2000 and 2020 (Table 13–62).

5.2.2 Location of the Demand

Total demand estimates have only a limited information content. The location and direction of urban expansion is much more revealing and useful for planning. Much of the expansion is projected to occur within Standard Metropolitan Statistical Areas. For the Region as a whole, nearly 1.2 million acres, or 86 percent of a total urban expansion of 1.4 mil-

lion acres by 1980, are projected within SMSAs (Figure 13–20). During the 1980 to 2000 period, 1.7 million acres, or 86 percent of the total urban build-up, will occur within SMSAs. By the 2000 to 2020 period, other areas will experience more urban pressure as 1.4 million acres or 82 percent of the expansion will occur within SMSAs. Some SMSAs are projected to experience a dramatic increase in urban and built-up areas from 1980 to 2000. Examples are Duluth in Planning Subarea 1.1 and Lorain in Planning Subarea 4.3 in which the acreage of urban and built-up areas will more than double. In most cases, the rate of increase declines after the year 2000.

The rate and direction of urban expansion is influenced by many factors. Population, population growth, economic activity, and transportation networks are some of the more important factors. These affect growth around existing urban areas and also between centers of economic activity.

The direction and relative magnitude of the projected increase in urban and built-up land may be described by equipotential lines (Figures 13–21 to 13–23). The relative geographic distribution of urban expansion is shown by these lines, with the values representing acres in thousands. For example, the increase in urban land from the present to 1980 in the Chicago area is projected to be 2000 times that in much of Michigan's Upper Peninsula (values 200 and 0.1 respectively).

High potential contours are centered at the major metropolitan areas. For the period up to 1980, the peak within the Region lies at the center of the Chicago area with a value greater than 200 (Figure 13–21). The value for the Detroit area is more than 100, while it is more than 50 in the Cleveland and Milwaukee areas. Buffalo, Syracuse, and Erie have values greater than 25. The values range downward for other urban centers. Large areas in the northern portions of the Region have potentials for urban land increase which approach zero.

Potentials continue to increase around the major metropolitan areas between 1980 and 2000 (Figure 13–22). The potential in the Chicago area increases to greater than 300, Detroit to more than 200, and Cleveland to more than 100. Several other areas show geographic expansion of the potential lines.

For the period from 2000 to 2020, potentials around the major metropolitan areas decline to levels nearly equal to those for the initial period (Figure 13–20). Many of the medium-sized urban centers show a continuing growth in potential.

Note the pattern in the "corridor areas" between major metropolitan areas. The Milwaukee-Chicago-Detroit corridor shows an intensification of development through the year 2000. After 2000 there is a decline in the rate of growth in this corridor. The Detroit-Saginaw corridor displays a similar pattern. The Fox River corridor between Green Bay and Lake Winnebago shows a steady rate of growth through the three projection periods, as does the Buffalo to Rome-Utica corridor.

Many of the shore zones show a general growth in urban expansion. More rurally oriented areas display a wide variation in potential values. The interior areas of Minnesota, Wisconsin, New York, and parts of Michigan and Ohio show the lowest rate of urban growth. Note the gradual dissipation of the 1.0 equipotential line that encloses a sizable area in Planning Subareas 2.3 and 4.2 in the initial period. By the year 2020, this enclosure nearly disappears in the face of urban expansion in surrounding areas. Also of interest is the area along the boundary of Planning Subareas 2.4 and 3.1. In the initial period, equipotential values are less than 0.5. By 2020, values range from 0.5 to 1.0 following a corridor along the U.S. 27 and I–75 highways.

5.2.3 Impact of the Demand

The problems of urban areas seem destined to continue and proliferate during the projection period. The growth of urban areas, which has nurtured those problems, is projected to continue as discussed above. This growth will have extensive impact on land use and management conditions throughout the Region.

One of the most dramatic effects of urban expansion is the increase in land prices. Each parcel of land is unique, and only a relatively small number of buyers and sellers participate. Monopoly power may develop under such conditions and thwart efficient market operation and resource allocation. Research[5] has shown that appreciation in suburban land values above farm land prices is several hundred percent.

Land value represents an ever increasing share of home prices, and is a factor in the decline in single-family home construction. This may be causing a shift away from traditional single-family housing. In many cities

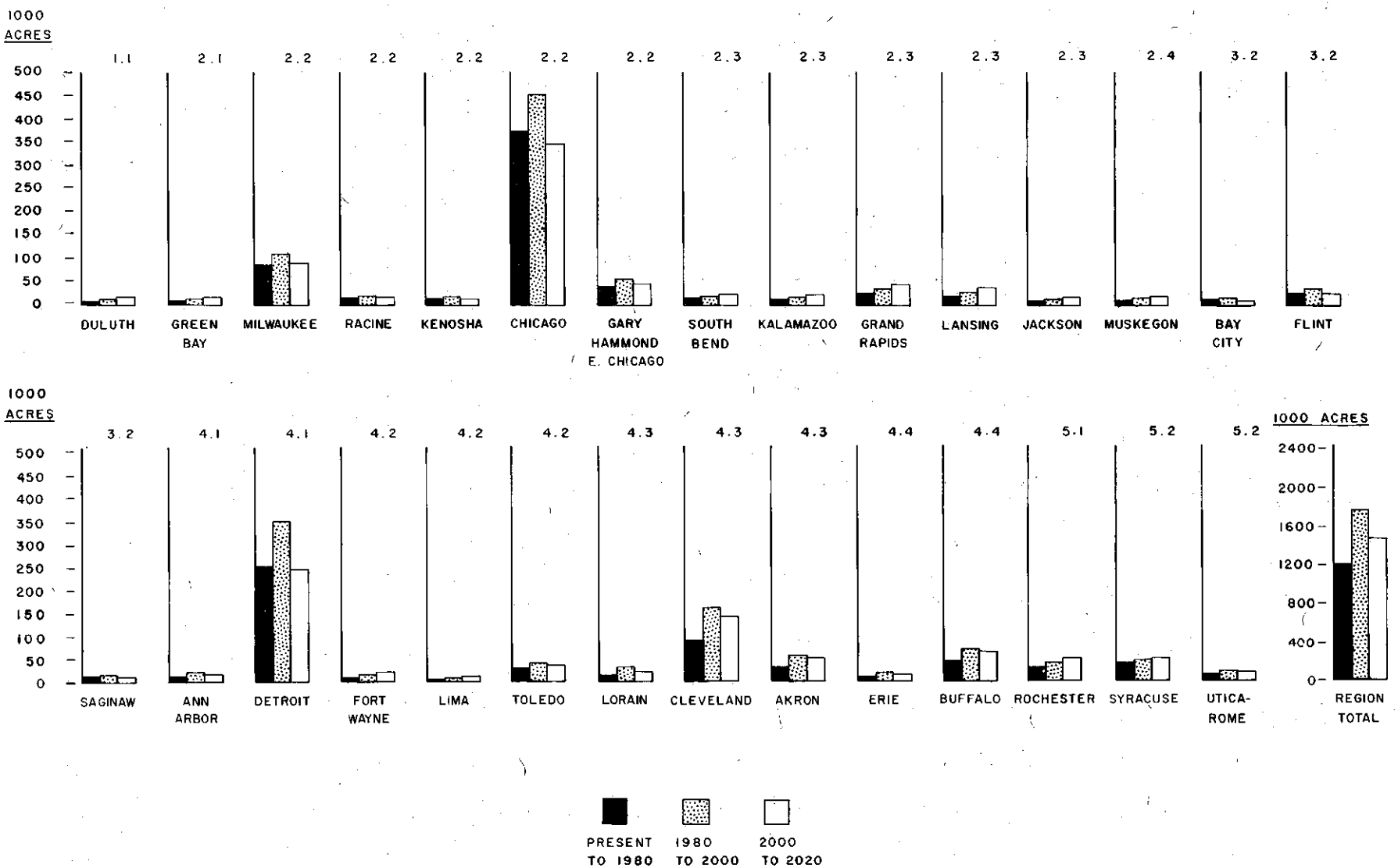


FIGURE 13–20 Projected Increase in Urban and Built-Up Land in Standard Metropolitan Statistical Areas, Great Lakes Region, Present to 1980, 1980 to 2000, 2000 to 2020

apartment units comprise nearly one-half of all new housing.

Single-family homes on typical suburban lots inefficiently use high-value urban land. Townhouses and cluster or planned unit developments (PUD) offer a compromise between single-family homes and apartments that may become increasingly popular. In many instances local housing codes will need revision to allow for PUDs. Failure to move in this direction could lead to a decline in individual home ownership or even greater competition for developable land.

Increased land values will also tend to reduce the amount of open space close to urban areas. Flood plains, public recreation and wildlife areas, private recreation land, and agricultural and forest lands comprise most of the open space surrounding existing urban settlements. As urban sprawl proceeds, both public and private landowners will be presented with strong monetary incentives to yield the land for development. In the absence of well-established land use regulations much open space will be irrevocably lost.

Developments in flood plains have a dual impact. Not only is open space lost, but flood damage potential is increased as well. As land values rise on upland sites, flood plain property becomes more susceptible to development. Unfortunately, only land and development costs are usually considered. Total costs to society do not enter the decision-making process. This results in a misallocation of land resources.

The loss of agricultural and forest land to urban development may have locally adverse economic effects. For the Region as a whole, projected urban expansion will not reduce agricultural output as long as unused or underutilized land resources exist and/or output increasing technological advances continue. But the effects will be dramatic in some township or county areas with an agriculturally-based economy. Urban expansion in such areas will reduce incomes from farm and forest production and related service and marketing enterprises. At least temporary unemployment may be experienced.

At the same time, local government will be called upon to provide more public services to the new residents. Local public financing will be difficult, particularly if urban expansion is without an industrial or large commercial component in the tax base. The problem is aggravated by developments located in the rural fringe, which have higher utility costs per unit than developments adjacent to higher density areas.

Accelerated erosion and sedimentation are usual consequences of urban expansion. Land development requires at least temporary removal of vegetation in preparing the site for construction. Large areas of soil are often disturbed through extensive land leveling and shaping. The soil is thus exposed to the erosive forces of wind and water. Urban developments can produce sediment discharges many times greater than those which occurred under natural or even agricultural conditions. The problem will increase in scope and intensity as urban expansion continues. Relatively low-cost erosion control methods should be implemented wherever development is under way. This issue is discussed more completely in Appendix 18, *Erosion and Sedimentation.*

The loss of open space has increased the need for protection and establishment of trees and shrubs in urban areas. Growing conditions for remaining trees and shrubs have steadily worsened because of air pollution, drought, erosion, heat, mechanical hazards, poor soil conditions, and other adverse influences resulting from construction and concentrated use. The loss of trees and associated plants has led to deterioration of environmental values.

Many of the problems associated with urban expansion stem from a failure of existing legal and institutional arrangements. Antiquated, overlapping, and often conflicting policies and regulations inherited from our rural past have proven inadequate for an urban society. Dynamic changes in technology and population have seemingly surpassed our ability to adapt a complex social system to meet current needs.

Land use decisions of individuals or even individual communities have economical and uneconomical effects beyond the local level. This creates a need for planning and coordination on an increasingly broad scale. Yet the optimum land use patterns described in city and regional plans often fail when implemented under current legal and institutional arrangements. In some cases better enforcement of existing regulation would improve land use conditions. In others, new legislation and/or administrative procedures are needed. The goal must be full implementation of comprehensive and well-formulated land use plans.

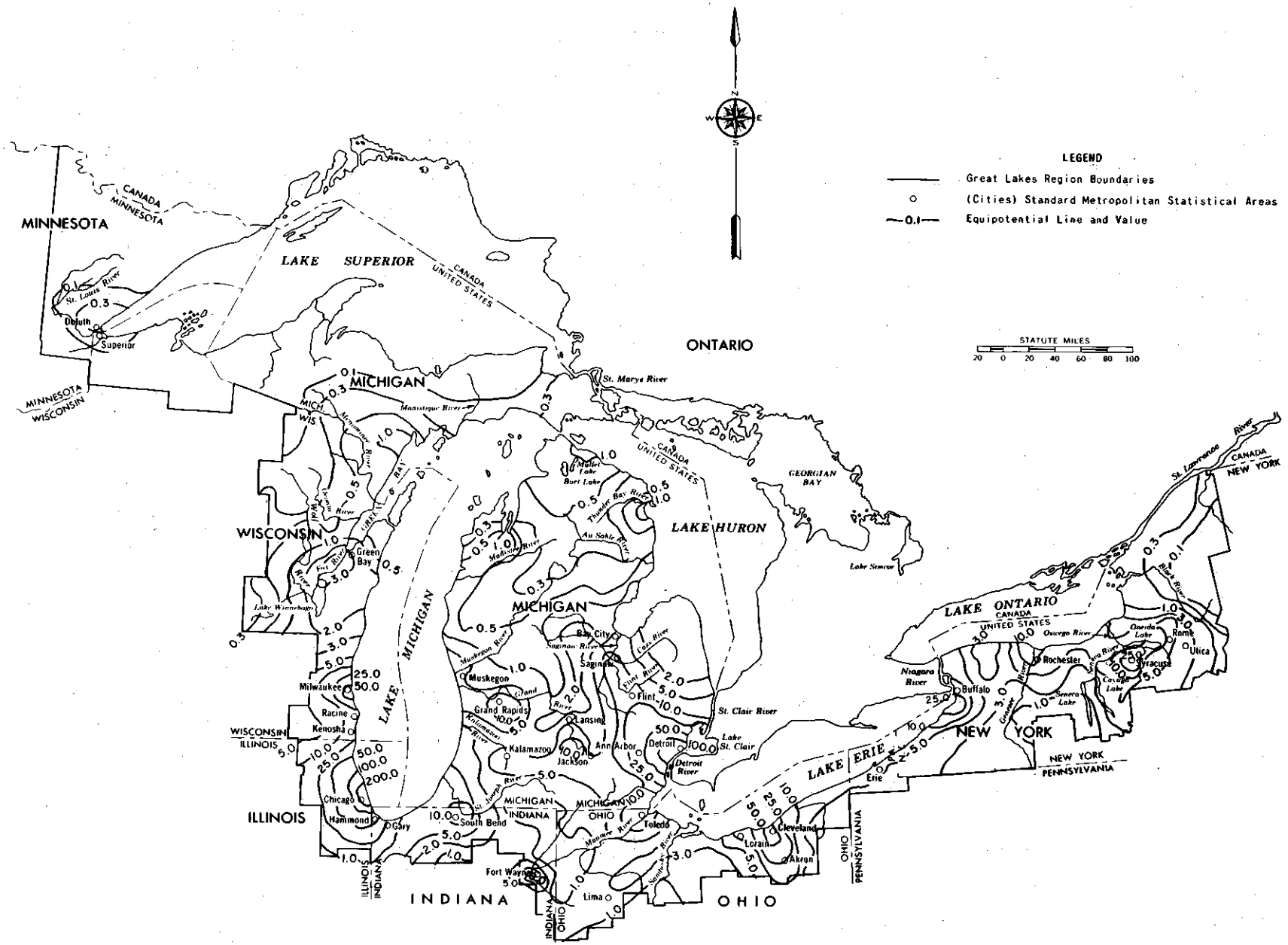


FIGURE 13–21 Equipotentials of Projected Increase in Urban and Built-Up Land, Great Lakes Region, Present to 1980

