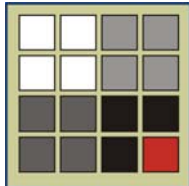


Social and Economic Assessment for Michigan's State Forests

**Prepared for: Michigan Department of Natural Resources
Forest, Mineral, and Fire Management Division**

Lansing, Michigan

September 5, 2006



**Prepared by:
Tessa Systems, LLC
East Lansing, MI**

Preface

Public Act 125 of 2004, Section 52505, requires the Michigan Department of Natural Resources (MiDNR) to seek and maintain third-party sustainable forestry certification. Forest certification requires that MiDNR forest management plans take into consideration social and economic parameters that affect future forest management operations. Currently, the MiDNR is preparing a statewide forest management plan, and each of three eco-teams are drafting ecoregional management plans. The social and economic information provided in this report will be used to assess current social and economic conditions and to develop future management directions within each of the plans.

The report focuses primarily on three ecoregions: the Western Upper Peninsula, Eastern Upper Peninsula, and Northern Lower Peninsula as defined by the MiDNR along county boundaries. It covers social and economic conditions within these ecoregions in aggregate and on a county-level basis. As a result data for the areas in and around Michigan state forests are highlighted.

The “Social and Economic Assessment for the Michigan National Forests” (July 25, 2003), by Larry Leefers, Karen Potter-Witter, and Maureen McDonough from Michigan State University, provides a general model for this report.

The assessment report is based on secondary data. No primary data collection was done. MiDNR personnel provided unpublished data from MiDNR records. The report presents analyses of existing data and discusses relationships and trends in the variables of interest, and contains some projections based on existing literature.

The authors would like to especially acknowledge Lawrence Pedersen and Thomas Haxby of the MiDNR for their cooperation and assistance in this project. We greatly appreciate the assistance of many individuals throughout the MiDNR who provided specific data: Jason Bau, Rick Bresnahan, Steve DeBrabander, Bob DeVilles, Lisa Dygert, Brian Frawley, Tom Hoan, Mike Koss, Susan Krusik, Lt. Tom Lennox, Mark MacKay, Pat Murley, David Price, Jim Radabaugh, Brandon Reed, William Schmidt, Jason Stephens, Anna Sylvester, Ada Takacs, and Eleanora Wehrwein.

All omissions and errors are the sole responsibility of the Authors.

This report was prepared by:

J. Michael Vasievich

Tessa Systems, LLC
mvasie@tessasys.com

and

Larry A. Leefers

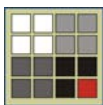
Michigan State University
leefers@msu.edu

September 5, 2006

Citations: (primary report and appendix)

Tessa Systems, LLC. 2006. Social and Economic Assessment for Michigan’s State Forests. A report prepared for the Michigan Department of Natural Resources, Forest, Mineral, and Fire Management Division, Lansing, Michigan. East Lansing, MI: Tessa Systems, LLC. 153 p.

Tessa Systems, LLC. 2006. Social and Economic Assessment for Michigan’s State Forests: Appendix. A report prepared for the Michigan Department of Natural Resources, Forest, Mineral, and Fire Management Division, Lansing, Michigan. East Lansing, MI: Tessa Systems, LLC. 152 p.



Tessa Systems, LLC
1950 Wembley Way
East Lansing, MI 48823

Table of Contents

Preface	i
Table of Contents	ii
Chapter 1. Introduction	1
Historical Context	1
Purpose	2
Scope.....	2
Figure 1.1. MiDNR ecoregion boundaries and associated counties (Source: MiDNR)	3
Figure 1.2. MiDNR ecoregions, Forest Management Units and county ecoregion aggregations for the social and economic assessment (Source: MiDNR)	3
Table 1.1. Michigan ecoregion counties (Source: MiDNR)	3
Table 1.2. Total land, MiDNR, and state forest area by ecoregion (Source: MiDNR)	4
Approach	4
Literature Cited	5
Chapter 2. Demographic Patterns and Trends in Michigan	6
Introduction	6
Population Trends	6
Total population and Population change.....	6
Table 2.1. Total population in the United States, Michigan, and ecoregion areas (1980, 1990, and 2000) and percentage change in population.....	7
Figure 2.1. Total population, Michigan and ecoregions, 1790-2000.....	8
Figure 2.2a. Ten-year population change (counts), 1980 to 1990	9
Figure 2.2b. Ten-year population change (percent), 1980 to 1990	9
Figure 2.2c. Ten-year population change (counts), 1990 to 2000	9
Figure 2.2d. Ten-year population change (percent), 1990 to 2000	9
Figure 2.3. Population change by county, 1980-1990 and 1990-2000.....	10
Population densities	10
Table 2.2. Total population, land area, and population density in the United States, Michigan, the Western Upper Peninsula, the Eastern Upper Peninsula, and the Northern Lower Peninsula, 2000.	10
Figure 2.4. Population density by county, 1980 and 2000 (persons per square mile.).....	11
Proximity of population to state forests	11
Table 2.3. Estimate of population near state forest lands for 2000.	11
Components of population change.....	12
Table 2.4. Births, deaths and, net migration by ecoregion, 1990-1999	13
Population age, structure, sex and dependency	13
Table 2.5. Population by sex and total for ecoregions, Michigan and the United States.....	13

Figure 2.5. Age cohorts, in percent, by sex in Michigan and ecoregions, 2000	14
Ethnic/racial composition.....	14
Table 2.6. Racial and ethnic composition of population by impact area, 1980, 1990, and 2000.	15
Figure 2.6. Percent of minority (non-white) and Hispanic population by county in Michigan, 2000	16
Educational achievement	17
Housing.....	17
Housing units and seasonal homes	17
Figure 2.7. Total population, housing units, and housing units per person, by minor civil division, 2000	18
Table 2.7. Total housing units by Michigan and ecoregion, 1990 and 2000.....	19
Figure 2.8. Seasonal homes as a percent of housing units, 2000.....	20
Selected studies on fragmentation and parcelization of land.....	20
References	22
Chapter 3. MI DNR Relationships with Communities.....	23
Introduction.....	23
Communities of interest.....	23
Table 3.1. MiDNR-identified communities of interest by category.	24
Acceptance of perceived natural resource changes	24
Perceptions of the importance of natural resources.....	24
Table 3.2. Distribution of DNR-issued citations by ecoregion and statewide by type, 2004.....	25
Perceptions of change.....	25
Figure 3.1. Percent of respondents who feel each characteristic of the EUP has changed over the past five years (Source: Peterson 1999).	26
Figure 3.2. Percent of respondents who support given strategies for the future of the EUP (Source: Peterson 1999).....	27
Community capacity and well being.....	27
Table 3.3. Community capacity and well being measures for ecoregion counties, 2000.....	28
Institutional and other relationships.....	30
Tribal governments.....	30
Figure 3.3. Federally recognized Tribes in Michigan.	31
Figure 3.4. Treaty cessions in Michigan, 1795-1842.	31
Public participation/partnerships/volunteers.....	31
Table 3.4. Groups of organizations involved in Michigan DNR volunteer and partnership activities (self reported).....	32
Table 3.5. Summary of volunteer activity by program area and hours, Jan.1 –Oct. 8, 2004 (self reported).33	
Table 3.6. Number of State Forest acres "Adopted" by interested groups (self reported).	33
Table 3.7. Number of forest dump sites tracked by Michigan DNR.....	34
Table 3.8. Volunteer Forest Dumpsite Cleanup Activities, 1991-2005.	34
Table 3.9. Project Learning Tree (PLT) Workshops conducted by DNR staff, 2003 to 2005.....	35

Land Use, Planning, and Policy	35
Major federal statutes	35
Table 3.10. Major federal statutes affecting national forest management.....	35
Major state statutes	36
Table 3.11. State statutes affecting state forest planning.....	36
Major local planning and zoning statutes	37
Table 3.12. Principal local planning and zoning statutes affecting state forest planning.....	37
Table 3.13. Master plans and zoning ordinances by county and ecoregion.....	37
References	39
Chapter 4. Economic Vitality and Natural Resource Dependence	41
Introduction.....	41
Number of Establishments	41
Table 4.1. Number of establishments, for selected economic sectors by ecoregion, 2005.....	42
Table 4.2. Total wages (million \$) for selected economic sectors by ecoregion, 2005.	43
Table 4.3. Average weekly wages, for selected economic sectors by ecoregion, 2005.....	44
Employment by sector.....	45
Table 4.4. Average annual employment, for selected economic sectors by ecoregion, 2005.....	45
Figure 4.1. Employment by ecoregion, 1990 to 2005	46
Figure 4.2. Unemployment rate by ecoregion and Michigan, 1990 to 2005	47
Figure 4.3. Unemployment rate by county, 2000 and 2005.....	47
Employment Seasonality.....	48
Figure 4.4. Average monthly unemployment rate by ecoregion, 1990 – 2005.	48
Figure 4.5. Variation in unemployment rate by county for 2000 and 2005.	49
Forest-related economic activities.....	49
Timber and wood products.....	49
Table 4.5. Employment and firms in the forest products industries by county and ecoregion, 2005.	50
Recreation and Tourism.....	50
Table 4.6. Tourism-related spending by segment and ecoregion, 1995, 1997, and 2000.	51
Figure 4.6. Tourism-related spending and state market share by county, 2000.....	52
Figure 4.7. Change and percent change in tourism spending, by county, 1997 to 2000.	52
Minerals, oil and gas	53
Government Activities.....	53
DNR Employment.....	53
Figure 4.8. Number of MiDNR employees by ecoregion, 1995 – 2005. Note: Mecosta County data not included.	54
Figure 4.9. Percent of full-time MiDNR employees by ecoregion, 1995 – 2005. Note: Mecosta County data not included.	54
Payments in Lieu of Taxes (PILT).....	54

Table 4.7. MI DNR payments to counties in lieu of taxes by ecoregion, 1999-2004.....	55
Regional economic well-being.....	55
Household and per capita income.....	55
Table 4.8. Households and household income by ecoregion, 2000.....	56
Figure 4.10. Median household income by county and ecoregion, 2000.....	57
Figure 4.11. Per capita personal income trends by county and ecoregion, 1970-2004.....	58
Table 4.9. Household with earnings and income sources by county and ecoregion, 2000.....	59
Housing Characteristics and values.....	59
Table 4.11. Housing units and median value by county and ecoregion, 2000.....	60
Land values from selected studies and MI DNR data (acquisition/disposal).....	60
Table 4.12. Value of undeveloped, non-agricultural land by region, 2003 - 2005.....	60
Table 4.13. Recent purchases of forestland parcels by the MiDNR.....	60
Figure 4.12. Per acre price for undeveloped parcels sold in Wexford County, 2000-01 (Source: Leefers and White 2003).....	61
Natural resource dependency.....	61
Figure 4.13. Percent of total county earnings (dependency measure) from wildland-based industries, 1990 Source: E. Schuster, USDA-Forest Service, unpublished data, 1993.....	62
Table 4.14. Percent of total county earnings (dependency measure) from forest products industries, 1996	62
References.....	63
5. Natural Resources Production.....	64
Introduction.....	64
Table 5.1. Top twenty states in terms of timberland area (thousand acres) in 2002.....	64
Table 5.2. Trends in Michigan timberland area and ownership, 1953 to 2002.....	64
Land use.....	65
Figure 5.1. Distribution of land cover in the Upper Peninsula, 2000.....	66
Figure 5.2. Distribution of land cover in the Lower Peninsula, 1980 and 2000.....	67
Table 5.3. Percent of ecoregions by land cover, 1980 and 2000.....	67
Table 5.4. Counties by ecoregion with greater than 5% change in forest area from 1980 to 2000.....	69
Figure 5.3. Change in forest cover from 1980 to 2000 by county.....	69
Forest area, type, distribution and ownership.....	69
Table 5.5. Forest area (thousand acres) by land class for all owner groups, by ecoregion, 1980, 1993, and 2004.....	70
Table 5.6. Forest area (thousand acres) by land class for State ownership, by ecoregion, 1980, 1993, and 2004.....	71
Figure 5.4. Distribution of State-owned timberlands as determined by the USDA-Forest Service Inventory, 2000-2004.....	72
Timberland area by forest type.....	72
Figure 5.5. Timberland area by softwood forest types for all owners, 1980, 1993, and 2004.....	73

Figure 5.6. Timberland area by hardwood forest types for all owners, 1980, 1993, and 2004.....	74
Figure 5.7. Timberland area by softwood forest types for State ownership, 1980, 1993, and 2004.	74
Figure 5.8. Timberland area by hardwood forest types for State ownership, 1980, 1993, and 2004.....	75
Figure 5.9. Timberland area by hardwood forest type and ecoregion, all owners, 2004.....	76
Figure 5.10. Timberland area by softwood forest type and ecoregion, all owners, 2004.	76
Figure 5.11. Timberland area by hardwood forest type and ecoregion, State ownership, 2004.	77
Figure 5.12. Timberland area by softwood forest type and ecoregion, State ownership, 2004.....	77
Volume of growing stock trees	77
Figure 5.13. Total growing stock volume and volume per acre for all forest types on State-owned timberlands, 2004.....	78
Table 5.7. Volume of all growing stock trees (million cubic feet) on timberland, all owners and State ownership, by forest type and ecoregion, 2004.	78
Growth	79
Table 5.8. Average net annual growth (million cubic feet) on timberland, all owners and State ownership, by forest type group and ecoregion, 2004.....	79
Removals.....	80
Table 5.9. Average annual removals of merchantable volume (million cubic feet) from growing stock trees on timberland, all owners and State ownership, by forest type and ecoregion, 2004.	80
Figure 5.14. Percent of timberland, volume, growth, and removals from State lands by forest type, 2004.	81
Timber production.....	81
Figure 5.15. Pulpwood production (thousand cords) from all lands by ecoregion, 1980 to 2004.....	82
Figure 5.16. Pulpwood production from all lands, by species group, Western Upper Peninsula, 1980 – 2004.	83
Figure 5.17. Pulpwood production from all lands, by species group, Eastern Upper Peninsula, 1980 – 2004.	83
Figure 5.18. Pulpwood production from all lands, by species group, Northern Lower Peninsula, 1980 – 2003.	84
Table 5.10. Distribution of pulpwood production (thousand cords) by species and ecoregion, 2004.	84
Table 5.11. Distribution of sawlog production (MBF) by species and ecoregion, 1998.....	85
Figure 5.19. Pulpwood production (thousand cords) by species and ecoregion, 2003.	86
Figure 5.20. Sawlog production (MBF) by species and ecoregion, 1998.	87
Michigan DNR timber volume and value.....	87
Figure 5.21. Volume of pulpwood for selected species groups sold from DNR lands by ecoregion, 1986 - 2005.	88
Figure 5.22. Volume of sawlogs sold from DNR lands for selected species by ecoregion, 1986 -2005.	89
Table 5.12. Volume of timber products (cords) sold from all DNR lands, by species group, 1986 to 2005. 90	
Figure 5.23. Trend in total revenue for DNR timber sales from State Forests, 1986 – 2005.	91
Table 5.13. Value of timber products (thousand dollars) sold from all DNR lands, by species group, 1986 to 2005.	91

Table 5.14. Average bid (\$/cord) for timber products sold from all DNR lands, by species group, 1986 to 2005.	92
Figure 5.24. Real price trends (adjusted for inflation) for selected pulpwood timber products by region, 1986 to 2005.	94
Figure 5.25. Real price trends (adjusted for inflation) for selected sawlog timber products by region, 1986 to 2005.	95
Mineral, oil and gas extraction.....	96
Oil and Gas.....	96
Figure 5.26. Distribution of oil and gas wells in Michigan.	96
Table 5.15. Area (thousand acres) of State-owned land, by ownership rights and ecoregion	97
Table 5.16. Michigan oil production (thousand barrels, including natural gas liquids and condensate) on all lands, by ecoregion, 1990 to 2005.	97
Table 5.17. Michigan gas production (million cubic feet) on all lands, by ecoregion, 1990 to 2005.....	98
Table 5.18. Distribution of Michigan lands and oil and gas wells by ecoregion, 2005.....	98
Minerals	98
Table 5.19. Mineral occurrences by commodity group, development status, and ecoregion.....	99
Figure 5.27. Distribution of metallic mineral occurrences in Michigan.	100
Figure 5.28. Distribution of nonmetallic mineral occurrences in Michigan.....	100
Water Resources.....	100
Table 5.20. Distribution of major watersheds and percent land area coverage by ecoregion, 2000.....	101
Figure 5.29. Hydrologic unit (watershed) boundaries in Michigan by ecoregion.	102
Figure 5.30. Groundwater, surface water, and total water use by county, 2000.	103
Figure 5.31. Per capita water use in Michigan, by county, 2000.	104
Table 5.21. Public water supply by ecoregion from ground and surface water, 2000.	105
Table 5.22. Per-capita water use and per-acre withdrawals from ground and surface water, by ecoregion, 2000.	105
Special forest products.....	105
Captive Cervids	105
Table 5.23. Number of captive privately-owned cervid facilities in Michigan by type of registration, 2004.	106
Figure 5.32. Number of active captive privately-owned cervid facilities inspected in 2004. (from O'Brien et al., 2005, p 94)	106
Figure 5.33. Distribution of captive privately-owned cervid facilities by Michigan DNR Wildlife Management Unit, 2004.	107
Table 5.24. Number of captive privately-owned cervid facilities in Michigan by Wildlife Management Unit, 2004.	107
References	108
Chapter 6: Outdoor Recreation Uses and Values.....	110
Introduction.....	110
Settings for Outdoor Recreation.....	110
Figure 6.1. Public lands in Michigan.	111

Table 6.1. Public lands in Michigan ^a	111
Table 6.2. Major forestland owners enrolled in Michigan's Commercial Forest Program.	112
Figure 6.2. Commercial Forest Program lands in northern Michigan, 2005.	112
Special areas and designations	113
Recreation Opportunity Spectrum (ROS) areas.....	113
Figure 6.3. Recreation Opportunity Spectrum setting and experience characterization.	113
Table 6.3. Recreation Opportunity Spectrum areas proposed in 2006 Michigan National Forest Plans. ..	114
Wilderness and Wild Areas	114
Table 6.4. Natural areas in Michigan protected by the National Wilderness Preservation System.....	114
Natural Rivers and Wild and Scenic Rivers	115
Figure 6.4. Wild and Scenic Rivers and Natural Rivers in Michigan.....	116
Designated trails.....	116
Table 6.5. Michigan state pathways by Ecoregion.....	116
Table 6.6. Miles of Trails and Pathways by Provider, 2006.....	117
Natural Beauty Roads and Heritage Routes	117
Campgrounds and other special areas and designations.....	118
Table 6.7. Michigan state forest campgrounds by Ecoregion.	118
Table 6.8. Michigan state parks by Ecoregion.	119
Figure 6.5. Public and private campgrounds in northern Michigan (Source: Leefers and Vasievich 2001).	120
Table 6.9. Campsites by ecoregion, 2000.	120
Recreation facilities	121
Table 6.10. Natural resources and recreation/travel facilities by ecoregion.	121
State and national trends in recreation activities.....	121
Table 6.11. Projections for change in the U.S. population and selected recreation visits for the region (North Region), adjusted to 2000 = 100.....	121
Access to outdoor recreation (including transportation and traffic counts)	123
Recreation activities and participation on state and national forests	124
Table 6.12. Site visit length of stay (in hours) from the National Visitor Use Monitoring (NVUM) Program, by Michigan national forest.	124
Table 6.13. Top five primary recreation activities (and percent) from the National Visitor Use Monitoring (NVUM) Program, by national forest.....	124
Water access.....	125
Recreational trails.....	125
Figure 6.6. MiDNR snowmobile and ORV license sales (in thousands), 1998-2004.	126
State forest campgrounds	127
Figure 6.7. Camper days at state forest campgrounds by ecoregion for regular and senior campers, FY 2000-05.	127
Table 6.14. Camper days in cabins and group areas by ecoregion, FY 2002-05.	127