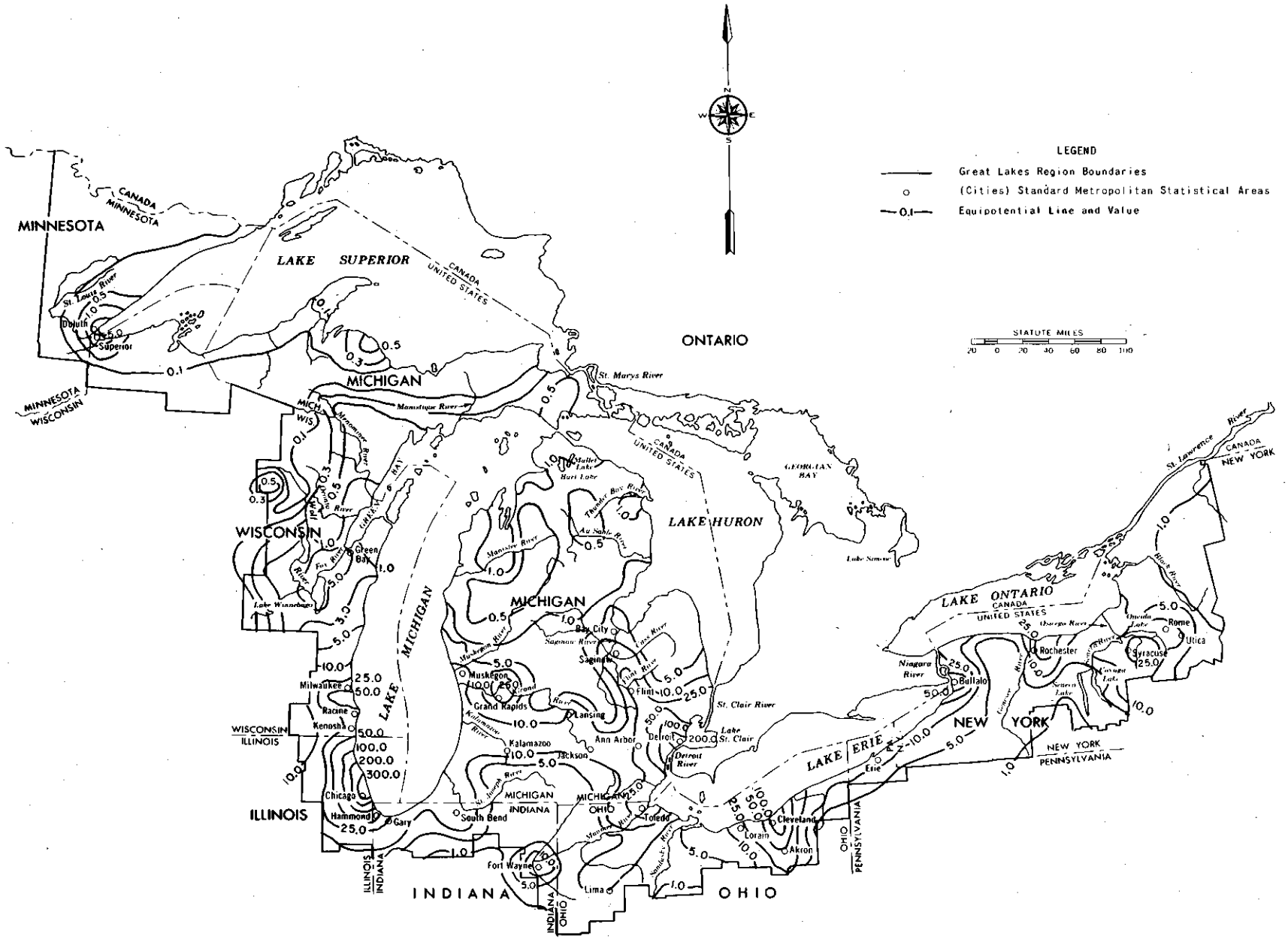


FIGURE 13–22 Equipotentials of Projected Increase in Urban and Built-Up Land, Great Lakes Region, 1980 to 2000

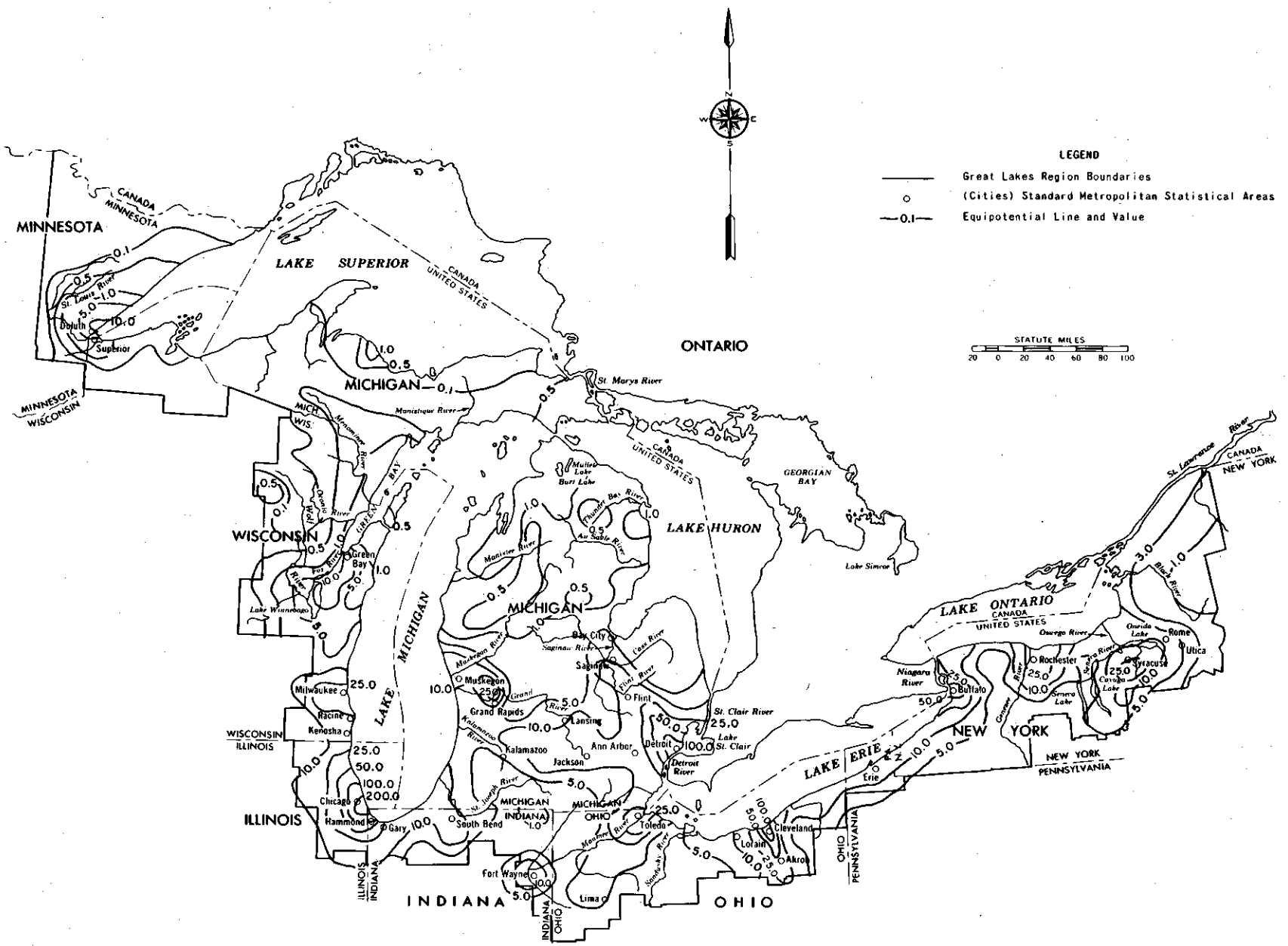


FIGURE 13–23 Equipotentials of Projected Increase in Urban and Built-Up Land, Great Lakes Region, 2000 to 2020

Section 6

ACCOMPLISHMENTS AND RECOMMENDED PROGRAMS

6.1 Introduction

The preceding discussion of problems and needs does not imply a complete lack of progress. A number of programs are currently under way to foster the goal of good land use and management, but nevertheless, we find a continuing gap between needs and accomplishments. Additional efforts must be made in order to maintain a land resource base capable of meeting future requirements.

6.2 Present Accomplishments

6.2.1 Agricultural Land

Many types and kinds of conservation measures can be applied to agricultural land in order to reduce serious soil erosion and runoff. Basically they center on conservation cropping systems that use not only crops in a well-planned sequence, but also employ crop-residue management, the needed fertilizer and lime, and a good water disposal system. However, due to the intensity of crop land use today, reliance on rotation alone to control erosion is limited. It is necessary to design conservation cropping systems that embody essential practices to protect the soil while meeting the farmer's needs for economical crop production. Some systems may include crop rotations containing perennial grasses and legumes, strip cropping, contouring terraces, crop residue, covercrops, grass waterways, and removal of excess surface and internal water.

Soil Conservation Districts and Soil and Water Conservation Districts (SCDs) are locally organized, locally managed units of State government composed of democratically elected or appointed landowners who direct a program of soil and water conservation. They are usually organized on a county basis, but a district may cover two or more counties, and a county may be organized into two or more districts. Through a Memorandum of Understanding, authorized under the Soil Conservation Act of 1935 (PL–46), individual SCDs can enter into an agreement with the Soil Conservation Service to receive technical assistance. The district landowners receive this information and assistance in resource conservation improvement from SCS technicians stationed at the county level.

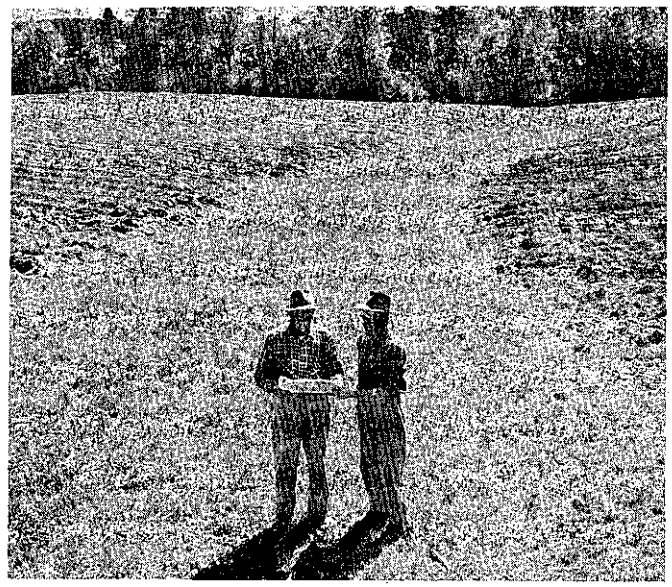
The program of the districts involves conservation planning on all lands, assistance in the development of broad resource plans, and the installation of land treatment and conservation practices. The practices are determined after full consideration of the soil capabilities and needs of the land.

There are 189 districts organized within the Region. Over the years they have assisted landowners install numerous land treatment practices on thousands of acres (Table 13–63). Many practices such as conservation cropping systems, strip cropping, and terraces serve primarily to reduce runoff and erosion. Other measures such as streambank protection, hedgerow plantings, and recreation enterprise development provide fish and wildlife recreation benefits and environmental enhancement.

The USDA Agricultural Stabilization and Conservation Service has also made a substantial contribution to soil and water conservation. The Rural Environmental Assistance Program (REAP), formerly the Agricultural Conservation Program (ACP), provides cost-share assistance to farmers in implementing soil, water, woodland, and wildlife conservation practices, and certain agricultural pollution abatement practices. Information and education programs conducted by the Cooperative Extension Service have also aided the soil and water conservation effort.

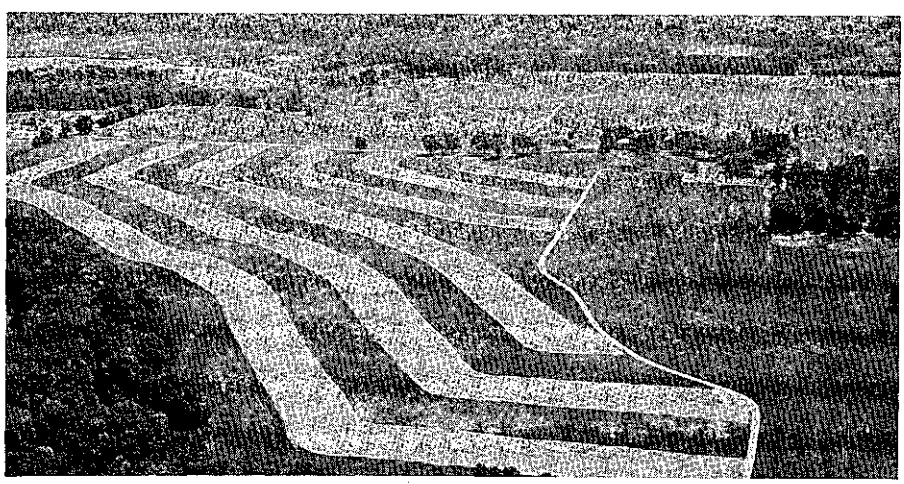
6.2.2 Forest Land

State forestry programs are the responsibility of the State Forester within each State, usually under the Department of Natural Resources or Conservation. This agency works



GRASS WATERWAYS CARRY WATER SAFELY FROM THE FIELD.

WINDBREAKS HELP CONTROL WIND EROSION.



STRIPCROPPING PROTECTS FIELDS AGAINST EROSION.

FIGURE 13–24 Protecting the Land

with private landowners upon their request, to help them better manage and protect their forest land. Service or area foresters who are assigned various counties within a State, provide professional assistance for the management and protection of forest lands to assure protection of the watersheds and optimum production of forest products and services.

State forests provide timber, watershed protection, wildlife habitat, recreational opportunities, and aesthetic beauty. The multiple-use concept is clearly seen in the programs for hunting and fishing, recreation, and for timber production and the employment it brings. Timber is harvested by approved cutting practices on approximately 4.8 million acres of commercial forest land in State forests (Table 13–64). Wood-using industries depend upon State forests to supply part of their raw material.

The United States Forest Service cooperates with other Federal agencies, private landowners, State forestry organizations, and local or private organizations to improve forest management. The objectives of these cooperative forestry programs are:

(1) to better protect the 34.5 million acres of State, county, community, and privately owned forests and critical watersheds against fire, insects, and diseases

(2) to encourage better forest practices for conservation and profit

(3) to encourage the management of the forested portions of watersheds for the regulation of storm runoff and streamflow, reduction of flood damage and sediment production,

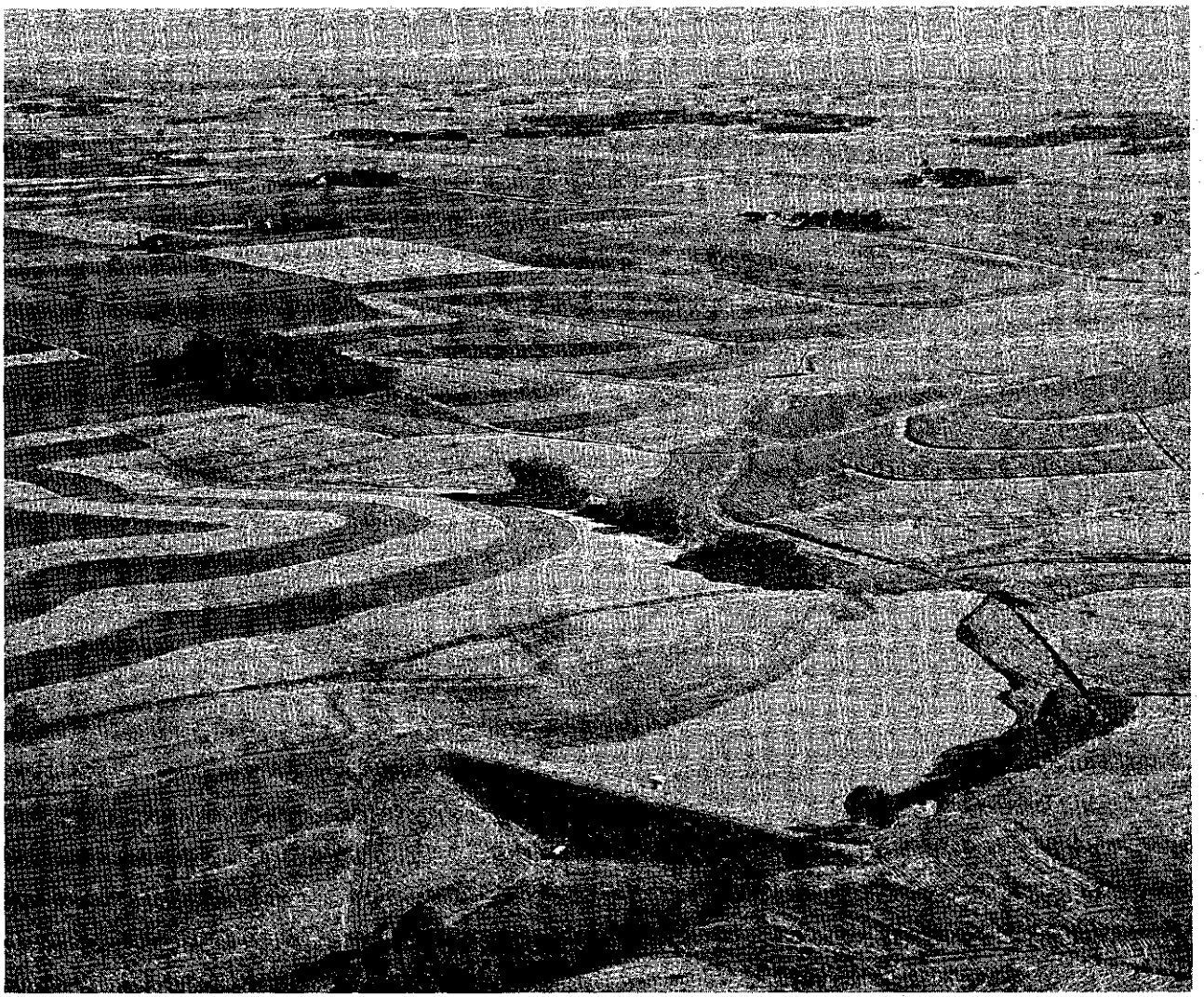


FIGURE 13–25 Watershed Protection. Contour stripcropping, contour terracing, and a flood-retarding reservoir combine to reduce erosion, runoff, and flooding.

TABLE 13-63 Conservation Practices Applied by Planning Subarea[1]

Planning Sub-Area	Conservation Cropping Systems (Acres)	Contour Farming (Acres)	Grassed Waterways (Acres)	Irrigation Water Mgt. (Acres)	Drainage Mains or Laterals (Miles)	Drainage Field Ditches (Miles)	Strip Cropping (Acres)	Terraces Level and Gradient (Miles)	Pasture and Hayland Plantings (Acres)	Tile Drains (Miles)	Grade Stabilization Structures (Number)
1.1	118,528	610	500	90	108.4	1,572.4	1,239	3.9	91,152	1.8	31
1.2	87,878	2,751	2,170	1,334	20.6	488.3	1,093	8.8	4,847	48.9	8
2.1	824,583	94,694	4,898	------	662.1	4,540.0	91,983	440.8	87,689	5,195.2	496
2.2	334,190	22,683	1,341	78	482.3	183.0	24,490	34.0	31,811	2,485.3	244
2.3	1,920,404	40,600	3,995	73,007	2,011.1	140.0	58,261	52.7	313,329	18,211.5	757
2.4	388,377	18,371	1,335	23,410	377.8	215.1	70,666	14.5	57,394	1,612.8	77
3.1	188,361	2,414	1,205	913	686.1	275.0	3,213	8.3	23,410	3,404.5	41
3.2	840,153	13,112	1,017	5,912	1,745.4	124.5	73,899	13.5	36,190	68,627.6	1,582
4.1	551,382	3,268	538	8,513	762.7	88.4	3,224	5.7	25,202	20,723.8	1,001
4.2	1,568,791	7,953	4,443	538	4,287.3	2,624.4	5,183	27.8	29,756	111,619.9	610
4.3	364,233	7,366	3,004	300	180.5	450.3	36,789	50.2	46,496	6,244.5	1
4.4	228,764	42,081	1,678	170	561.8	71.7	24,723	-----	147,562	1,915.1	102
5.1	394,221	57,383	3,609	3,443	547.8	58.1	35,350	4.1	77,610	2,315.1	44
5.2	442,905	80,646	2,188	140	1,453.0	76.2	81,319	-----	137,507	3,482.4	17
5.3	11,891	340	242	------	139.4	53.9	410	-----	34,043	148.5	-----
Total	8,264,661	394,272	32,163	117,848	14,026.3	10,961.3	511,842	664.3	1,143,998	246,036.8	5,011

Planning Sub-Area	Crop Residue Mgt. (Acres)	Diversions (Miles)	Minimum Tillage (Acres)	Farm Ponds (No.)	Field Windbreaks (Miles)	Streambank Protection (Miles)	Tree[2] Planting (Acres)	Wildlife Habitat Mgt. Including Wetland (Acres)	Fish Pond Mgt. (No.)	Recreation Area Improvement (Acres)
1.1	2,300	29.1	420	503	5.4	10.7	125,882	58,353	43	1,346
1.2	757	40.3	2,504	830	80.7	2.9	15,533	20,807	485	721
2.1	---------	411.6	-------	2,562	392.8	80.8	201,338	144,529	2,200	7,709
2.2	146,562	111.4	72,514	1,202	51.0	13.0	17,413	35,642	30	1,720
2.3	1,199,473	124.8	919,741	3,789	625.2	19.4	102,756	157,846	2,335	14,792
2.4	107,140	58.6	67,306	2,347	715.5	17.4	195,368	59,767	1,206	2,819
3.1	49,775	18.0	35,026	775	92.8	2.8	32,386	88,785	508	239
3.2	677,647	8.8	488,973	1,761	429.6	47.1	44,140	64,604	818	1,193
4.1	418,899	19.3	166,065	1,341	98.0	18.9	9,336	27,393	904	1,549
4.2	379,072	60.7	255,319	2,573	19.4	.9	7,074	54,123	1,391	1,466
4.3	5,145	118.9	14,371	3,599	3.1	----	20,445	30,726	5,023	6,597
4.4	46,359	848.9	3,055	3,584	4.3	82.1	129,708	50,998	2,773	1,288
5.1	26,208	627.7	58,925	3,686	56.4	43.4	39,203	38,202	861	666
5.2	76,498	461.8	30,146	6,874	20.1	6.7	149,095	29,658	2,490	1,631
5.3	200	7.5	80	713	.7	.3	71,408	6,109	83	260
Total	3,136,035	2,947.3	2,114,445	36,139	4,595.0	346.4	1,161,085	867,542	21,150	43,996

				Recreation Enterprises						
Planning Sub-Area	Hedgerow Plantings (Miles)	Cropland to Grassland (Acres)	Cropland to Woodland (Acres)	Cropland to Wild-Life Recreation (Acres)	Establishing First Commercial (No.)	Expanding and Adding for Commercial (Use/No.)	Changing to Primary Source of Income No.	Changing to Primary Source of Income Acres	Establishing Expanding Adding for Non-Commercial Use (Number)	Establishing and Expanding to Public Development (Number)
1.1	0.3	24,016	6,138	9,428	80	16	28	759	698	87
1.2	0.4	16,883	5,512	1,844	107	9	49	2,240	555	130
2.1	168.2	45,845	37,701	40,454	681	132	174	17,947	2,729	492
2.2	445.2	11,127	3,931	22,698	344	4	73	6,135	1,174	364
2.3	705.5	113,715	110,759	28,428	734	45	249	23,113	5,022	400
2.4	106.9	80,419	47,438	13,024	318	49	140	22,450	10,709	326
3.1	14.4	27,545	10,799	3,364	211	4	96	25,640	5,892	102
3.2	408.4	46,386	15,103	20,544	67	24	19	4,218	2,209	109
4.1	130.5	33,935	6,813	6,605	239	5	134	7,239	1,232	90
4.2	455.5	10,745	1,028	4,903	143	1	42	2,903	1,561	96
4.3	64.3	8,077	2,526	3,342	211	17	98	4,962	537	346
4.4	143.8	32,103	16,112	13,090	321	5	38	3,127	6,503	178
5.1	66.4	15,845	5,389	6,854	58	---	17	1,500	967	59
5.2	103.5	26,977	19,717	17,917	170	---	37	4,490	1,434	172
5.3	4.8	4,174	4,660	4,150	89	---	29	2,792	187	31
Total	2,818.1	497,792	293,826	196,645	3,773	311	1,223	129,513	40,409	2,980

[1] As of June 30, 1969

[2] A portion of accomplishments shown may also be accounted for in Tables 13-65 and 13-66

Source: Reference 6

TABLE 13–64 State Forest Timber Management Accomplishments 1966–1969

State	Timber Sales (No.)	Timber Stand Improvement (1000 acres)	Reforestation (1000 acres)	Net Ownership (1000 acres)
Michigan	6,714	12.4	6.8	3,756.5
Minnesota	2,124	4.1	6.2	544.4
New York	190	15.2	4.8	393.3
Ohio	15	.3	.1	3.1
Wisconsin	59	3.0	3.0	89.3
Region Total[1]	9,102	35.0	20.9	4,786.6

[1]There are no State forest lands within the Region in Illinois, Indiana, and Pennsylvania.

and for the protection of sources of water for municipal and industrial supply, recreation, power, irrigation, and navigation

(4) to aid in distribution of planting stock for forests, shelter-belts, and woodlots

(5) to stimulate development and proper management of State, county, and community forests

From 1966 to 1969 technical assistance has been provided on more than 348,000 acres (Table 13–65). This amounts to more than 87,000 acres annually (Table 13–66).

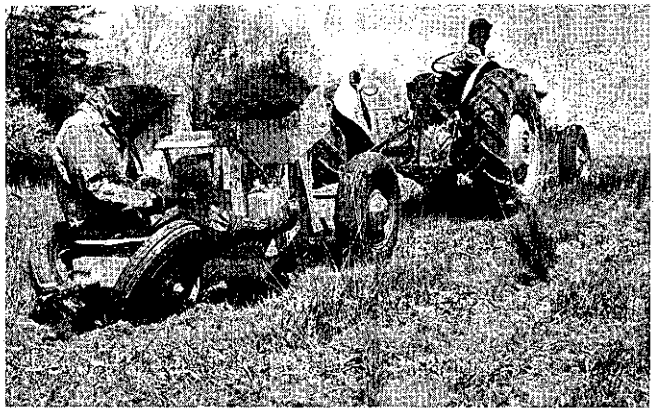
The boundaries of seven national forests, seven purchase units, and eight land utilization project areas are partially or completely within the Great Lakes Basin and include almost 10 million acres. Of this, approximately six million acres are Federally-owned. They are administered by the U.S. Forest Service as a part of the National Forest System.

Each national forest resource, water, timber, recreation, wildlife, and forage, is managed with other resources to meet present and future public needs. The practice of managing several forest resources harmoniously for the benefit of the greatest number of people is known as multiple use. This is a cardinal forest management principle as emphasized by Congress in the Multiple Use-Sustained Yield Act of 1960. Watersheds are managed to regulate streamflow, control floods and erosion, serve as water-storage areas, and supply high quality water.

Quantity, quality, and timing of streamflow from national forest land are of major concern to the Forest Service. The Huron-Manistee National Forest in Michigan has established a "barometer" watershed on the Pine River, which will provide management information on the effect of various practices on the hydrology of forested areas. Information from this study will be useful to all agencies responsible for land management in Michigan and parts of Wisconsin. Some of the national forests are making hydrologic surveys involving a complete survey of water and related land resources. These are made on watersheds of high value in terms of municipal and/or industrial water supply.

All national forests have a sampling system for water supplies and bathing beaches to determine whether these waters meet established health standards. Water quality monitoring systems are used in the Ottawa, Huron-Manistee, Chequamegon, Superior, and Hiawatha National Forests to appraise the quality of waters flowing from these lands. The systems are designed to identify sources of water pollution, should they develop.

All national forests are actively involved in continuing programs of fire prevention, presuppression, and suppression. Typical proj-



TREE PLANTING ADDS TO OUR FOREST RESOURCE AND HELPS CONTROL EROSION.

LANDOWNERS ARE GIVEN TECHNICAL ASSISTANCE ON FOREST MANAGEMENT.

FENCING PROTECTS FOREST LAND FROM LIVESTOCK GRAZING.

SELECTIVE CUTTING ON OVERSTOCKED LAND BRINGS ADDED INCOME AND IMPROVES THE REMAINING STAND.

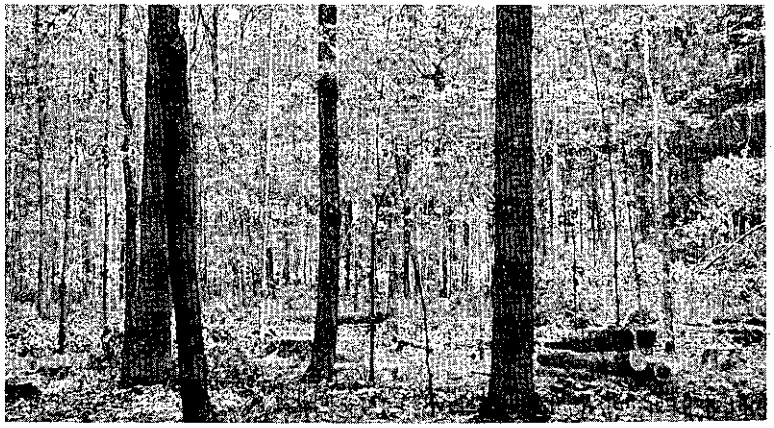


FIGURE 13–26 Forest Management

TABLE 13–65 Cooperative Forest Management Accomplishments 1966–1969

Practice	1966	1967	1968	1969	Ave.
			(1,000 Acres)		
Management Planning	78.7	81.3	95.7	92.9	87.2
Managed Harvest Cutting	31.7	33.3	34.2	27.6	31.7
Timber Stand Improvement	11.7	11.4	11.9	9.4	11.1
Tree Planting or Seeding	25.0	21.3	23.8	26.5	24.2
Erosion Control	2.1	1.5	2.7	1.0	1.8
Recreation Improvement	1.5	1.7	.7	.5	1.1
Wildlife Improvement	22.3	32.6	17.5	16.3	22.2
Improved Protection from:					
Fire	13.7	13.5	12.0	11.0	12.6
Grazing	20.5	18.8	20.7	18.1	19.5
Insect & Disease	8.4	8.7	2.4	1.7	5.3

ects that should affect the fire control situation in the years ahead are:

(1) detection of fires by aircraft

(2) developing fire access ways through high hazard conifer stands

(3) preplanned green strips in timber management activities

(4) fire prevention directed at vacation home owners

All of these forests are also involved in a soil management program, which involves classifying soil erosion hazards and land stability, area ratings for development by soils, effects of soils on water quality, potential soil sediment areas, matching soils with timber species, and environmental landscaping.

National forests have a continuing timber management program (Table 13–67). Many of their timber stands have been improved, but the opportunity exists for further improvement.

Management of fish and wildlife habitat in national forests is carried out in cooperation with State fish and game biologists and the U.S. Fish and Wildlife Service. As opportunities arise and funds are available, further development of deer yards will be undertaken, permanent wildlife openings will be established, hunter access will be developed, and rare, endangered, and unique wildlife species will be protected.

All national forests have an active land acquisition program. As funds are available, desirable tracts of land for watershed protection, recreational and other purposes are acquired by purchase or exchange.

Numerous recreation developments including campgrounds, picnic grounds, swimming sites, boat landings, ski sites, scenic roads and trails, and wilderness areas are available in national forests. Plans call for improving the quality of existing developments, constructing new developments, providing more wayside and scenic rest stops along roads, and improving and maintaining scenic recreational drives and wilderness areas.