Figure 6.8. Fee structure at private and public campgrounds, ca. 2000 (Source: Leefers and Vasievich 2001).	128
Figure 6.9. Fee structure at public campgrounds, ca. 2000 (Source: Leefers and Vasievich 2001).	129
Hunting, fishing, trapping, and other dispersed recreation	129
Table 6.15. License sales for selected hunting and trapping species, 1997-2004.	130
Figure 6.10. Number of paid hunting license holders in Michigan, 1995-2005 (Source: Frawley 2004 and MiDNR unpublished data).	130
Figure 6.11. Number of active firearm deer, small game, and waterfowl hunters (went afield) in Michigan, 1954-2005 (Source: Frawley 2004 and MiDNR unpublished data). Note: All available annual data presented.	131
Figure 6.12. Number of active spring turkey, fall turkey, and bear hunters (went afield) in Michigan, 1968-2005 (Source: Frawley 2004 and MiDNR unpublished data).	131
Figure 6.13. Number of active furtakers (went afield) that trapped or hunted furbearers in Michigan, 1957-2004 (Source: Frawley 2004 and MiDNR unpublished data).	132
Table 6.16. Participation in outdoor activities by segment in the eastern Upper Peninsula and northern Wisconsin.	133
Spending Profiles for Forest-Based Recreation Visitors	134
Table 6.17. Average per person national forest trip expenditures within 50 miles of recreation site, Hiawatha National Forest.	135
Economic Impacts of Forest-Based Recreation Visitors	135
References	137
Chapter 7. Other Forest Uses and Values	140
Introduction	140
Existing historic buildings and archaeological sites	140
Table 7.1. Number of existing historic buildings and archaeological sites by ecoregion	140
Native American cultural sites	141
Special sites	141
Table 7.2. Special places near the Black River and in the Upper Peninsula (Schroeder 2002)	141
Benefits associated with gathering special forest products	142
Passive use values	142
Figure 7.1. Biological diversity areas in the Western Upper Peninsula	144
Figure 7.2. Biological diversity areas in the Eastern Upper Peninsula	145
Figure 7.3. Biological diversity areas in the Northern Lower Peninsula	146
References	147
Chapter 8. Assessment Summary	148
Chapter 1. Introduction	148
Chapter 2. Demographic Patterns and Trends in Michigan	148
Chapter 3. MI DNR Relationships with Communities	149
Chapter 4. Economic Vitality and Natural Resource Dependence	149
Chapter 5. Natural Resources Production	150

Chapter 6. Outdoor Recreation Uses and Values.....	151
Chapter 7. Other forest uses and values.....	152
Data gaps and limitations	152

Chapter 1. Introduction

Historical Context

Natural resources have been a foundation of life in Michigan since post-glacial immigration into the region by early hunters and gatherers. Indigenous people used forest plants and animals in many ways; their cultures adapted to use forest resources over hundreds of generations (Cleland 1983, Dickmann and Leefers 2003). Indigenous societies in the upper Great Lakes cultivated crops, used fire as a management tool, and subsisted with hunting and gathering. There were about 15,000 indigenous people in what we now call Michigan by the time European explorers arrived in the early 1600s (Public Sector Consultants, Inc. 2002). At the time, the landscape was influenced by Algonquin tribes, especially through the use of fire (MiDNR 2006). Some of the first European immigrants were fur traders and missionaries, mostly from France. British and colonial immigrants, in time, supplanted the French, and the land and its riches became central to this migration. After the United States gained independence from Great Britain, the Northwest Territory including Michigan began to develop. Michigan was established as a territory in 1805. Surveying the area was essential for settlement, and the General Land Office began surveying in Lower Michigan in 1816 and in Upper Michigan in 1840. The survey was completed in 1856 (MiDNR 2006).

Statehood was achieved in 1837, and exploitation of natural resources became commonplace for the remainder of the century. Resource extraction from the region has a long history: the first lumber from Michigan's pineries was shipped to eastern markets in 1836; oil was found in Macomb County in the 1830s; and copper and iron ore were discovered in Upper Michigan in the 1840s (Public Sector Consultants, Inc. 2002). The workers and infrastructure needed to extract these resources followed. During that period, cutover lands were settled and many were abandoned; fire ravaged large areas. By the beginning of the 20th century, conservation of natural resources became an important social movement due to the rampant exploitation occurring and the efforts of early conservation leaders. Michigan's first state forest reserves, Reserves No. 1 and No. 2, were created in Roscommon and Crawford Counties in 1903; federal forest reserves followed soon thereafter.

Now, state forests have been part of the Michigan's forested landscape for over a century. Use of the forest and forest resources evolved. Market hunting was supplanted by recreational hunting. Many abandoned lands became public forests. Fire suppression, with a strong boost from the Civilian Conservation Corps, became the norm, and forest management expanded to encompass multiple uses of the forests (MiDNR 2006).

Growth of national forest ownership was concurrent with expansion of the state forests. The Michigan National Forest was established in 1909 in an area near the first state forest reserves; it was expanded and renamed the Huron National Forest in 1928. The Marquette National Forest in the eastern Upper Michigan also was created in 1909, and the Hiawatha and Ottawa National Forests were established in 1931 when the federal government began purchasing mostly cutover lands—the Marquette was consolidated with the Hiawatha. The Manistee was created in 1938 and combined with the Huron in 1945.

The modest start for state forests in 1903 has greatly expanded, especially with land purchases during and shortly after the Great Depression. The cutover, sandy pine lands were the beginning for both state and federal forest landholdings that now cover over 6 million acres in Michigan. The MiDNR lands are well known for their diverse wildlife habitats, protected scenic and natural areas, excellent recreational opportunities, and role in supporting Michigan's forest products industries. This mixed, multiple-use approach is the hallmark of American and Michigan forestry. It also provides the basis for pursuing different societal goals which are fashioned by dynamic social and economic factors.

The MiDNR's Western Upper Peninsula, Eastern Upper Peninsula, and Northern Lower Peninsula Eco-Teams are developing regional ecosystem management plans. Natural resource managers recognize the importance of understanding the social and economic context in which they operate. This social and economic assessment has been undertaken to facilitate plan development by providing a coordinated report of conditions and trends for all three Ecoregions.

Purpose

The purpose of this report is to assess ecoregional conditions from a social and economic perspective for the Western Upper Peninsula, Eastern Upper Peninsula, and Northern Lower Peninsula. In 2006, the MiDNR prepared a statewide forest management plan (MiDNR 2006), and each of the three established Eco-teams is in the process of drafting ecoregional management plans. The social and economic information provided by this report will be used to assess current conditions and in developing future management directions within each of the plans. Information regarding ecoregions in southern Lower Michigan are provided only in the summary of statewide data.

The principal focus is Michigan's state forests and adjacent impact areas surrounding state forests. The report provides a social and economic context for regional planning for the Michigan Department of Natural Resources. This report is a starting point for information and data compilation; it will be supplemented as new information and data become available.

Outcomes of the report will be (1) a social and economic context for ecoregions, (2) a better understanding of the relationship between public lands and communities and (3) an assemblage of information needed to evaluate trade-offs between options for future forest management.

Scope

Several considerations must be addressed when defining the scope of a social and economic assessment. First, there are broad-scale geographic concerns. For purposes of this assessment, the principal lands of interest are state forest lands within ecoregions in northern Michigan. Because comparisons between forest-level and state-level conditions and trends are desired, the geographic scope of the assessment encompasses the entire state of Michigan and also the ecoregions near the state forests. Ecoregional boundaries differ depending upon the ecological classification system and scale which is used. The MiDNR has differentiated five ecoregions: Western Upper Michigan (WUP), Eastern Upper Michigan (EUP), Northern Lower Michigan (NLP), Southwest Lower Michigan (SWLP), and Southeast Lower Michigan (SELP) (MiDNR 2006). The first three ecoregions are the focus in this report; taken together, these will be referred to as "northern Michigan." And combined, SWLP and SELP are called the Southern Lower Michigan (SLP). Second, social and economic data are often collected at different geographic scales (e.g., counties, minor civil divisions), and the boundaries do not perfectly coincide with ecological boundaries (Figure 1.1). The MiDNR selected the counties for inclusion in the ecoregional summaries developed for this report; they account for 45 of Michigan's 83 counties (Figure 1.2, Table 1.1). Moreover, due to the large number of possible comparisons, the MiDNR identified the most relevant variables for inclusion in this report. Only secondary data are used for economic and social variables.

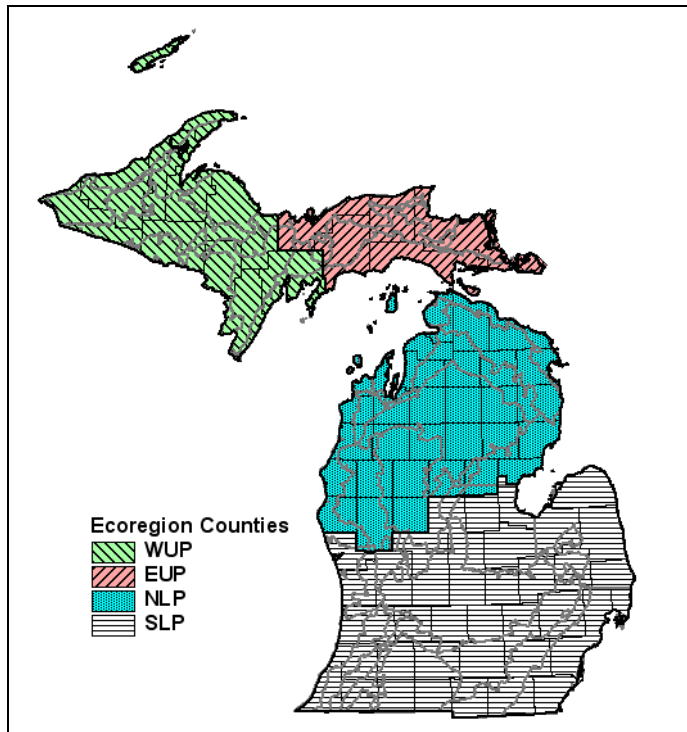


Figure 1.1. MiDNR ecoregion boundaries and associated counties (Source: MiDNR)

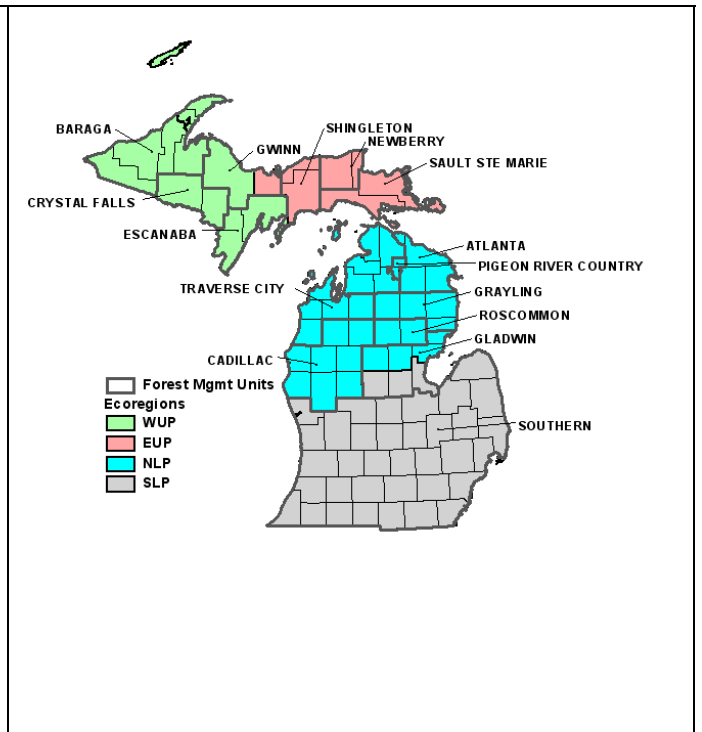


Figure 1.2. MiDNR ecoregions, Forest Management Units and county ecoregion aggregations for the social and economic assessment (Source: MiDNR)

Table 1.1. Michigan ecoregion counties (Source: MiDNR)

Western Upper Peninsula	Eastern Upper Peninsula	Northern Lower Peninsula	
Baraga	Alger	Alcona	Leelanau
Delta	Chippewa	Alpena	Manistee
Dickinson	Luce	Antrim	Mason
Gogebic	Mackinac	Arenac	Mecosta
Houghton	Schoolcraft	Benzie	Missaukee
Iron		Charlevoix	Montmorency
Keweenaw		Cheboygan	Newaygo
Marquette		Clare	Oceana
Menominee		Crawford	Ogemaw
Ontonagon		Emmet	Osceola
		Gladwin	Oscoda
		Grand Traverse	Otsego
		Iosco	Presque Isle
		Kalkaska	Roscommon
		Lake	Wexford

State forest lands are intermingled with private lands and communities within the ecoregions (Table 1.2). State forests account for 1 out of every 10 acres in Michigan, but they are much more concentrated in the EUP and NLP. State forest area is almost evenly split between the NLP and the Upper Peninsula (WUP and EUP).

Table 1.2. Total land, MiDNR, and state forest area by ecoregion (Source: MiDNR)

Ecoregion	Land Area	MiDNR Ownership	MiDNR Ownership	State Forests	State Forests	State Forests
	Acres (1000s)	Acres (1000s)	Percent of Area	Acres (1000s)	Percent of Area	Percent of MiDNR
Western Upper Peninsula	6,937	935	13.5	857	12.4	91.7
Eastern Upper Peninsula	3,572	1,103	30.9	1,054	29.5	95.6
Northern Lower Peninsula	10,359	2,063	19.9	1,981	19.1	96.0
Michigan	36,358	4,532	12.5	3,938	10.8	86.9

Note: Southern Lower Peninsula totals are included in Michigan totals. State forest area for Isabella and Midland counties are included in the Southern Lower Peninsula.

Approach

The MiDNR, using a process similar to one adopted by the Michigan national forests (Leefers et al. 2003), identified six broad categories of interest for the assessment:

- Demographic patterns and trends
- Relationships with communities
- Economic vitality and dependence
- Natural resources production and economic contributions
- Outdoor recreation
- Other forest uses and values

These categories are described briefly below and discussed in depth in Sections 2-7.

Category 1: Demographic patterns and trends. These factors (e.g., population attributes) address questions raised about the characteristics of people living near state forests and changes in this population over time. Resident and seasonal populations are included. In aggregate, these variables provide a context for ecoregional forest planning. “Lifestyle segments” may be derived from these data.

Category 2: Relationships with communities. Relationships between communities and ecoregions are identified through descriptions of formal and informal institutional relationships. Changes in community expectations from the forest and potential community conflicts related to these changes are addressed through demographic variables in Category 1 above as well as assessments of community perceptions of change. Land ownership patterns and the local land-use policy environment are addressed.

Category 3 Economic vitality and dependence. These variables provide the basic information for addressing the concerns related to economic sustainability. They provide a context for the economic well being of residents in the ecoregions directly affected by the state forests. In addition, economic measures of the role of the state forests are presented.

Category 4: Natural resources production and economic contributions. These variables relate to timber harvesting, mineral extraction and other commodities and the role of the state forests in sustainable production of other market goods. Physical and economic measures of this role are presented.

Category 5: Outdoor recreation. Outdoor recreation is clearly an important use of state forests including demand for specific activities, distribution of land, water and facilities available for activities.

Category 6: Other forest uses and values. "Other forest uses" include gathering of special forest products and conservation of traditional and/or sacred use sites.

Background information and data related to each of these categories are compiled and presented in separate sections of this report. Because counties are used as the building blocks for summarizing ecoregional information, standard data from the U.S. Census Bureau, the MiDNR, and other government agencies often can be summarized for the ecoregions. In many cases, data on communities, outdoor recreation, and other forest uses and values were derived from independent studies in areas proximate to the ecoregions. Scientists conducted these studies for varied purposes, and data are not always consistent across or available for all ecoregions. Additional data needs are presented in Section 8.

Literature Cited

- Cleland, C.E. 1983. Indians in a changing environment. In *The Great Lakes Forest*, edited by S.L. Flader, 83-95. Minneapolis: University of Minnesota Press.
- Dickmann, D.I. and L.A. Leefers. 2003. *The Forests of Michigan*. Ann Arbor: The University of Michigan Press. 297 p.
- Leefers, L., K. Potter-Witter, and M. McDonough. 2003. Social and economic assessment for the Michigan national forests. 244 p. Report submitted to Robert Brenner, James DiMaio, David Maercklein, and Fred P. Clark for the Michigan national forests on July 25, 2003.
- Michigan Department of Natural Resources (MiDNR). 2006. 2006 State Forest Management Plan. DRAFT Rev. 7/24/2006. Lansing, MI: Michigan Department of Natural Resources. 220 p.
- Public Sector Consultants, Inc. 2002. Michigan in brief: 2002-03. Lansing, MI: Public Sector Consultants, Inc.

Chapter 2. Demographic Patterns and Trends in Michigan

Introduction

Demographers use statistical data to study human populations, especially their size and density, distribution and vital statistics. The U.S. Department of Commerce's Census Bureau is the principal source of demographic data in the United States; the data is based on its decennial survey and supplementary surveys. Many of these data are available from the Census Bureau website (<http://www.census.gov/>). Other agencies, such as the U.S. Department of Labor's Bureau of Labor Statistics (BLS) and the U.S. Department of Commerce's Bureau of Economic Analysis (BEA), also collect data related to people's employment, industry characteristics and other economic activity. Special studies conducted by universities and consultants may provide regional or local data of interest, but generally are not as comprehensive as census data.

The purpose of this section is to examine various demographic patterns and trends related to the Michigan Department of Natural Resources' ecoregions and to the state forests of Michigan. These demographic factors include overall population, components of population change, age class distribution, sex, ethnicity, location, proximity to ecoregions and state forests, density, educational achievement, dependency, and housing (both permanent and seasonal). In total, demographic information for Michigan yields insights into the structure of the population and how it has changed. These changes, in turn, have implications for resource management.

The Michigan Society of Planning Officials published a series of 11 working papers in the mid-1990s as part of its Trend Future Project—one focused on demographic trends (Wyckoff and Reed 1995). Their analysis indicated that the most important population changes in recent decades were:

- Michigan's population growth has slowed.
- Areas on the fringe of Michigan's largest cities are increasing in population along with some rural areas in the northern Lower Peninsula (NLP).
- The population is aging.
- Households have increased, but household size has declined.
- Income levels have increased, but not as fast as poverty rates.
- Education levels have risen, but local and regional disparities exist.

Though these conclusions were based on 1990 and earlier census data, the 2000 Census supports the general findings. In this chapter, we supplement information on broad patterns or trends by providing further analysis of demographic conditions within the ecoregions and in close proximity to state forests. As a result, broad and local conditions relevant for resource management can be considered in ecoregional planning.

Population Trends

Total population and Population change

Michigan's population has increased at a fairly steady rate since achieving statehood in 1837 (Figure 2.1, Appendix Table A2.1). In 1840, there were just over 200,000 people; the population increased to almost 10 million people by 2000. Post-World War II population growth surged in Michigan with well over 1 million people added each decade for 1950-1970. The 1980 census showed a slowing of Michigan's growth, and by 1990 growth had almost stopped. The 2000 census reported a resurgence in population growth with an increase of over 640,000 people compared to the 1990 total. The SLP has almost 9 million of the 10 million Michigan residents. In recent decades, population growth has occurred in the NLP, but the EUP and WUP have been relatively stagnant in terms of population growth (Figure 2.2). The WUP was 2.4% of the state's population in 2000—the percentage has been declining for 90 years (Appendix Table A2.2). The NLP, in contrast, accounted for 7.5% of Michigan's population in 2000 and continues as a growth area.