The Forest Service carries on forest research through its North Central Forest Ex-

TABLE 13–66 Average Annual Cooperative Forest Management Accomplishments[1]

Planning Subarea	Mgmt. Plans	Managed Harvest Cutting	Timber Stand Improvement	Tree Planting or Seeding	Erosion Control	Recreation Improvement	Wildlife Improvement	Improved Protection From Fire	Improved Protection From Grazing	Improved Protection From Insect & Disease
					(thousand acres)					
1.1	17.4	4.1	1.2	4.3	.8	.5	6.2	5.2	6.4	1.0
1.2	8.7	2.5	1.3	3.6	a[2]	.1	1.5	.1	.1	.1
2.1	17.0	6.0	1.5	4.1	.6	.2	6.0	4.4	7.6	.4
2.2	8.1	3.4	.6	1.5	.3	.1	3.0	2.1	3.6	.2
2.3	3.8	1.0	.4	1.0	.1	a	.6	a	.1	a
2.4	8.0	2.3	1.2	3.3	a	.1	1.4	.1	.1	.1
3.1	4.3	1.2	.6	1.8	a	.1	.7	a	.1	.1
3.2	1.8	.5	.3	.7	a	a	.3	a	a	a
4.1	1.0	.3	.1	.4	a	a	.2	a	a	a
4.2	1.6	1.2	.3	.2	a	a	.2	a	.3	a
4.3	1.1	1.1	.4	.2	a	a	.1	a	.4	a
4.4	2.7	1.5	.6	.6	a	a	.4	.2	.1	.6
5.1	1.8	1.0	.4	.4	a	a	.3	.1	.1	.4
5.2	5.3	3.0	1.2	1.1	a	a	.7	.2	.3	1.3
5.3	4.6	2.6	1.0	1.0	a	a	.6	.2	.3	1.1
Total	87.2	31.7	11.1	24.2	1.8	1.1	22.2	12.6	19.5	5.3

[1]Years 1966 through 1969.

[2]Denotes areas less than 50 acres.

TABLE 13–67 Total Timber Management Accomplishments of National Forests in Great Lakes Basin, 1965–1969

Planning Subarea[1]	Renew Old and Poorly Stocked Stands	Thin & Improve Stands	Release Young Growth	Reforestation	Total
		(Thousand Acres)			
1.1	57	10	32	13	112
1.2	29	47	15	12	103
2.1	30	41	4	7	82
2.4	36	19	13	24	92
3.1	21	8	10	14	53
5.2[2]	---	---	--	--	---
TOTAL	173	125	74	70	442

[1]Refer to Table 13-27 for listing of national forests within each planning subarea.

[2]Includes land use area acreages, not national forest land but administered by Forest Service, and includes 300 acres of thin and improved stands.

periment Station headquartered in St. Paul, Minnesota, and the Northeastern Forest Experiment Station located in Upper Darby, Pennsylvania. Scientists study watershed management, the protection of forests from fire, insects, and diseases, the growth and harvesting of timber, forest recreation, wildlife habitat, efficient and economical utilization of forest products, and forest economics. These studies are conducted at various project locations and experimental forests and watersheds within and adjacent to the Basin. A continuing periodic forest survey is conducted in each State within the Basin and provides comprehensive information on the extent and condition of forest lands, the volume and quality of timber resources, trends in timber growth and harvest, and outlook for future supplies and demands.

The watershed management research of the North Central Station includes studies in ground water movement, streambank erosion, seasonal flood and erosion reduction through surface water runoff control, and hydrologic characteristics of northern bogs. Most of the ground water and streambank erosion research is done on and near the Udel Experimental Forest near Cadillac, Michigan. The Coulee Experimental Forest in southwestern Wisconsin near LaCrosse is the site of studies for the control of surface water runoff to reduce seasonal flooding and erosion. The Marcell Experimental Forest in northern Minnesota is testing ground for studying the hydrology of northern bogs.

The Northeastern Station has watershed management studies in water yield improvement, stream regimen and water yields, watershed correlation and synthesis, floods and water yield, and improving the human environment with trees. The stream regimen and water yields study is conducted out of Syracuse, New York.

6.2.3 Urban and Built-up Areas

One of the principal land use and management activities in urban areas is land use planning. The land use plan (or general plan, or city plan) is a basic document used by local governmental units to help guide short-range land use decisions so that an orderly and productive long-range pattern is developed. Planning is carried out at several levels from municipal to county to regional. Plans may be relatively short-term and linked closely with current zoning ordinances, or they may be long-range conceptual outlines of general goals.

The primary Federal Assistance program in this field is the Comprehensive Planning Assistance (701) Program administered by the Department of Housing and Urban Development. This program provides grants to State and local governmental units to foster sound community, regional, and Statewide comprehensive planning. Many areas within the Region are currently carrying out planning activities with assistance through this program[7] (Figure 13–27c). In addition to this current planning, many governmental units have completed land use plans in the past. Planning is also conducted independently of the 701 program by State and local planning units.

6.3 Projected Accomplishments Under Current Programs

6.3.1 Agricultural and Forest Land

Current land treatment and management programs include the Soil and Water Conservation Program (PL–46) of the Soil Conservation Service, the land treatment phase of the Watershed Protection and Flood Prevention Program (PL–566), Federal-State Cooperative Forestry Programs, National Forest Programs, and various State, county, and private industrial forest programs.

It is estimated that more than 8.2 million acres of agricultural land will be treated by 2020 at a total cost of more than $342 million (Tables 13–68 and 13–69). Current forest programs will provide treatment for nearly 4.2 million acres of State, county, and private forest land by 2020 at an estimated cost of $210 million (Table 13–70). Current forest programs will also provide treatment for 4.4 million acres of national forest land by 2020 at an estimated cost of $146 million (Table 13–71). These projections assume continuation of existing authorities and manpower and budget levels throughout the projection periods. Projected accomplishments to 2020 will provide for approximately 40 percent of the total agricultural land treatment needs and 20 percent of total forest land treatment needs.

TABLE 13–68 Projected Accomplishments of Current Agricultural Land Treatment Programs, Great Lakes Region—1980, 2000, 2020[1]

PLANNING SUB-AREA	(1,000 Acres) CROPLAND 1980	2000	2020	Total	PASTURE 1980	2000	2020	Total	OTHER LAND 1980	2000	2020	Total	TOTAL LAND TREATMENT Acres (X 1,000)	Cost[2]
1.1	14.6	29.6	17.8	62.0	7.6	15.1	9.1	31.8	5.4	10.7	6.5	22.6	116.4	4.7
1.2	6.0	12.0	6.0	24.0	4.9	9.9	6.0	20.8	0.5	1.0	0.7	2.2	47.0	1.9
2.1	170.2	340.5	204.3	715.0	26.9	53.9	32.4	113.2	25.4	50.7	30.4	106.5	934.7	37.6
2.2	180.1	360.1	216.0	756.2	11.9	23.8	14.3	50.0	22.3	44.5	26.7	93.5	899.7	36.2
2.3	306.1	612.1	367.3	1,285.5	35.1	70.3	42.2	147.6	12.8	25.5	15.3	53.6	1,486.7	59.8
2.4	63.2	126.4	75.9	265.5	26.3	52.6	31.6	110.5	12.3	24.6	14.7	51.6	427.6	17.2
3.1	26.8	53.5	32.1	112.4	13.0	26.0	15.6	54.6	3.8	7.6	4.6	16.0	183.0	7.4
3.2	139.0	278.0	166.8	583.8	15.4	30.9	18.5	64.8	7.1	14.1	8.5	29.7	678.3	29.6
4.1	117.4	234.7	140.8	492.9	8.6	17.3	10.3	36.2	4.6	9.1	5.4	19.1	548.2	24.0
4.2	365.4	730.7	438.4	1,534.5	12.1	24.1	14.4	50.6	4.6	9.3	5.6	19.5	1,604.6	70.1
4.3	31.6	63.3	38.1	133.0	8.4	16.7	9.9	35.0	12.1	24.3	14.6	51.0	219.0	8.8
4.4	33.0	66.0	40.0	139.0	14.5	29.0	17.4	60.9	2.4	4.7	2.9	10.0	209.9	8.5
5.1	46.0	92.0	55.0	193.0	9.6	19.3	11.6	40.5	2.4	4.9	2.9	10.2	243.7	9.9
5.2	83.9	167.8	102.3	354.0	30.4	60.9	36.6	127.9	10.9	21.9	13.1	45.9	527.8	21.3
5.3	23.1	46.2	27.7	97.0	7.1	14.2	8.7	30.0	2.0	4.0	2.3	8.3	135.3	5.5
Total	1,606.4	3,212.9	1,928.5	6,747.8	231.8	464.0	278.6	974.4	128.6	256.9	154.2	539.7	8,261.9	342.5

[1] Public Law 566 and PL-46 Programs.
[2] Includes recurring practices, maintenance, and technical assistance cost ($1,000,000).

TABLE 13–69 Projected Cost of Current Agricultural Land Treatment Programs, Great Lakes Region—1980, 2000, 2020[1]

PLANNING SUB-AREA	CROPLAND 1980	2000	2020	Total	PASTURE 1980	2000	2020	Total	OTHER LAND 1980	2000	2020	Total	TOTAL LAND TREATMENT COST
							($1,000,000)						
1.1	.6	1.2	.7	2.5	.3	.6	.4	1.3	.2	.4	.3	.9	4.7
1.2	.3	.5	.2	1.0	.2	.4	.2	.8	.03	.04	.03	.1	1.9
2.1	6.9	13.7	8.2	28.8	1.1	2.2	1.3	4.6	1.0	2.0	1.2	4.2	37.6
2.2	7.2	14.5	8.7	30.4	.5	.9	.6	2.0	.9	1.8	1.1	3.8	36.2
2.3	12.3	24.7	14.8	51.8	1.4	2.8	1.7	5.9	.5	1.0	.6	2.1	59.8
2.4	2.5	5.0	3.0	10.5	1.0	2.5	1.2	4.7	.5	.9	.6	2.0	17.2
3.1	1.1	2.2	1.3	4.6	.5	1.0	.6	2.1	.2	.3	.2	.7	7.4
3.2	6.1	12.1	7.3	25.5	.7	1.3	.8	2.8	.3	.6	.4	1.3	29.6
4.1	5.1	10.3	6.2	21.6	.4	.8	.4	1.6	.2	.4	.2	.8	24.0
4.2	16.0	31.9	19.2	67.1	.5	1.1	.6	2.2	.2	.4	.2	.8	70.1
4.3	1.3	2.5	1.5	5.3	.3	.7	.4	1.4	.5	1.0	.6	2.1	8.8
4.4	1.3	2.7	1.6	5.6	.6	1.2	.7	2.5	.1	.2	.1	.4	8.5
5.1	1.9	3.7	2.2	7.8	.4	.8	.5	1.7	.1	.2	.1	.4	9.9
5.2	3.4	6.8	4.1	14.3	1.2	2.5	1.5	5.2	.4	.9	.5	1.8	21.3
5.3	.9	1.9	1.1	3.9	.3	.6	.4	1.3	.05	.2	.05	.3	5.5
Total	66.9	133.7	80.1	280.7	9.4	19.4	11.3	40.1	5.18	10.34	6.18	21.7	342.5

TABLE 13–70 Projected Forest Land Treatment Accomplishments on State, County, and Private Forest Land by Current Programs at Current Levels[1]

Planning Sub-area	1980		2000		2020		Total	
	Acres (1,000)	Cost[2] (million $)	Acres (1,000)	Cost (million $)	Acres (1,000)	Cost (million $)	Acres (1,000)	Cost (million $)
1.1	174	7.0	348	13.9	348	13.9	870	34.8
1.2	87	3.4	174	7.0	174	7.0	435	17.4
2.1	170	8.2	340	16.3	340	16.3	850	40.8
2.2	81	5.1	131	8.2	0[3]	0	212	13.3
2.3	38	2.2	76	4.6	76	4.6	190	11.4
2.4	80	3.6	160	7.4	160	7.4	400	18.4
3.1	43	2.5	86	4.9	86	4.9	215	12.3
3.2	18	1.0	36	2.0	36	2.0	90	5.0
4.1	10	0.6	20	1.2	20	1.2	50	3.0
4.2	16	1.1	32	2.3	32	2.3	80	5.7
4.3	11	0.9	22	1.6	22	1.6	55	4.1
4.4	27	1.9	54	4.1	54	4.1	135	10.1
5.1	18	1.1	36	2.2	36	2.2	90	5.5
5.2	53	2.9	106	5.8	106	5.8	265	14.5
5.3	46	2.7	92	5.4	92	5.4	230	13.5
Total	872	44.2	1,713	86.9	1,582	78.7	4,167	209.8

[1] Treatment includes multiple-use plans, reforestation, improved harvesting, forest stand improvement, erosion control, grazing control and urban forestry.

[2] Includes technical assistance and installation costs.

[3] By 2000 total needs will be adequately treated by projected current programs at current levels.

TABLE 13–71 Projected Land Treatment on National Forests of Current Programs at Current Levels

Planning Subarea	1980 Acres (1,000)	1980 Cost[1] (Million $)	2000 Acres (1,000)	2000 Cost (Million $)	2020 Acres (1,000)	2020 Cost (Million $)	Total Acres (1,000)	Total Cost (Million $)
1.1	220.0	6.4	440.0	12.8	440.0	12.8	1,100.0	32.0
1.2	210.0	6.7	420.0	13.4	420.0	13.4	1,050.0	33.5
2.1	160.0	5.0	320.0	10.0	320.0	10.0	800.0	25.0
2.4	180.0	6.8	360.0	13.6	360.0	13.6	900.0	34.0
3.1	110.0	4.3	220.0	8.6	220.0	8.6	550.0	21.5
5.2[2]	1.0	.1	2.0	.2	2.0	.2	5.0	.5
Total	881.0	29.3	1,762.0	58.6	1,762.0	58.6	4,405.0	146.5

[1] Includes labor, installation, site preparation, and survey costs when applicable.

[2] Includes land use area acreage, not national forest land, but administered by Forest Service.

6.3.2 Urban and Built-Up Areas

Unfortunately, uniformly reliable data on current urban land use and management activities in the Region are not sufficient to form a basis for projection. We may expect that some program such as the 701 Comprehensive Planning program will continue. As urban expansion reaches into new areas, more governmental units will be faced with a need for land use plans or revisions of existing plans. Thus land use planning will continue to be an important function of local government. There is also growing interest and activity in comprehensive land use planning at the State level.

Future action in other problem areas is even less certain. Several localities have enacted sediment control ordinances to control erosion primarily related to construction activities. Similar action may be anticipated by other local governments. Some municipalities have taken action to revise or supplement zoning ordinances to include flood plain zoning. The problems of flood plain development are becoming more widely recognized, and better controls may be adopted in the future. The entire issue here is so complex that only broad generalizations are possible. Until better data are available, further discussion is of little value.

6.4 Recommended Programs

6.4.1 Agricultural and Forest Land

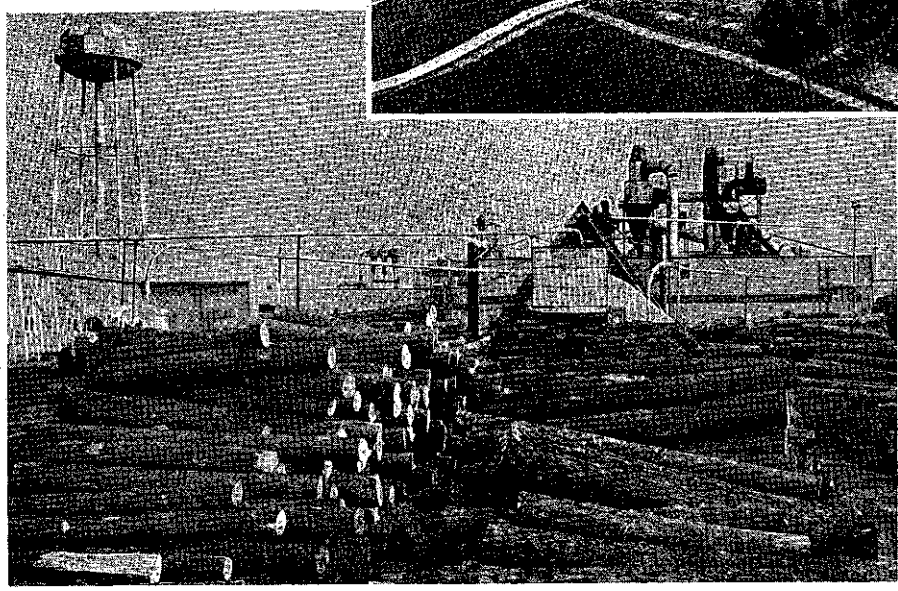
Current land treatment programs, continued at present levels through 2020, will fall short of total conservation needs as identified by CNI and discussed in Section 4. It is recommended that an accelerated land treatment program be initiated in order to narrow the gap between needs and accomplishments. Accelerated technical assistance could be provided by the Soil Conservation Service and the Forest Service. It is anticipated that the program would operate through soil conservation districts, and through existing Federal-State cooperative forestry programs. Accelerated cost sharing through the Rural Environmental Assistance Program (REAP) or other programs should also be considered.