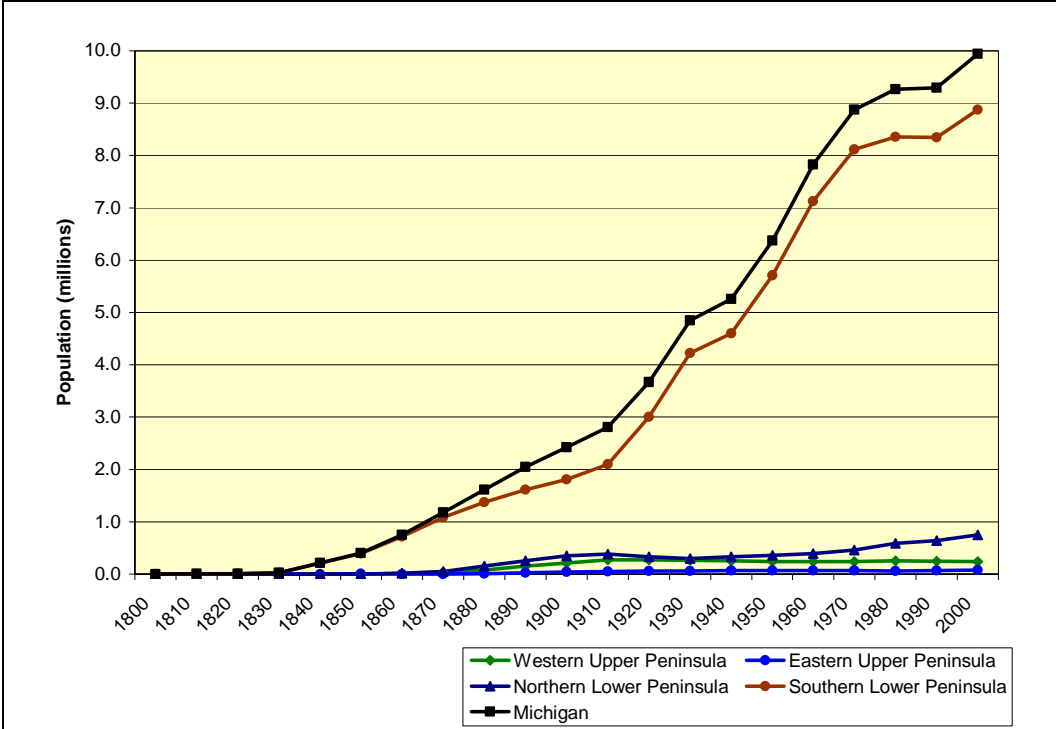
Population trends in the United States, Michigan, and in the ecoregions demonstrate a wide array of changes over the past three censuses. From 1980 to 2000, total U.S. resident population increased 24.2% (54.9 million people) due to steady natural population growth (births minus deaths) and positive net international migration (Table 2.1). Population growth in Michigan was much lower at 7.3% (676 thousand people). However, the NLP is growing slightly faster, in percentage terms, than the US, and the EUP is growing faster than the state. The WUP has experienced a population decline; there were 15,000 fewer people in 2000 than in 1980. The 1990 and 2000 census data show an increasing prison population. These population increases contribute to higher populations in northern Michigan. This is especially true for the EUP where prison population accounted for 9% of the total population in 2000.

Growth varied widely across Michigan (Figure 2.3). Population declines were most striking in Wayne County, the Flint-Saginaw-Bay City corridor, and in many WUP counties. The WUP experienced negative population growth from 1980-2000. Seven counties lost population from 1980-2000—Delta, Gogebic, Houghton, Iron, Marquette, Menominee, and Ontonagon counties. Dickinson County was the only WUP county to experience growth in both decades; overall population in the Michigan counties remained fairly constant from 1990-2000. The large decrease in Marquette County’s population from 1990-2000 was due, in part, to the 1995 closing of K.I. Sawyer Air Force Base. All counties in the EUP experienced population growth during the 1990-2000 period, though the total population was still below 80,000. Mackinac and Chippewa counties led the population growth in the EUP.

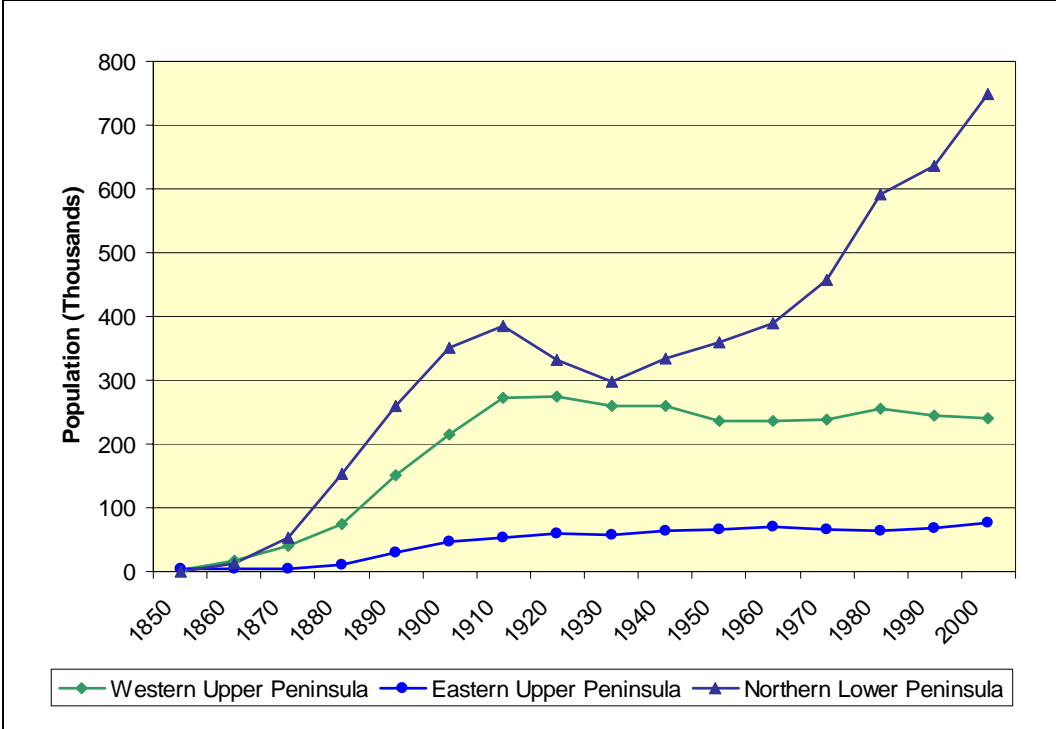
Table 2.1. Total population in the United States, Michigan, and ecoregion areas (1980, 1990, and 2000) and percentage change in population.

Impact area	Total population			Population change		
	1980	1990	2000	1980-1990	1990-2000	1980-2000
	thousands			thousands / percent		
Western Upper Peninsula	256.1	245.6	241.3	-10.5 -4.1%	-4.3 -1.7%	-14.8 -5.8%
Eastern Upper Peninsula	63.7	68.3	76.3	4.6 7.3%	8.0 11.7%	12.6 19.8%
Northern Lower Peninsula	718.3	766.8	896.0	48.5 6.8%	129.2 16.8%	177.7 24.7%
Michigan	9,262.1	9,295.3	9,938.4	33.2 0.4%	643.1 6.9%	676.4 7.3%
United States	226,545.8	248,709.9	281,421.9	22,164.1 9.8%	32,712.0 13.2%	54,876.1 24.2%

Data Source: Census, 1980 - 2000



Source: Census, 1790 – 2000



Source: Census, 1790 – 2000

Figure 2.1. Total population, Michigan and ecoregions, 1790-2000

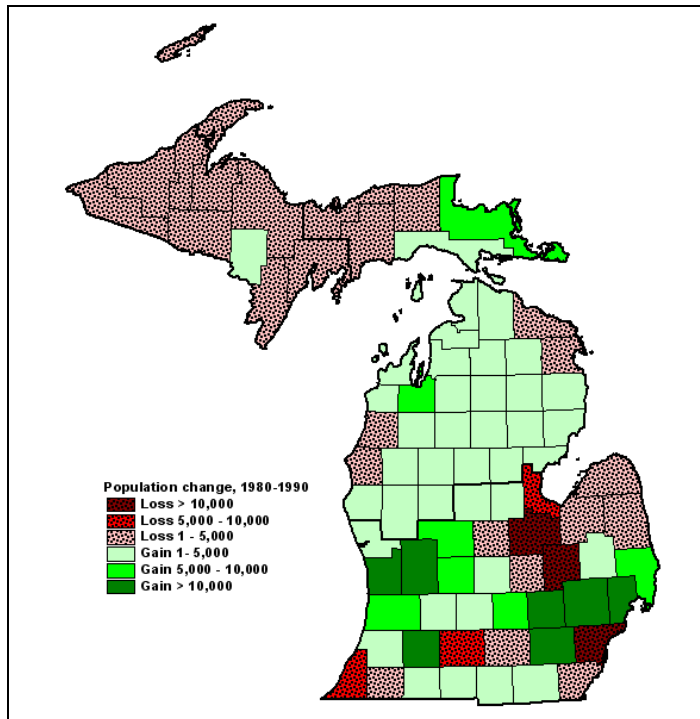


Figure 2.2a. Ten-year population change (counts), 1980 to 1990

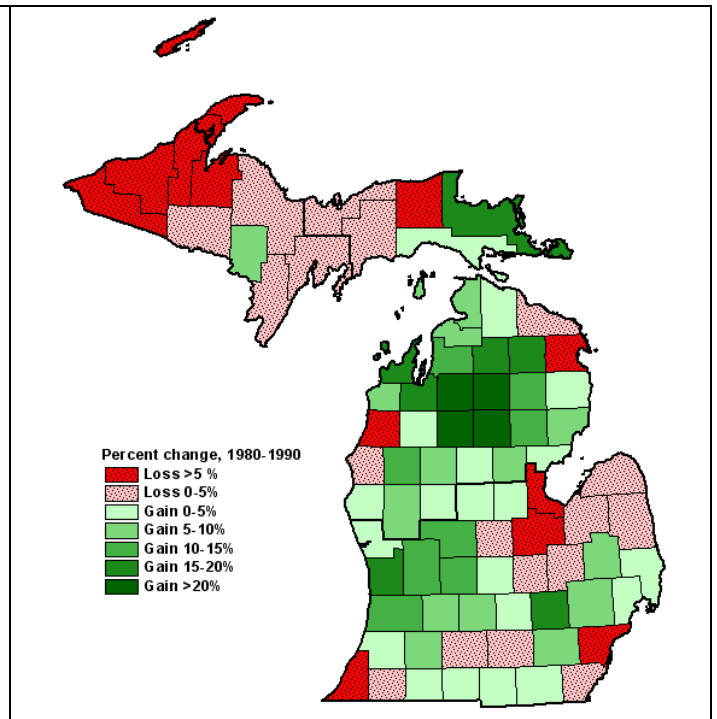
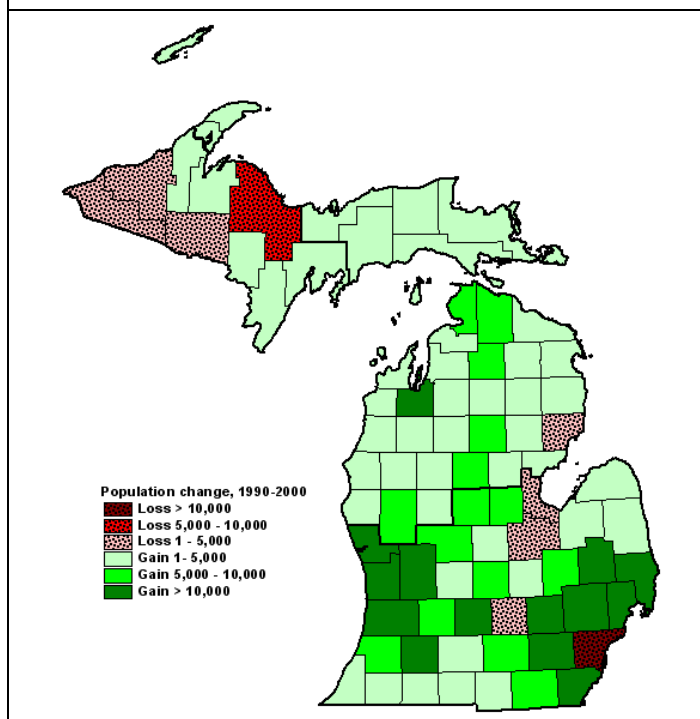


Figure 2.2b. Ten-year population change (percent), 1980 to 1990



Data Source: US Census, 1980 - 2000

Figure 2.2c. Ten-year population change (counts), 1990 to 2000

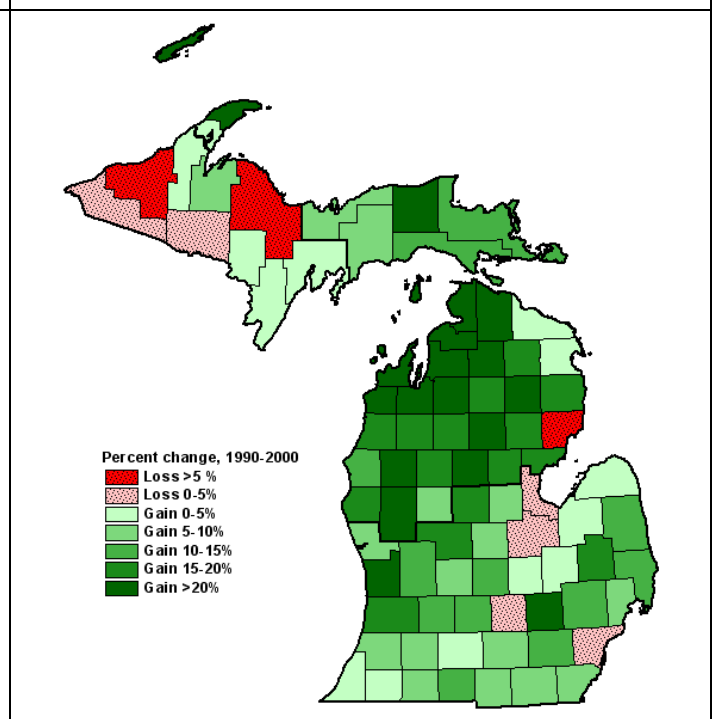


Figure 2.2d. Ten-year population change (percent), 1990 to 2000

Data Source: US Census, 1980 - 2000

Figure 2.3. Population change by county, 1980-1990 and 1990-2000.

Double digit percentage population growth is most notable in the NLP. Increases were greatest in the central NLP along the I-75 corridor—Roscommon, Crawford, and Otsego counties increased over 50% during the 1980-2000 period. The Frankfort-Traverse City-Petosky-Cheboygan areas also showed significant growth. Iosco County was the only NLP county that had negative growth from 1990 to 2000. This was due largely to closure of the Wurtsmith Air Force Base in 1993. Alpena County population also declined over the 20 year period. The largest population increases from 1980 to 2000 were in Grand Traverse and Newaygo counties.

Population densities

Michigan’s population is concentrated in the SLP (Figure 2.1). Of the 20 Michigan counties with populations over 100,000 people in 2000, none are in the WUP, EUP or NLP. Five are near the southern edge of the NLP: Kent, Ottawa, and Muskegon counties on the west side, and Bay and Saginaw counties on the east side. Population densities are likewise low in the more sparsely populated ecoregions (Table 2.2, Figure 2.4). The population density for Michigan is about 175 people per square mile. The NLP has the highest population density of the four areas—46 people per square mile. Twenty-five of 44 northern Michigan counties have population densities of 40 or fewer people per square mile. Five counties—Baraga, Keweenaw, Luce, Ontonagon, and Schoolcraft—have fewer than 10 persons per square mile. Over time, population density has increased in many counties in the SLP and NLP, especially.

Table 2.2. Total population, land area, and population density in the United States, Michigan, the Western Upper Peninsula, the Eastern Upper Peninsula, and the Northern Lower Peninsula, 2000.

Impact area	Population	Land Area	Population Density
	Number	Sq. Mi.	People/Sq. Mi.
Western Upper Peninsula	241,341	10,837	22.3
Eastern Upper Peninsula	76,275	5,582	13.7
Northern Lower Peninsula	749,768	16,185	46.3
Michigan	9,938,444	56,804	175.0
United States	281,421,906	3,536,338	79.6

Data Source: US Census, 2000

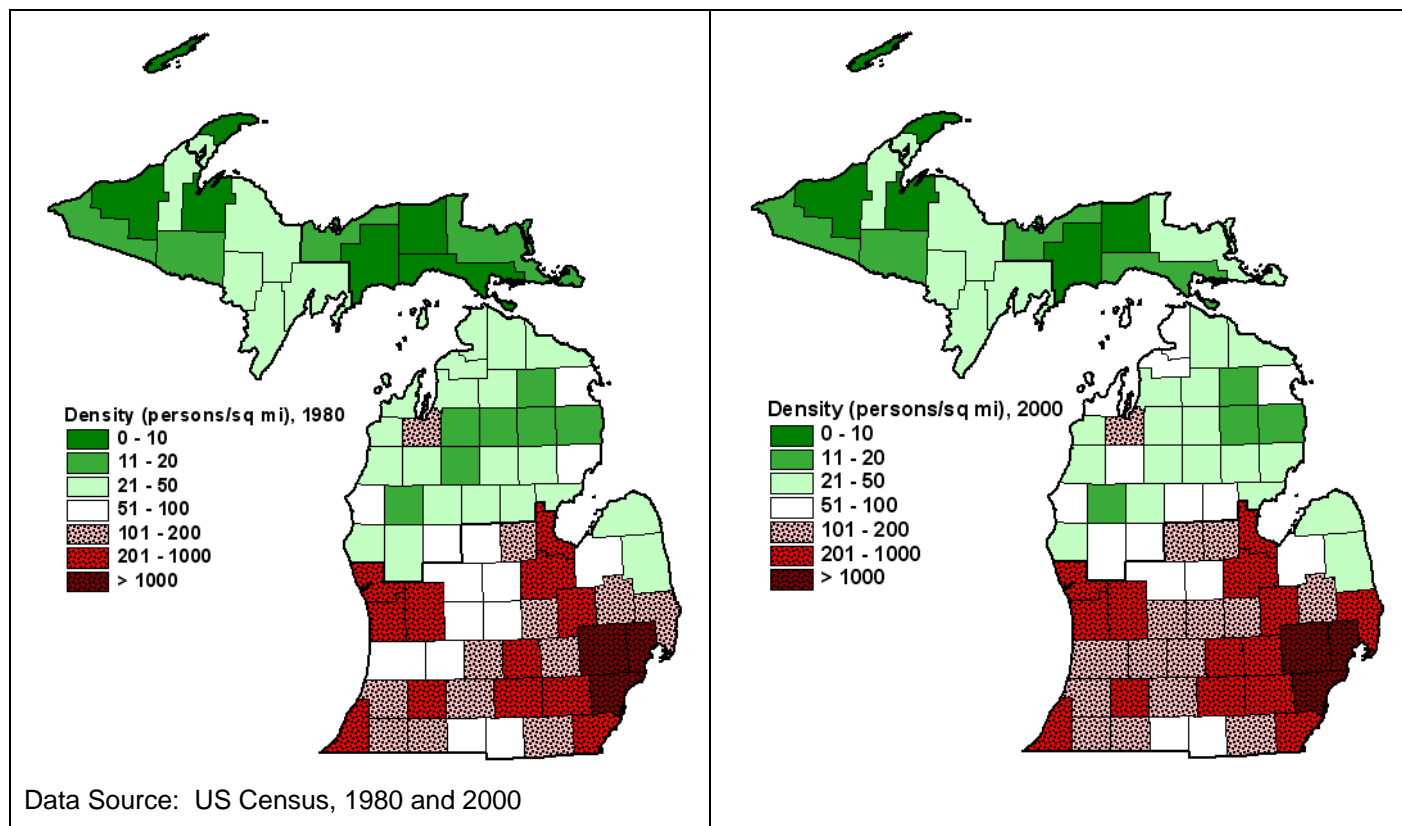


Figure 2.4. Population density by county, 1980 and 2000 (persons per square mile.)

Proximity of population to state forests

Population patterns in Michigan lead to two distinct situations with respect to U.S. resident population within close proximity of state forests (Appendix Figures A2.1, A2.2, and A2.3; Table 2.3). To approximate one- and two-hour driving times, zones were developed from the centroid of state forests in the WUP, EUP and NLP. One hour from a county to the closest state forest is roughly approximated by the 120 mile buffer, and two hours is approximated by the 180 mile buffer. County populations were totaled within each buffer. Counties were adjusted based on the Lake Michigan barrier. Canadian population data were not included. WUP state forests have approximately one million U.S. residents living within an hour of their borders. The majority of these persons live in Wisconsin. About 600 thousand people live within an hour of EUP state forests, but this excludes over 75,000 people living in the Sault Ste. Marie, Ontario census agglomeration in close proximity to the EUP (based on Statistics Canada data). The NLP has nearly five times the number of persons as the EUP state forests within 120 miles of the centroid—2.9 million people. As this zone is increased to two hours (180 miles from the centroid), totals increase by three-fold. Approximately 29% and 93% of Michigan's population are within one or two hours from the NLP state forests, respectively.

Table 2.3. Estimate of population near state forest lands for 2000.