This program would apply needed land treatment measures on an estimated 9,049,300 acres of agricultural land by 2020 (Table 13–72). This includes treatment of 7,389,900 acres of cropland, 1,068,200 acres of pasture, and 591,200 acres of other land. The total estimated cost for this portion of the program is $375,000,000 (Table 13–73).

The program would also apply needed treatment to 11,516,000 acres of State, county, and private forest land by 2020 at an estimated cost of $592,400,000 (Table 13–74). This does not include recurring costs for fire protection, insects and disease protection, and recurring practices.

To help meet the increasing problems and needs created by the increased emphasis for multiple use of public lands, an acceleration above the current national forest development and multiple use program levels is recommended for both land treatment and structural measures (Table 13–75). The land treatment measures provide for multiple use planning and management, erosion and sediment control, fish and wildlife habitat improvement, improvement of timber produc-

PROTECTED AND PRODUCTIVE AGRICULTURAL LAND.



A CONTINUING SUPPLY OF FOREST PRODUCTS.

FISH AND WILDLIFE ENHANCEMENT AND RECREATION.

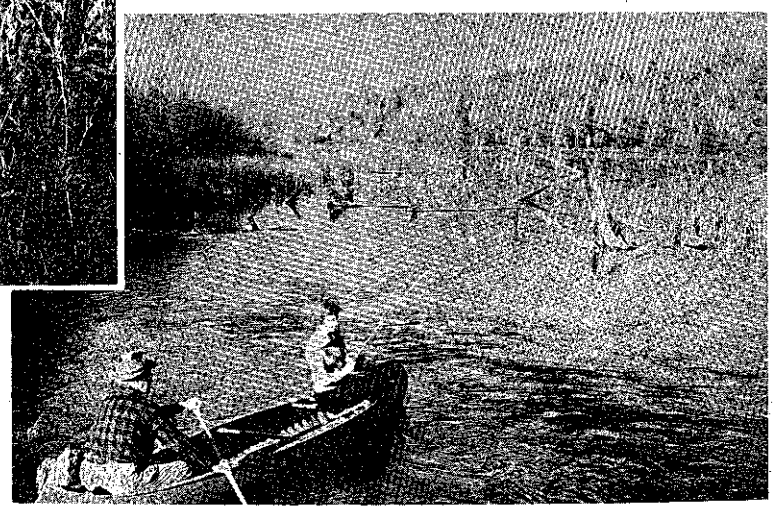


FIGURE 13–28 Benefits of Adequate Land Treatment

TABLE 13-72 Projected Agricultural Land Treatment Accomplishments Under Recommended Accelerated Program, Great Lakes Region—1980, 2000, 2020[1]

PLANNING SUB-AREA	CROPLAND				PASTURE				OTHER LAND				TOTAL LAND TREATMENT COST
	1980	2000	2020	Total	1980	2000	2020	Total	1980	2000	2020	Total	
	($1,000,000)												
1.1	.7	1.2	.8	2.7	.4	.6	.4	1.4	.3	.4	.3	1.0	5.1
1.2	.3	.5	.3	1.1	.2	.4	.3	.9	.03	.04	.03	.1	2.1
2.1	8.2	14.4	8.9	31.5	1.3	2.3	1.4	5.0	1.2	2.2	1.3	4.7	41.2
2.2	8.7	15.2	9.4	33.3	.6	1.0	.6	2.2	1.1	1.9	1.2	4.2	39.7
2.3	14.8	25.8	16.0	56.6	1.7	3.0	1.8	6.5	.6	1.1	.7	2.4	65.5
2.4	3.1	5.4	3.3	11.8	1.3	2.2	1.4	4.9	.6	1.0	.6	2.2	18.9
3.1	1.3	2.3	1.4	5.0	.6	1.1	.7	2.4	.2	.3	.2	.7	8.1
3.2	7.3	12.8	7.9	28.0	.8	1.4	.9	3.1	.4	.6	.4	1.4	32.5
4.1	6.1	10.8	6.7	23.6	.4	.8	.5	1.7	.2	.4	.3	.9	26.2
4.2	19.2	33.5	20.8	73.5	.6	1.1	.7	2.4	.2	.4	.3	.9	76.8
4.3	1.5	2.7	1.7	5.9	.4	.7	.4	1.5	.6	1.0	.7	2.3	9.7
4.4	1.6	2.8	1.8	6.2	.7	1.2	.8	2.7	.1	.2	.1	.4	9.3
5.1	2.2	3.9	2.4	8.5	.5	.8	.5	1.8	.1	.2	.1	.4	10.7
5.2	4.0	7.1	4.4	15.5	1.5	2.6	1.6	5.7	.5	.9	.6	2.0	23.2
5.3	1.1	2.0	1.2	4.3	.3	.6	.4	1.3	.1	.2	.1	.4	6.0
Total	80.1	140.4	87.0	307.5	11.3	19.8	12.4	43.5	6.23	10.84	6.93	24.0	375.0

TABLE 13-73 Projected Cost of Agricultural Land Treatment Accomplishments Under Recommended Accelerated Program, Great Lakes Region—1980, 2000, 2020

PLANNING SUB-AREA	(1,000 Acres) CROPLAND				PASTURE				OTHER LAND				TOTAL LAND TREATMENT	
	1980	2000	2020	Total	1980	2000	2020	Total	1980	2000	2020	Total	Acres	Cost[2]
													(X 1,000)	
1.1	17.7	31.0	19.3	68.0	9.1	16.0	9.9	35.0	6.5	11.2	7.0	24.7	127.7	5.1
1.2	6.9	12.2	7.9	27.0	6.0	10.4	6.6	23.0	0.6	1.1	0.7	2.4	52.4	2.1
2.1	204.3	357.4	221.3	783.0	32.3	56.6	35.0	123.9	30.4	53.2	33.0	116.6	1,023.5	41.2
2.2	216.0	378.0	234.1	828.1	14.3	25.0	15.7	55.0	26.7	46.8	29.0	102.5	985.6	39.7
2.3	367.3	642.7	397.9	1,407.9	42.2	73.7	45.7	161.6	15.3	26.8	16.6	58.7	1,628.2	65.5
2.4	75.9	132.8	82.2	290.9	31.6	55.2	34.2	121.0	14.7	25.8	16.0	56.5	468.4	18.9
3.1	32.1	56.2	34.8	123.1	15.6	27.3	16.9	59.8	4.6	7.9	4.9	17.4	200.3	8.1
3.2	166.8	292.0	180.7	639.5	18.5	32.5	20.0	71.0	8.5	14.9	9.2	32.6	743.1	32.5
4.1	140.8	246.4	152.6	539.8	10.3	18.1	11.2	39.6	5.4	9.6	5.9	20.9	600.3	26.2
4.2	438.4	767.2	475.0	1,680.6	14.5	25.3	15.6	55.4	5.6	9.8	6.0	21.4	1,757.4	76.8
4.3	37.9	66.4	41.7	146.0	10.0	17.6	10.4	38.0	14.6	25.5	15.8	55.9	239.9	9.7
4.4	39.8	69.7	43.5	153.0	17.4	30.4	18.8	66.6	2.9	5.0	3.1	11.0	230.6	9.3
5.1	55.0	96.4	59.6	211.0	11.5	20.2	12.5	44.2	2.9	5.2	3.1	11.2	266.4	10.7
5.2	100.6	176.2	109.2	386.0	36.6	63.9	39.6	140.1	13.2	22.9	14.2	50.3	576.4	23.2
5.3	27.7	48.5	29.8	106.0	8.5	14.9	10.6	34.0	2.4	4.2	2.5	9.1	149.1	6.0
Total	1,927.2	3,373.2	2,089.6	7,389.9	278.4	487.1	302.7	1,068.2	154.3	269.9	167.0	591.2	9,049.3	375.0

[1] Programs providing monies for installation costs of land treatment measures.

[2] Includes recurring practices, maintenance, and technical assistance cost ($1,000,000).

TABLE 13-74 Projected Land Treatment Accomplishments on State, County, and Private Forest Land Under Recommended Accelerated Program, Great Lakes Region—1980, 2000, 2020[1]

Planning Subarea	1980		2000		2020		Total	
	Acres (1,000)	Cost[2] (million $)	Acres (1,000)	Cost (million $)	Acres (1,000)	Cost (million $)	Acres (1,000)	Cost (million $)
1.1	366	14.6	729	29.2	729	29.2	1,824	73.0
1.2	334	13.2	664	26.2	664	26.2	1,662	65.6
2.1	112	5.4	221	10.7	221	10.7	554	26.8
2.2[3]	---	----	---	----	---	----	-----	----
2.3	145	8.7	293	17.4	293	17.4	731	43.5
2.4	376	17.4	752	35.0	752	35.0	1,880	87.4
3.1	146	8.3	295	16.7	295	16.7	736	41.7
3.2	99	5.4	198	10.8	198	10.8	495	27.0
4.1	53	3.3	106	6.4	106	6.4	265	16.1
4.2	37	2.7	72	5.1	72	5.1	181	12.9
4.3	52	4.0	107	7.8	107	7.8	266	19.6
4.4	128	9.5	254	19.0	254	19.0	636	47.5
5.1	49	3.0	97	6.0	97	6.0	243	15.0
5.2	196	10.7	392	21.4	392	21.4	980	53.5
5.3	211	12.6	426	25.1	426	25.1	1,063	62.8
Total	2,304	118.8	4,606	236.8	4,606	236.8	11,516	592.4

[1] Treatment includes multiple use plans, reforestation, improved harvesting, forest stand improvement, erosion control, grazing control and urban forestry.

[2] Includes technical assistance and installation costs.

[3] No accelerated program is proposed. The planning subarea has a high percent of urban and built-up areas with a small amount of forest land. Projected current programs at current levels will satisfy total needs. However, a growing need will exist for urban forestry programs which will be studied in detail in the Type IV Chicago Metropolitan Area River Basin Study.

TABLE 13–75 Recommended Accelerated Land Treatment and Structural Measures on National Forest Land

Land Treatment PSA	1980 Acres (1,000)	1980 Cost (Million $)	2000 Acres (1,000)	2000 Cost (Million $)	2020 Acres (1,000)	2020 Cost (Million $)	Total Acres (1,000)	Total Cost (Million $)
1.1	189.7	4.7	379.6	9.8	379.6	9.8	948.9	24.3
1.2	109.5	2.8	219.0	5.5	219.0	5.5	547.5	13.8
2.1	75.3	1.6	150.6	3.4	150.6	3.4	376.5	8.4
2.4	124.7	3.1	249.5	6.1	249.5	6.1	623.7	15.3
3.1	41.7	0.8	83.4	1.7	83.4	1.7	208.5	4.2
5.2	1.0	0.1	2.0	0.2	2.0	0.2	5.0	0.5
Total	541.9	13.1	1084.1	26.7	1084.1	26.7	2710.1	66.5

Structural Measures PSA	1980 Acres	1980 Miles	1980 Cost (Million) $	2000 Acres	2000 Miles	2000 Cost (Million) $	2020 Acres	2020 Miles	2020 Cost (Million) $	Total Acres	Total Miles	Total Cost (Million) $
1.1	36	51	1.0	72	102	2.2	72	102	2.2	180	225	5.4
1.2	117	84	2.0	234	168	3.8	234	168	3.8	585	420	9.6
2.1	240	15	0.5	480	30	0.8	480	30	0.8	1200	75	2.1
2.4	84	75	1.9	168	150	3.7	168	150	3.7	420	375	9.3
3.1	15	36	0.8	30	72	1.6	30	72	1.6	75	180	4.0
5.2	10	1	0.6	20	4	1.2	20	4	1.2	50	9	3.0
Total	502	262	6.8	1004	526	13.3	1004	526	13.3	2510	1314	33.4

tion and quality, and improvement of hydrologic conditions. The structural measures are designed to provide additional protection of national forest lands from fire damages, increase development and utilization of forest and water resources, and provide a healthier environment for development of the human resources. Structural measures would include items such as construction of outdoor recreational facilities, roads, trails, and fish and wildlife impoundments.

6.4.2 Urban and Built-Up Areas

It is evident that many urban land use problems stem from a lack of coordinated planning. Many details concerning urban land use are not presented in this appendix. This omission is due in part to the problems of the work group in attempting to compile urban land use data, which were cited earlier. It is also important to recognize that meaningful urban land use planning goes far beyond the scope of a

framework study. Yet the need for such planning will become even more acute as urban expansion continues.

It is recommended that a more detailed analysis of urban land use problems be completed in regional or river basin studies conducted in the Region. Emphasis should be given to urban expansion and land use change, rural-urban interaction, and maintenance of open spaces. It is assumed that current State and local planning agencies would provide inputs for these studies.

Effective comprehensive planning is circumscribed to a high degree by the available data base. It is therefore recommended that urban and regional information systems be established throughout the Great Lakes Region. These systems should be established at least within each SMSA. The systems would be metropolitan or regional in nature, encompassing more than one political jurisdiction. They would be planning-oriented rather than operations-oriented.

Because of the mass of data generated and utilized in comprehensive planning, the systems would be developed for electronic data processing. Uniformity of the systems throughout the Region would be required to achieve the desired objectives. Existing State and local planning commissions would form the core of these systems. Appropriate Federal agencies, such as the Department of Housing and Urban Development (HUD) would provide leadership in design, implementation, and utilization of the systems.[7] Other agencies would supply resource inventory information. For example, the Soil Conservation Service would provide soil survey data and interpretations. It is recommended that HUD prepare a feasibility study and cost estimate for instituting such systems in the Great Lakes Region. This study would also give guidance on organization, management, and funding.

A technical assistance program for urban areas is recommended in order to protect soil and water resources, and to provide an opportunity for man to live in harmony with his natural environment. These goals may be achieved through proper land use planning designed to reduce soil erosion, help maintain water quality, reduce flood damages, improve vegetative cover, and enhance natural beauty. This program will provide assistance to planning boards, community leaders, and developers in formulating and implementing effective land use plans.

Proper interpretation of soil surveys will be provided to indicate the best development sites, and to help avoid problems of poor drainage, unstable soils, and severe erosion hazards. Recommendations for good land use will include methods of controlling excessive erosion which occurs despite the most conscientious application of protective measures. The goal will be to prevent controllable erosion and keep sediment production to a minimum. This not only will protect the development site itself, but also prevent sedimentation and degradation of surface waters. Since much of the most favorable land is already developed, the use of soil surveys and soil conservation practices will become even more important in the future.

Vegetative cover, including trees, shrubs, and grasses, established, retained, or improved in the metropolitan areas will provide natural beauty, recreation opportunities, and environmental enhancement. This program will furnish technical assistance for the development and maintenance of forests, nature areas, parks, open spaces, buffer zones, and greenbelt areas.

Assistance will include the identification and location of suitable areas to be retained for:

(1) community and school forests—to provide areas for aesthetics, recreation, and nature study and conservation education

(2) vegetated buffer zones or screening strips—to isolate housing or industrial developments and for highway beautification

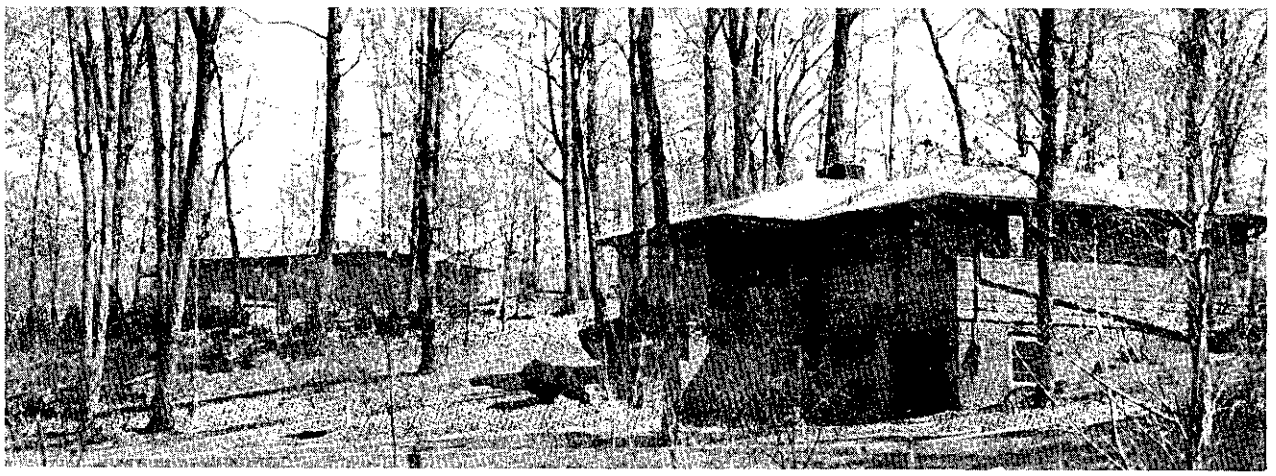
(3) infiltration zones or sediment traps along waterways and roads—to retard surface runoff, erosion, and sedimentation.

Advice will be available to improve tree stands and develop plants to enhance recreation opportunities, wildlife habitat, nature studies, and sylvan aesthetics. Technical services will be provided for the control of insects, plant diseases, nonstructural fires, animal damage, and pollutants in forests, parks, and greenbelt areas.

This would be a local State-Federal cooperative program involving the U.S. Department of Agriculture, the States, soil conservation districts, and other local units of government. The urban soil and water conservation phase of the program would be implemented through soil conservation districts in cooperation with the Soil Conservation Service. The urban and community forestry assistance phase of the program would be under the leadership of the Forest Service. The average annual cost is estimated at $2.9 million.

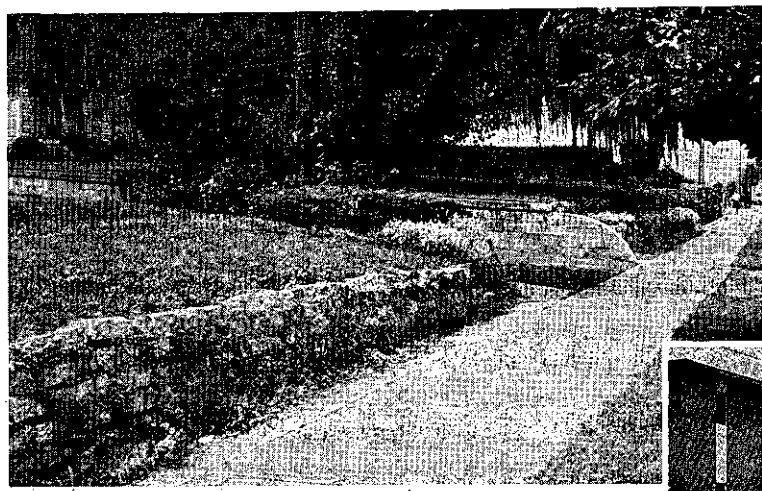
SOIL SURVEYS PROVIDE BASIC RESOURCE DATA FOR PLANNING.

SOUND PLANNING IS ESSENTIAL FOR COMMUNITY DEVELOPMENT AND IMPROVEMENT.



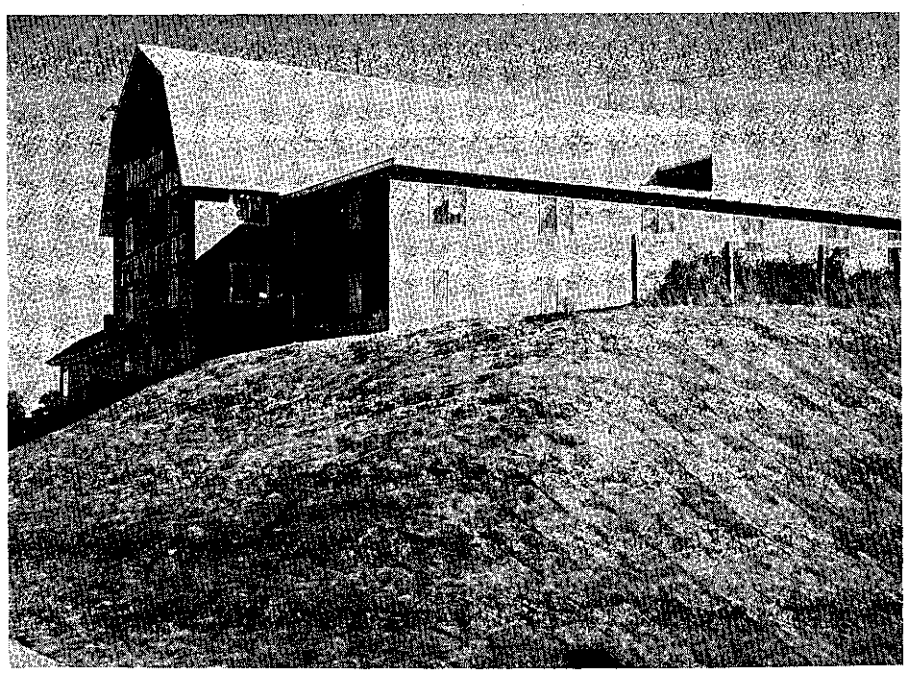
PRESERVATION AND ESTABLISHMENT OF TREES AND SHRUBS ENHANCES URBAN DEVELOPMENTS.

FIGURE 13–29 Improving the Urban Environment



RETAINING WALLS AND SELECTED PLANTINGS PROVIDE EROSION CONTROL AND BEAUTIFICATION.

SODDING, SEEDING, AND A CONCRETE CHUTE CONTROL EROSION ON THIS URBAN SITE.



SODDING THIS STEEP SLOPE CONTROLS EROSION.

FIGURE 13–30 Urban Land Treatment

6.4.3 A Comprehensive Land Use Policy

It is impossible to separate rural and urban land use problems completely. Present social and institutional factors produce continuous interaction between these two sectors. It is therefore unrealistic to consider separate solutions to the needs of each area. It is equally unrealistic to expect that fragmented individual or group land use decisions will combine to produce an overall economically and socially desirable land use pattern. Decision-makers must deal with the issue of what constitutes irreplaceable land for any particular purpose, and devise policies to ensure that such lands are maintained in the desired use. A rational and well-defined comprehensive land use policy is vital in planning for the future of the Region.

It is recommended that a comprehensive land use policy be adopted for the Great Lakes Region. Legislation for a National Land Use Policy, which has been introduced in Congress, if enacted, would form the basis for this policy.[8] This would provide a means for improved land use planning and implementation. Effective action would also require establishment of land use policies at State and local levels. A combination of these elements is essential for meaningful improvements in current land use strategies.

Section 7

LAND USE AND MANAGEMENT ALTERNATIVES

7.1 Introduction

Alternatives may be considered either as issues of use or of management. That is, one may consider what alternate land use patterns are possible, and what alternate management tools may be utilized to meet a particular need. Land use alternatives are difficult to develop and define quantitatively. The time and manpower limitations of this work group have prevented a detailed analysis of various land use patterns and their impact. A general discussion is provided here to stimulate further study. Management alternatives are no more easily quantified, but there is more experience in managing a particular area than in making broad land use decisions.

7.2 Land Use Alternatives

Land use projections presented in Section 3 form a base from which alternatives might be considered. It is important to recognize that a projection is not a prediction. It is an estimate of future conditions based on assumptions about various factors that influence the variable under study. Projections are nevertheless very useful planning tools, particularly if they are updated with revised assumptions as new information becomes available.

Projections are necessarily based to a high degree upon past events and relationships. For example, urban land projections are based on the past relationship between urban acreage and population, population change, and employment. Such factors as zoning or planning were not specifically considered.

Projections implicitly assume that the influence of these factors will remain constant. To the extent that urban planning encourages more efficient use of the land, urban land requirements may be less than projected. On the other hand, should the reservation of open space within urban areas be relatively greater than in the past, urban land requirements may be greater than projected. The development of metropolitan mass transit systems, which reduce the proportion of transportation land, would also decrease urban land needs. In any case, urban land, which makes up only approximately eight percent of the present land area in the Region, is projected to increase to only approximately 14 percent. Even major changes in future urban land requirements would have only a marginal impact on the Region. The impact in specific planning subareas, however, could be significant.

Agricultural land use projections are similarly based on certain assumptions regarding needs for food and fiber and land productivity. Expanded agricultural research efforts that lead to increased productivity may reduce the projected land requirement. Urban expansion, which removes more highly productive agricultural land than assumed in the base projection, may raise the land requirement. Conversely, a policy that reserves the best soils for food and fiber production would reduce the projected agricultural land requirement. Expanded investments in agricultural water resource developments such as drainage may reduce the projected land requirements. This last point is discussed in more detail in Appendix 16, *Drainage*.

A detailed analysis of these and other changes in land use policy would be most useful for effective planning. When fully developed, such an analysis would form the basis for formulating a comprehensive land use policy for the Region. If that recommendation is accepted, resources must be allocated to refine the data base and provide a thorough analysis of land use alternatives as a guide to decision-making.

Land and water resources possess certain natural characteristics that may be used by man. These natural characteristics also limit resource suitability for certain uses. Yet certain physical and locational aspects of natural resources are important from an economic standpoint. Indeed the maintenance of society requires the use of natural resources in economic enterprises. The choice is not preservation or economic efficiency; elements of both are essential. There is a need for an

ecological approach to land use planning. This would provide a synthesis of natural resource characteristics and economic values. Future planning efforts and consideration of land use alternatives should be based on this concept.

7.3 Management Alternatives

In solving problems, changing undesirable present situations, and meeting resource needs in the Basin, several kinds of improvements and alternative solutions are often available. Consideration of these alternative choices, which are primarily institutional changes, and the selection of one or more kinds of solutions rest primarily with local people and with local units of government. A wise mixture of land use and management techniques will help to balance private economic interest and public benefit.

7.3.1 Zoning and Regulation

The use of zoning and regulation to influence future land use presupposes some conceptual plan and desire for a more orderly process of development and change. A comprehensive land use plan should be developed to guide zoning decisions. Zoning permits the community to control the use of land in public interest by limiting the number of uses and the ways of resource development available for the landowner to apply. In its extreme, it may restrict him to a single choice or a single development method.

Most early uses of zoning were designed to control the location of undesirable development, to segregate development requiring different levels of utility services, and to restrict certain uses from a particular place. Zoning measures may also be adopted that contain protective as well as preventive language. They could be designed to protect and perpetuate such extensive uses as agriculture, forestry, recreation, fish and wildlife, or any combination of these.

Regulation may take the form of control, enforcement of standards, or review of intended use. State and local ordinances or enabling legislation could be adopted to encourage certain uses, restrict others, or to establish tolerance limits for acceptable use. Such regulations have already been established at some level for public health reasons. Planning and control of permits for improvements such as water and sewer systems and transportation facilities are influential land use and management tools. Greater enforcement of these and additional regulations might result in an acceptable alternative to applying several structural measures in the solving of a given problem. An example would be flood plain regulations that control development and preclude the need for costly flood control measures.

7.3.2 Purchase or Acquisition

Public purchase of land in fee simple ownership or with limited easements or development rights, and acquisition by eminent domain provide the most direct mechanisms in land use and management for the public benefit. Strategically located purchases of public land could help alleviate present or future use problems. At the same time, it could enhance the environmental quality, provide for recreation, and preserve areas for a variety of recreational pursuits if tied in with purchase of development rights or recreation easements. Land acquisition can and has been used for urban renewal and highway construction projects, for making public access points available, and for preserving historic buildings and lands. Land purchase or acquisition of limited land rights by a public body is an effective way to control urban sprawl and to preserve land for scenic beauty.

7.3.3 Tax Policy

Tax policy is a vital element in deciding income and profit for landowners, investors, developers, and landlords. Tax policies can favor particular land uses and encourage their adoption while, at the same time, discourage other uses. Taxation, therefore, is an essential tool in shaping the man-made environment and preserving the natural environment.

Good assessment procedures for local property taxes can develop a fair spread of the tax burden. Proportionate tax increases on improvements could encourage restoring sound buildings or replacing deteriorating ones. Proportionate taxes on raw land in urban and fringe areas could discourage speculative purchases and leapfrog development. The local property tax could be used to encourage cluster development and open space preservation where no such options exist. Special tax treatment for commonly-owned open space and community facilities also encourages pro-

tection or enhancement of the environment by subdivision developers. Tax incentives for private forest lands are favorable to the long-term commitment necessary in the production of forest products and application of treatment measures. The retention of certain types of agricultural activities near urban areas could be encouraged by tax incentives.

7.3.4 Permits

Federal and sometimes State governments require permits for a range of activities on land and submerged lands. Although the control of individual land use decisions regarding private land is primarily local and varies widely, these permits may influence major growth patterns, economic development, and use of nearby privately-owned land.

Before water and sewer services may be extended to new housing and other facilities, most communities require certification that public capacities are adequate to supply the services and that equipment and other facilities on the property meet local specifications. When combined with adequate control over the use of wells and septic tanks, these permits can dictate the pace and direction of urban growth.

The permit authority of the U.S. Army Corps of Engineers is a significant tool in land use decisions affecting navigable waters. Most States have enacted legislation requiring permits for alteration of wetlands, bottomlands, and adjacent land areas. The trend is toward stronger State controls on dredging, draining, and filling of these lands.

SUMMARY

This appendix presents an inventory of existing land use and management conditions in the Great Lakes Basin and a discussion of major problems. Projections of future land use requirements, as well as estimates of future management and conservation treatment needs, are provided for the target years of 1980, 2000, and 2020. Information is presented for agricultural, forest, urban, and built-up land.

The Region's total land area of 83,579,700 acres includes 6,987,700 acres of urban and built-up areas, 28,609,000 acres of cropland, 3,505,800 acres of pasture land, 39,624,700 acres of forest land, and 4,852,500 acres of other land. Forest land comprises more than 47 percent of the total land area of the Region. Agricultural land (cropland and pasture) comprises more than 38 percent of the total. At the present time, urban and built-up areas cover a little more than eight percent of the Region.

The land capability classification system describes the potentialities of the land for agricultural purposes on the basis of physical soil limitations. Land is grouped in eight capability classes. The Region has more than 46.9 million acres in classes I through III. This land is suitable for sustained agricultural cultivation using good management practices. An additional 11.1 million acres in class IV are suitable for occasional cultivation. Thus, more than 58 million acres have potential for agricultural production. This represents 82 percent of the total non-Federal and nonurban built-up land in the Region. The remaining 12.7 million acres in classes V through VIII have severe limitations that make them generally impractical for cultivated crops.

Planning Subarea 4.2, with nearly 5.7 million acres of classes I, II, III, and IV land, has the highest proportion of cultivable land among the planning subareas. Planning Subarea 2.2 has the highest proportion of class I land.

For the Region as a whole land use is fairly consistent with its capabilities. More than 23 million acres, or 96 percent of the total cropland, are on land in capability classes I through IV. Within some planning subareas, some shifts in land use may be considered in order to bring land use and capabilities into better balance.

The Great Lakes Basin includes a wide variety of farm types, from forestry, dairying, and potatoes, to truck and fruit crops. Farm types and their location in certain geographic areas are related to climate, soils, and markets.

Forest land covers nearly one-half of the Region, but it is not uniformly distributed. Several counties in the northwestern portion are more than 80 percent forest land, while many other counties are less than 20 percent forested. Hardwoods are the major component (76 percent) of the Region's forest land.

Approximately 80 percent of the Region's total land area is privately-owned. Federal ownership primarily of forest lands, makes up approximately seven percent of the total. State and local governments control the remainder, which consists primarily of forested land, parks, and recreation land.