Cumulative Distance from Centroid	60 miles	120 miles	180 miles
Western Upper Peninsula			
Michigan	248,902	279,073	448,002
Wisconsin	79,529	687,855	1,867,978
Sum	328,431	966,928	2,315,980
Eastern Upper Peninsula			

Cumulative Distance from Centroid	60 miles	120 miles	180 miles
Michigan	198,770	573,686	1,323,766
Wisconsin			140,465
Sum	198,770	573,686	1,464,231
Northern Lower Peninsula			
Michigan	594,861	2,942,199	9,239,927
Wisconsin			48,472
Sum	594,861	2,942,199	9,288,399

Data Source: MiDNR, Census Bureau

Components of population change

The Census Bureau reports population based on census surveys every 10 years. It also estimates annual changes in population using three major components: natural change in population (births-deaths), net international migration, and net internal migration (origin and destination within the United States). The numeric population change is statistically derived, so the sum of the three components does not equal the numeric population change. Nonetheless, these estimates provide insights regarding the components of population growth and decline (Table 2.4). The 1990-1999 data is the closest available to the 1990-2000 period (Table 2.1), but is one year short.

Researchers have classified most northern Michigan counties as “recreation counties” due to economic ties to recreation, tourism and seasonal housing (Johnson and Beale 2002). Over 90 percent of nonmetropolitan counties associated with recreation grew in population during the 1990-2000 period. Counties in the west central Upper Peninsula—Baraga, Delta, Dickinson, Houghton, Marquette, and Menominee—did not meet the classification criteria and were not classified as recreation counties. The NLP counties of Alpena, Newaygo, and Wexford were not classified as recreation counties either. In most cases, non-tourism related economic activity led to these classifications. Population change in recreation counties is based generally on net migration into the area rather than natural population changes; this is clearly the case for the EUP and NLP. That is, net internal or domestic migration greatly exceeded natural change. In some parts of the country, recreation county growth is specifically associated with casinos (Johnson and Beale 2002). Their role is less clear in Michigan—some counties with casinos grew more slowly than counties without them.

Natural change in population was negative for the 1990-1999 reporting period for the WUP (i.e., deaths exceeded births). For the WUP, only Delta and Dickinson counties had positive natural population increases. Twenty-two of 30 NLP counties had positive natural growth. The NLP’s natural change and large net migration totaled over 84,000 additional people in the 1990-1999 period.

Johnson and others (2005) used a nationwide analysis of age-specific net migration data to identify “net migration signatures” for different classes of counties. They identified the NLP as one of a handful of in-migration “hot spots” in the country during the 1990s, especially for those aged 40-44, perhaps reflecting the beginnings of amenity migration (migration due to the attractiveness or amenities an area offers). This has been driven in recent years by “baby boomer” retirements. If age-specific migration can be linked with recreation activities, public facilities, and other community infrastructure, then social impacts of net migration can be assessed more readily.

Table 2.4. Births, deaths and, net migration by ecoregion, 1990-1999

Ecoregion	Births	Deaths	Natural change (Births-Deaths)	Net international migration	Net internal migration	Numeric population change
	1990 – 1999 Number of persons					
Western Upper Peninsula	24,952	25,021	-69	219	-8,762	-8,811
Eastern Upper Peninsula	7,473	6,461	1,012	263	5,208	6,317
Northern Lower Peninsula	78,450	66,145	12,305	927	72,854	84,713
Michigan	1,287,572	763,166	524,406	99,735	-199,465	568,488
United States	39,846,350	22,539,652	17,306,698	8,308,976		30,194,352

Data Source: Census Bureau

Population age, structure, sex and dependency

In Michigan, the percentage of females (51%) and males (49%) mirrors the national distribution (Table 2.5). There are slightly more males than females in the WUP and NLP, and the EUP has considerably more males than females. The proportions vary by age with males exceeding females until they reach the mid-60s in the EUP and WUP (Appendix Table A2.3). In the NLP, male population exceeds female population until the mid-30s. Thereafter, female cohorts (or groups) are larger and the gap expands as age increases. The United States and Michigan have very similar patterns—children from 0-4 years old exceed the number of seniors over the age of 75. In Michigan, the 5-14, 15-24, 25-34, and 45-54 age classes are relatively equal. The largest population is in the 35-44 year old class—they reflect the end of the baby boom (children born from 1946 to 1964). On a percentage basis, older persons comprise a larger proportion of the population in northern Michigan than in the state as a whole (Figure 2.5).

The “baby boom echo” is most pronounced in the NLP and WUP—children of “baby boomers” have increased the 5-14 year old, school-age population. Overall, the ratio of 0-4 to 5-14 year old children is lower for the impact areas (0.41-0.42) than it is for Michigan (0.45); this decline will be reflected in less state tax money being spent in school districts with declining enrollments (Appendix Table A.2.3). The cohort patterns for younger residents are similar for the WUP and EUP; population is higher in the 15-24 year old cohort than in those immediately younger or older, especially in the number of males. In the NLP, the 5-14 year old cohort is the largest for young residents; population declines from the 5-14 through the 25-34 year old groups.

Table 2.5. Population by sex and total for ecoregions, Michigan and the United States

Impact area	Year	Male	Female	Male	Female	Total
		Number		Percent		Number
Western Upper Peninsula	1980	129,262	126,829	50%	50%	256,091
	1990	123,063	122,537	50%	50%	245,600
	2000	121,679	119,662	50%	50%	241,341
Eastern Upper Peninsula	1980	31,867	31,799	50%	50%	63,666
	1990	35,936	32,379	53%	47%	68,315
	2000	41,073	35,202	54%	46%	76,275
Northern Lower Peninsula	1980	290,760	299,833	49%	51%	590,593
	1990	312,938	323,585	49%	51%	636,523
	2000	372,513	377,255	50%	50%	749,768

Impact area	Year	Male	Female	Male	Female	Total
		Number		Percent		Number
Michigan	1980	4,516,189	4,745,889	49%	51%	9,262,078
	1990	4,511,601	4,783,696	49%	51%	9,295,297
	2000	4,873,095	5,065,349	49%	51%	9,938,444
United States	1980	110,053,161	116,492,644	49%	51%	226,545,805
	1990	121,172,379	127,537,494	49%	51%	248,709,873
	2000	138,053,563	143,368,343	49%	51%	281,421,906

Data Source: US Census, 1980, 1990, and 2000

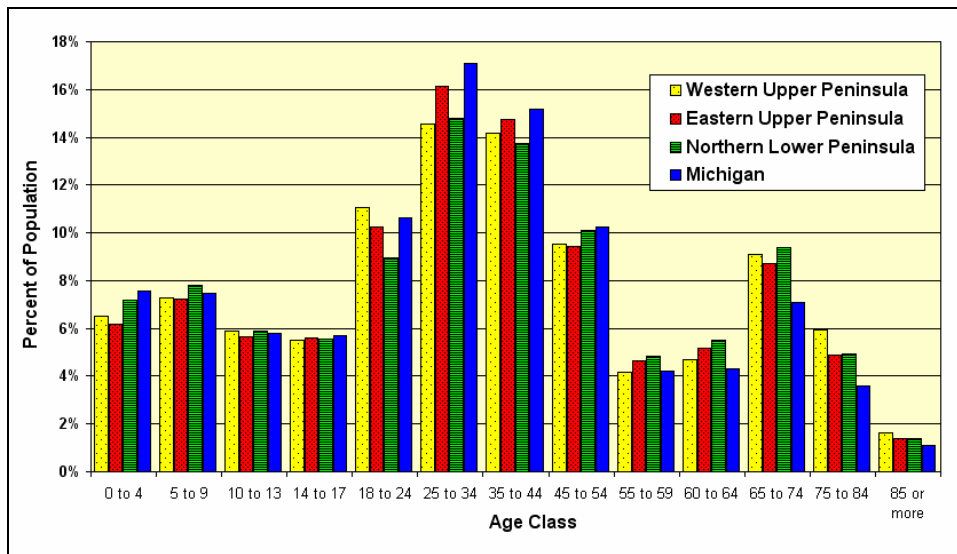


Figure 2.5. Age cohorts, in percent, by sex in Michigan and ecoregions, 2000

For older residents, a larger proportion of people are 75 and older in northern Michigan than they are on average in the state (Appendix Table A2.4). The statewide percentage is under 5%, but the ecoregions range from 6.3-7.6%. Dependent residents, those under 18 or 65 years old and older, comprise 38.4% of the Michigan population, and between 36.6-40.9% of the populations in northern Michigan ecoregions (Appendix Table A2.5). Provisions for social services and infrastructure (e.g., schools, hospitals, etc.) are related to these demographic groups. Relative to the United States and Michigan, the youth component is a much smaller proportion than the senior component in northern Michigan—indicating an aging population in these more rural areas. On a percentage basis, northern Michigan counties account for 28 of the top 30 Michigan counties in terms of dependent residents (Appendix Table A2.6).

Ethnic/racial composition

Ethnicity and race are defined as separate concepts by the federal government (Hobbs and Stoops 2002). People of a specific ethnic origin may be of any race, and people of a specific race may be of any ethnic origin. Race, as presented in this chapter, covers the following five groups: White, Black or African American, American Indian and Alaska Native, Asian and Pacific Islander, and Multiple Races. Persons of Hispanic origin are defined for federal statistical purposes as another group and may be of any race.

The 2000 percentage of non-white population in Michigan was 19.8% (Table 2.6, Appendix Tables A2.7 and A2.8). For the WUP and the NLP, the total non-white percentage of population was 4.8% and 4.1%, respectively— however, the EUP had 13.8%. The EUP had a higher percentage of Native Americans than the other reported areas. Hence, the impact areas are not as diverse as the United States or Michigan, but Native

American populations are higher than average in several locations—exceeding 10% in Baraga, Chippewa, Mackinac, and Schoolcraft counties.

Table 2.6. Racial and ethnic composition of population by impact area, 1980, 1990, and 2000.