Urban and built-up areas, while representing only approximately eight percent of the total land area, have a considerable influence over land use decisions. Many rural areas in the Region are affected by economic and social factors in nearby urban centers. The urban influence on agricultural land use may be even more dramatic in the future. In the Region, more than one-third of the total cropland is located within Standard Metropolitan Statistical Areas (SMSAs), where most future urban growth is expected.

Land use projections indicate that land in urban and built-up areas will increase from 6.9 million acres to 8.4 million acres by 1980, to 10.4 million acres by 2000, and to 12.1 million acres by 2020. Little change is expected in Planning Subareas 1.1 and 1.2, but a dramatic change is anticipated in Planning Subareas 2.2, 4.1, and 4.2.

Projections also indicate that the agricultural land base is adequate to meet the Region's share of national food and fiber requirements through 2020. Total cropland requirements will decline slightly between 1970 and 2000 but then increase as rising food require-

ments place more pressure on the resource base. There will be a continuing requirement to maintain some idle land for agricultural purposes.

Forest land is projected to decline by three percent (to 38.4 million acres) by 2020 due to urban development.

A total of 20,451,200 acres of agricultural land has been identified as needing conservation treatment. This includes 16,746,300 acres of cropland, 2,419,600 acres of pasture land, and 1,285,300 acres of other land. Proper treatment of this land is needed to reduce runoff, erosion, and sedimentation.

Approximately 20.8 million acres of non-Federal forest land has been identified as needing conservation treatment. Needed measures range from management plans to improved harvesting. Conservation treatment measures and intensified management are also needed on national forest lands in the Region.

Shoreline and natural areas are special land areas also in need of improved treatment and management. Competition for these lands is growing, and special efforts are needed to preserve and enhance their unique qualities.

The problems and needs of urban and built-up areas are serious and growing in scope and intensity. Many of the land use problems are associated with the change from rural to urban. Zoning conflicts, taxation problems, land value appreciation, and accelerated erosion are commonly associated with urban growth. These problems are concentrated around existing urban areas where most of the future growth is expected. By the year 2020, large areas of the Region will experience the impact of urban expansion. The southern portion of the Region and areas along the Great Lakes will be most affected.

Accelerated land treatment is recommended to help meet projected needs. The total proposed program would provide adequate treatment for 7,389,900 acres of cropland, 1,082,000 acres of pasture land, 591,200 acres of other land, and 9,172,000 acres of non-Federal forest land. In addition, accelerated land treatment and structural measures are recommended for 10,400 acres of land in national forests.

This study has shown that improved urban land data is a primary need for future land use planning. An urban and regional information system is recommended for the Region.

Coordinated land use planning for both rural and urban areas is a vital need in order to effectively and efficiently meet all the requirements of the land resource base. A comprehensive land use policy should be formulated for the Region. Implementation of this recommendation will require action at Federal, State, and local levels.

Further studies are required to provide a thorough analysis of the impacts of various land use alternatives. The preferred format for such a study would be as part of the background analysis for a comprehensive land use policy.

GLOSSARY

annual mortality of growing stock—the net cubic-foot volume removed from growing stock during a year through death from natural causes.

canopy—the cover of leaves and branches formed by the tops of crowns of plants.

commercial forest land—forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. (Note: Areas qualifying as commercial forest land have the capability of producing in excess of 20 cubic feet per acre per year of industrial wood under management. Currently inaccessible and inoperable areas are included, except when the areas involved are small and unlikely to become suitable for production of industrial wood in the foreseeable future.)

conservation—the protection, improvement, and use of natural resources according to principles that will assure their highest long-term economic and social benefit.

contour—an imaginary line on the surface of the earth connecting points of the same elevation.

contour farming—conducting field operations, such as plowing, planting, cultivating, and harvesting, on the contour.

contour strip cropping—layout of crops in comparatively narrow strips in which the farming operations are performed approximately on the contour. Usually strips of grass, close-growing crops, or fallow are alternated with those in cultivated crops.

cover crop—a close-growing crop grown primarily for the purposes of protecting and improving soil between periods of regular crop production or between trees and vines in orchards and vineyards.

crop rotation—the growing of different crops in recurring succession on the same land.

cropland acres—(CNI) includes all cultivated land used for field crops or hay and pasture in rotation; cropland temporarily idle or diverted from production under government programs; permanent hayland; orchards, vineyards, and bush fruits; and open land formerly cropped and not converted to another use.

current normal—a concept used to describe estimates that conform to an acceptable pattern and to remove aberrations associated with single point estimates. Acreage and production have been adjusted to reflect current production technology and prices, from which the impacts or abnormalities caused by weather and other hazards in a single year were weighted by their historical occurrence. Future projections, then, are not based on a single year's data, but are based on current normal levels, which take into consideration historical experience in the case of the Great Lakes Basin from 1939 to 1968.

forest land—land at least 10 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use. The minimum area for classification of forest land is one acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width at least 120 feet wide to qualify as forest land. Unimproved roads and trails, streams, or other bodies of water or clearings in forest areas shall be classed as forest if less than 120 feet in width.

forest land acres—(from forest surveys) land at least 10 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use. The minimum area for classification of forest land is one acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width of least 120 feet wide to qualify as forest land. Unimproved roads and trails, streams, or other bodies of water or clearings in forest areas shall be

classed as forest, if less than 120 feet in width.

forest trees—woody plants having a well-developed stem and usually more than 12 feet in height, including both growing stock and cull trees.

forest types—a classification of forest land based upon the tree species presently forming a plurality of the stock. For pole-timber size trees and larger, stocking is determined from basal area occurrence and for trees less than 5.0 inches d.b.h. from numbers of trees.

growing stock—net volume, in cubic feet of live sawtimber and pole-timber trees from stump to a minimum four-inch top (of central stem) outside bark. Net volume equals gross volume less deduction for rot.

hardwoods—dicotyledonous trees, usually broad-leaved and deciduous.

humus—partially decomposed organic matter.

hydrologic condition—the relative ability of specific combinations of soil and vegetative cover to absorb precipitation and retard runoff. It expresses the interrelationship existing between the soil and forest cover and its effect on the movement of precipitation on, into, and through the soil profile.

land resources—an area of land containing or supporting all or some of certain resources in some combination. The resources include soil, water, timber, forage, wildlife, and minerals.

land use—primary occupier of a tract of land, i.e., crops, fallow, idle, timber, etc.

land utilization projects—land administered by the Forest Service for programs of land utilization and adjustment under Title III of the Bankhead-Jones Farm Tenant Act.

litter—the uppermost layer of the organic debris, composed of freshly fallen or slightly decomposed organic materials.

miscellaneous private lands—privately owned land other than forest-industry and farmer-owned lands.

mortality—number of live trees with sound-wood volume dying from natural causes during a specified period.

multiple use—the management of all the various renewable surface resources of the national forests so that they are used in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; using some land for less than all of its resources; and harmonious and coordinated management of the various resources, each with the other, without impairing the productivity of the land, considering the relative values of the various resources. The combination of uses chosen will not necessarily give the greatest dollar return or the greatest unit output.

national forest land—Federal lands that have been legally designated as national forests or purchase units, and other lands under the administration of the Forest Service, including experimental areas and Bankhead-Jones Title III lands.

net volume in cubic feet—gross volume in cubic feet less deductions for rot.

noncommercial forest land area—forest land that is withdrawn from timber utilization through statute, ordinance, or administrative order, but that otherwise qualifies as commercial forest land; or incapable of yielding industrial wood products (usually sawtimber) because of adverse site conditions.

nonforest land—land that has never supported forests and lands formerly forested where use for timber management is precluded by development for other uses. (Note: Includes areas used for crops, improved pasture, residential areas, city parks, improved roads of any width and adjoining clearings, power-line clearings of any width, and 1-to-40 acre areas of water classified by the Bureau of the Census as land. If intermingled in forest areas, unimproved roads and nonforest strips must be more than 120 feet wide, and clearings, etc., must be more than one acre in size, to qualify as nonforest land.)

nonstocked areas—commercial forest land less than 10 percent stocked with growing-stock trees.

other Federal lands—Federal lands other than

national forest, including lands administered by the Bureau of Land Management, Bureau of Indian Affairs, and other Federal agencies.

other land acres—(CNI) includes all land not classified as cropland, pasture-range, forest land, urban built-up areas, and water areas. Other land considered a part of the farm, includes farmsteads, farm roads, feed lots, ditch banks, fence and hedgerows, and idle land. Idle land includes land formerly used for crop and pasture, now abandoned and not yet put to some other use. Other land outside the boundaries of a farm includes rural nonfarm residences, investment tracts, coastal dunes, marshes not used for grazing, and strip mines, borrow and gravel pits.

overland, or direct runoff—the part of the runoff that travels over the land surface to a stream system. It originates from rainfall and snowmelt.

ownership—property owned by one owner, regardless of the number of parcels in a specified area.

pasture-range acres—(CNI) includes lands producing forage plants, principally introduced species, primarily for grazing and not included in cropland rotation. Includes native pasture in humid areas and may contain shade or timber trees if the canopy is less that 10 percent.

primary land use—grouping together into classes with similar characteristics, i.e., cropland, pasture, forest.

purchase units—portions of approved national forest acquisition areas established by the Secretary of Agriculture, with the concurrence of the National Forest Reservation Commission, located outside designated or proclaimed national forest boundaries.

reforestation—the natural or artificial restocking of an area with forest trees; most commonly used in reference to the latter.

runoff—(1) the total stream discharge, including both surface and subsurface flow, usually expressed in acre feet. (2) The rate at which water is discharged from a drainage area, usually expressed in cubic feet per second per square mile of drainage area.

sediment yield—the sediment outflow from a drainage basin at a point of reference in a specified period of time. It is equivalent to the sediment discharged from a drainage basin in an average year. It is expressed in tons per acre or square mile per year.

sheet erosion—the more or less even removal of soil to take layers from the land surface.

site—an area, considered as to its ecological factors with reference to capacity to produce forests or other vegetation; the combination of biotic, climatic, and soil conditions of an area.

softwoods—coniferous trees, usually evergreens having needles or scalelike leaves.

soil loss tolerance—the maximum average annual soil loss in tons per acre per year that should be permitted on a given soil.

stand—a growth of trees on a minimum of one acre of forest land that is at least 10 percent stocked by forest trees of any size.

standard metropolitan statistical area—a county or group of contiguous counties that contains at least one central city of 50,000 or more inhabitants or twin cities with a combined population of at least 50,000. In addition to the county or counties containing such a city or cities, contiguous counties are included in an SMSA if, according to certain criteria, they are essentially metropolitan in character and socially and economically integrated with the central city.

State, county, and municipal lands—lands owned by States, counties, and local public agencies or municipalities, or lands leased to these governmental units for 50 years or more.

stocking—a measure of the degree to which forest land is occupied by trees of specified classes in relation to a specified basal area standard for trees 5.0 inches d.b.h. and larger, or numbers of trees per acre for trees less than 5.0 inches; tree classes include (1) all live trees, (2) growing-stock trees, and (3) desirable trees. Classifications of forest land and forest types are based on stocking of all live trees. Classifications of condition classes is based on stocking of desirable trees.

streambank erosion—destruction of land areas by active cutting of streambanks.

sustained yield—the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the national forests without impairment of the productivity of the land.

total area—the solid portion of the earth's surface plus rivers, lakes, and embayments.

total land area—the solid portion of the earth's surface excluding all bodies of water, rivers, and streams.

urban and built-up areas—(CNI) includes (a) cities, villages, and built-up areas of more than 10 acres; (b) industrial sites (except strip mines, borrow and gravel pits), railroad yards, cemeteries, airports, golf courses, shooting ranges, and so forth; (c) institutional and public administration sites and similar types of areas, and road and railroad acreage where such acreages are significant. Farmland acreage inside the city and village limits will be excluded under this category.

watershed planning—formulation of a plan to use and treat water and land resources.

watershed protection and flood prevention projects—a system of land measures or soil conservation practices combined with structural measures installed to improve infiltration and reduce erosion or land within a drainage basin and to protect lands from floods.

wind strip cropping—the production of crops in relatively narrow strips placed perpendicular to the direction of prevailing winds.

zoning—a means by which governmental authority is used to promote the proper use of land under certain circumstances. This power traditionally resides in the State and the power to regulate land uses by zoning is usually delegated to minor units of government, such as towns, municipalities, and counties, through an enabling act that specifies powers granted and the conditions under which these are to be exercised.

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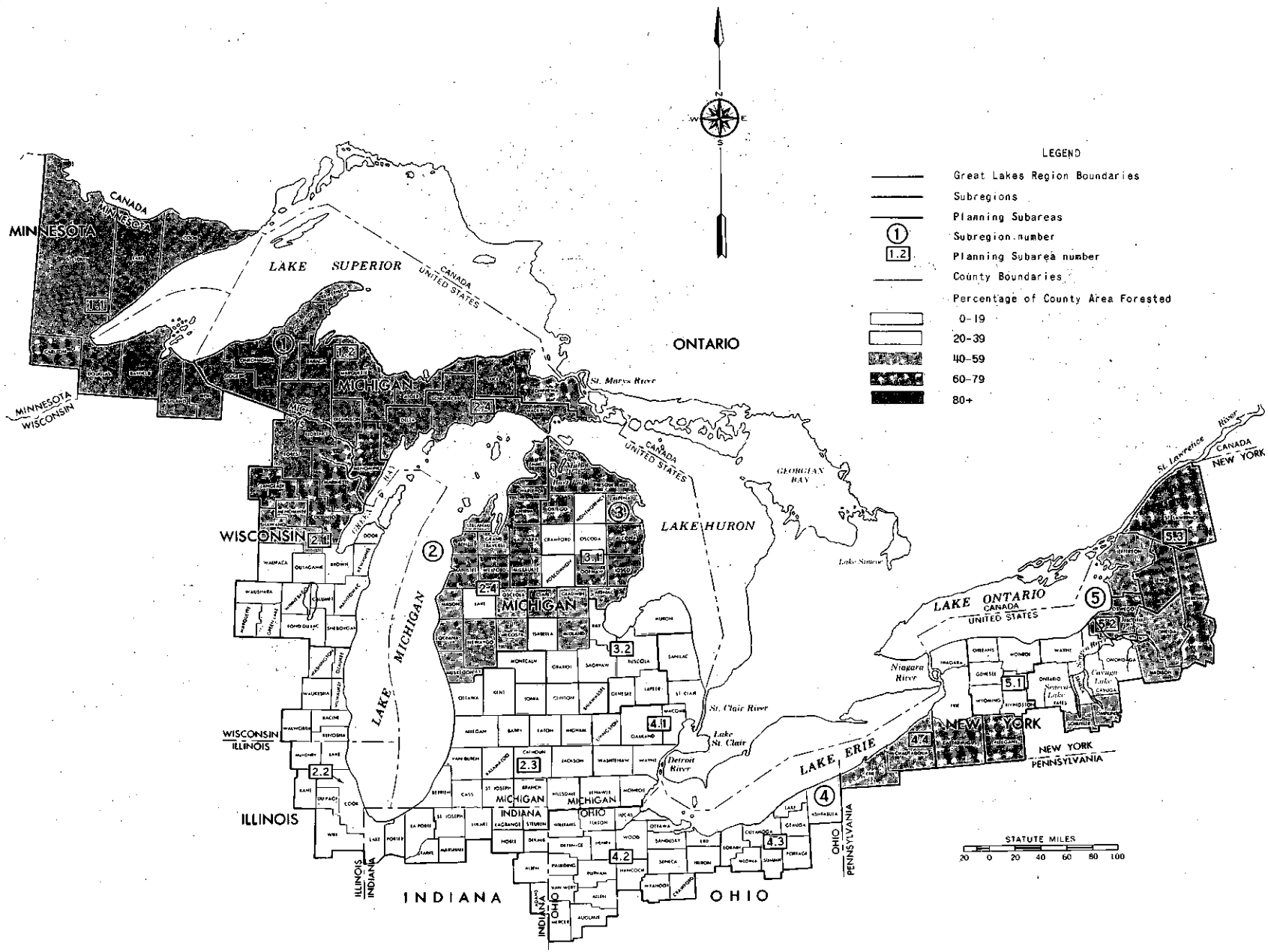

FIGURE 13–9c Forest Areas as Percent of Total County Land Area, Great Lakes Region

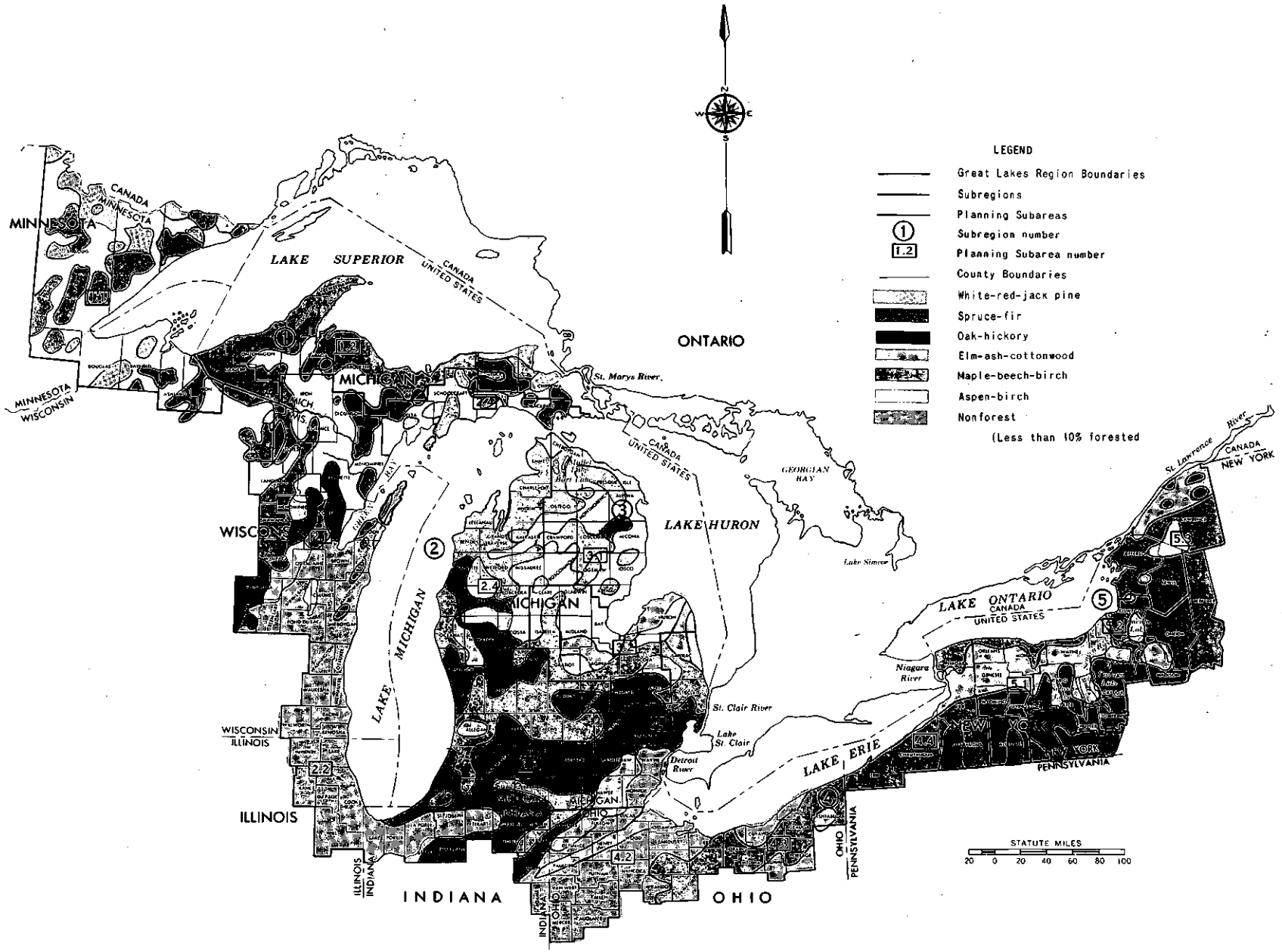

FIGURE 13–10c Major Forest Types

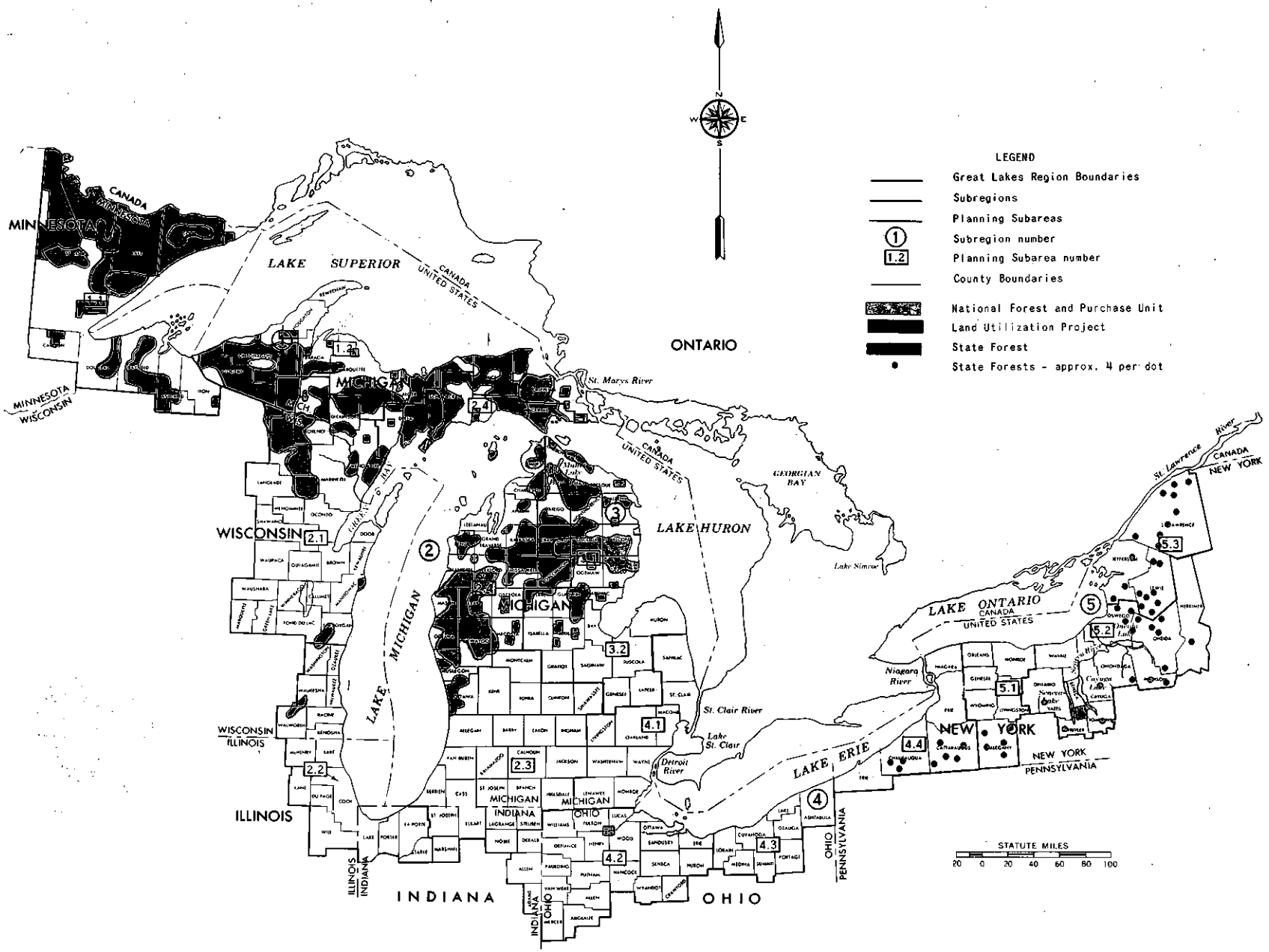

FIGURE 13–12c National Forest and State Forest Areas

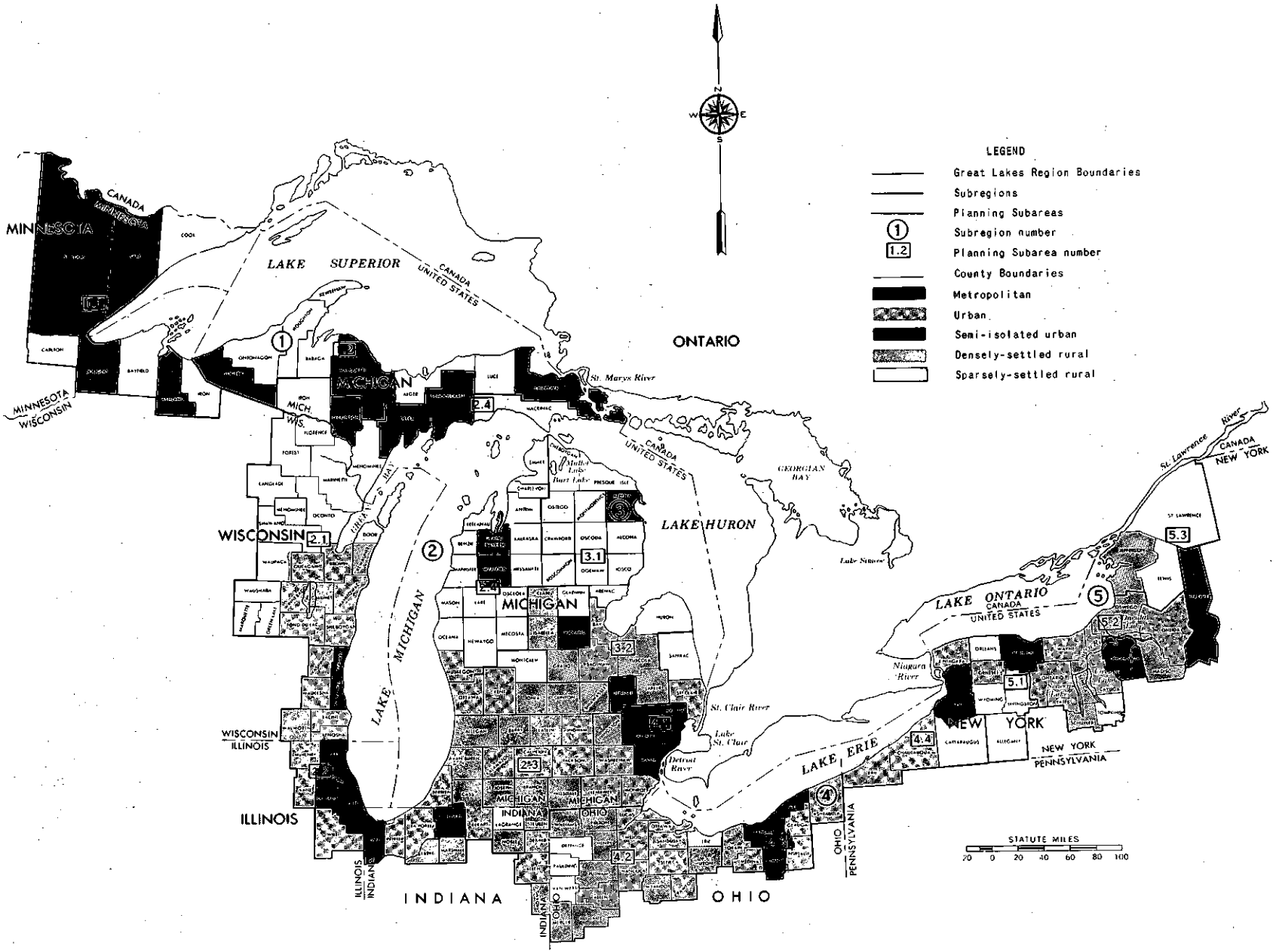

FIGURE 13–13c Urban Orientation of Counties, 1960

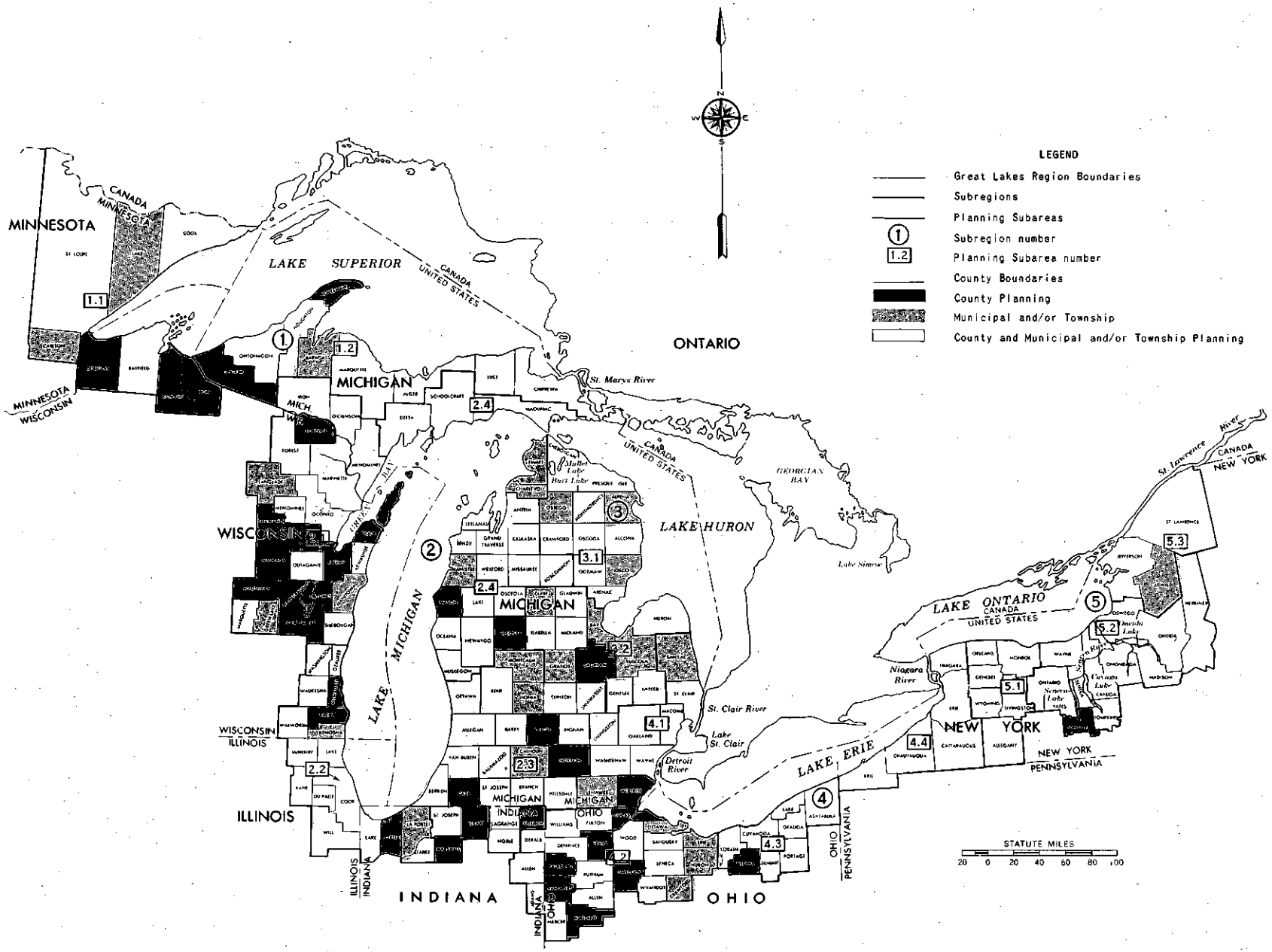

FIGURE 13–27c Areas Receiving Comprehensive Planning (701) Assistance, 1970–1971

GREAT LAKES BASIN FRAMEWORK STUDY - APPENDIX 13

AUTHOR

TITLE GREAT LAKES BASIN FRAME-WORK STUDY - APPENDIX 13

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