Impact Area	Year	American Indian or Alaska Native	Asian or Pacific Islander	African American or Black	Multiple Races	White	Total Population
Western Upper Peninsula	1980	2,604	771	1,607	703	250,406	256,091
	1990	3,949	1,438	1,651	387	238,175	245,600
	2000	4,373	1,403	2,253	3,553	229,759	241,341
Eastern Upper Peninsula	1980	4,093	103	427	129	58,914	63,666
	1990	6,724	200	2,377	133	58,881	68,315
	2000	8,087	326	3,427	3,252	61,183	76,275
Northern Lower Peninsula	1980	3,999	1,228	4,067	2,549	578,750	590,593
	1990	6,559	1,999	4,604	2,833	620,528	636,523
	2000	7,719	2,681	5,957	14,346	719,065	749,768
Michigan	1980	39,714	57,126	1,199,023	93,974	7,872,241	9,262,078
	1990	58,934	102,869	1,289,012	85,241	7,759,241	9,295,297
	2000	58,479	179,202	1,412,742	321,968	7,966,053	9,938,444
United States	1980	1,364,033	3,556,806	26,495,025	6,758,319	188,371,622	226,545,805
	1990	2,015,143	7,226,986	29,930,524	9,710,156	199,827,064	248,709,873
	2000	2,475,956	10,641,833	34,658,190	22,185,301	211,460,626	281,421,906

Data Source: US Census, 1980, 1990, and 2000

Racial populations are distributed unevenly across Michigan (Figure 2.6). The EUP and SLP have higher concentrations of non-white populations. Native Americans are concentrated more in the Upper Peninsula, and African Americans-Blacks are concentrated more in the SLP. Correctional facilities in the EUP contribute to the high Black-African American percentage in Alger and Luce counties (Appendix Table A2.9).

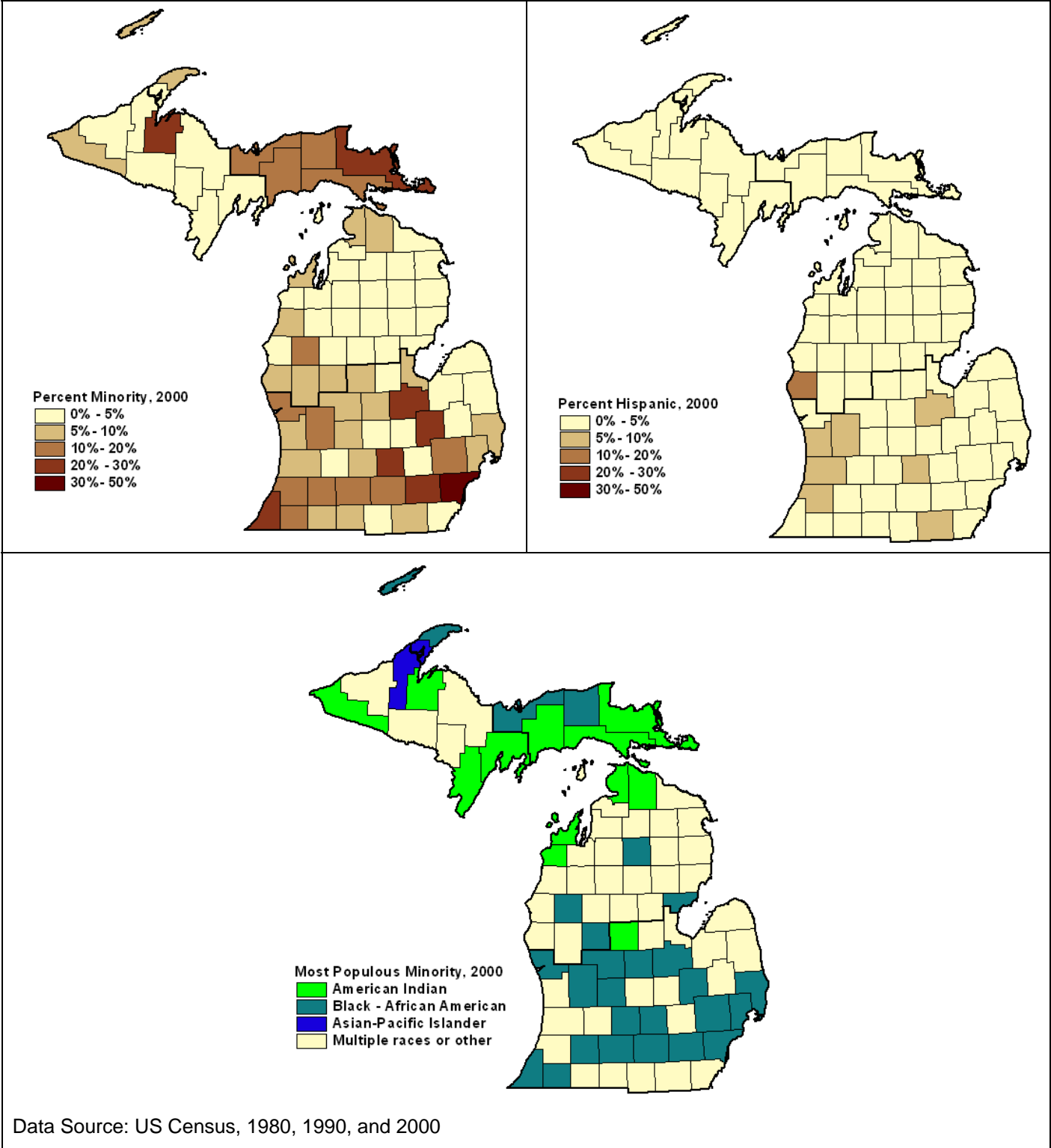


Figure 2.6. Percent of minority (non-white) and Hispanic population by county in Michigan, 2000

Educational achievement

Educational achievement is quantified in a number of ways (Appendix Table A2.10). It provides insights into educational accomplishments of a state, region or locality. One measure of achievement relates the proportion of people between 16 and 19 years of age who are not enrolled in school and who have not graduated from high school to the total population. The Michigan average for this metric was 8.7% in 2000—any level above this demonstrates poorer performance than the state average. All WUP counties have percentages below the state average indicating better performance. For the EUP, three of five counties exceed this level (i.e., have rates higher than 8.7%), with Luce County the highest at 18.3%. Fourteen of 30 counties in the NLP also exceed the state average with Lake County at 25.1%.

Another measure of educational achievement is the percentage of the population from 18 to 24 years old who are enrolled in college; these are the leading years for attending college. The Michigan average is 36.7% of people at these ages are enrolled in college. Only three impact counties have higher percentages enrolled in college: Chippewa (Lake Superior State University), Houghton (Michigan Technological University); Marquette (Northern Michigan University), and Mecosta (Ferris State University). Houghton County (73.8%) and Mecosta County (71.5%) had the highest Michigan county percentages of 18 to 24 years old enrolled in college in 2000.

For the population 25 years and older in Michigan, approximately 5% have less than a 9th grade education—four of 15 Upper Peninsula counties have lower percentages of the population with more than a 9th grade education. That is, these counties have a higher level of educational attainment with this metric than the state as a whole. For the NLP, 11 of 30 counties are better than the statewide average.

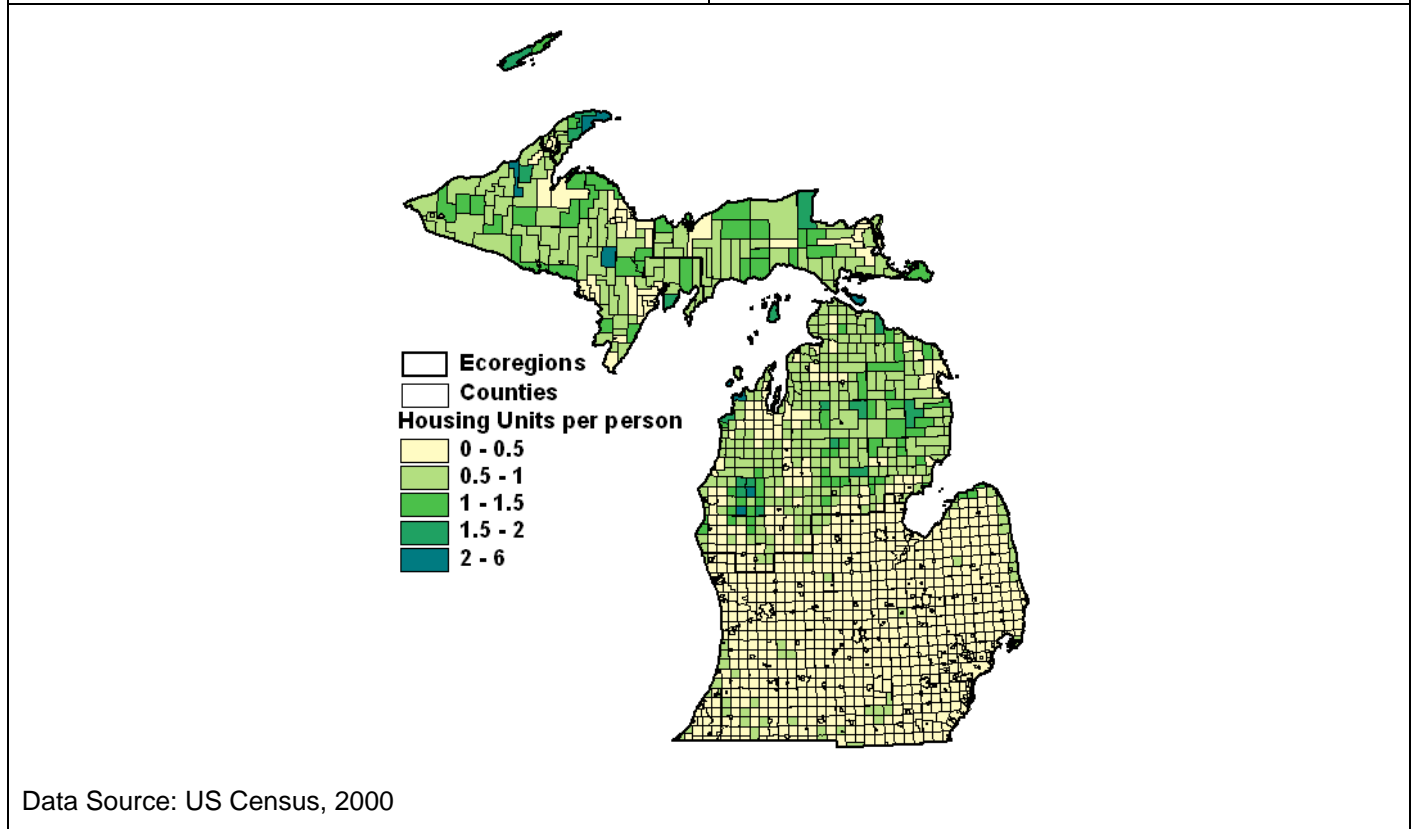
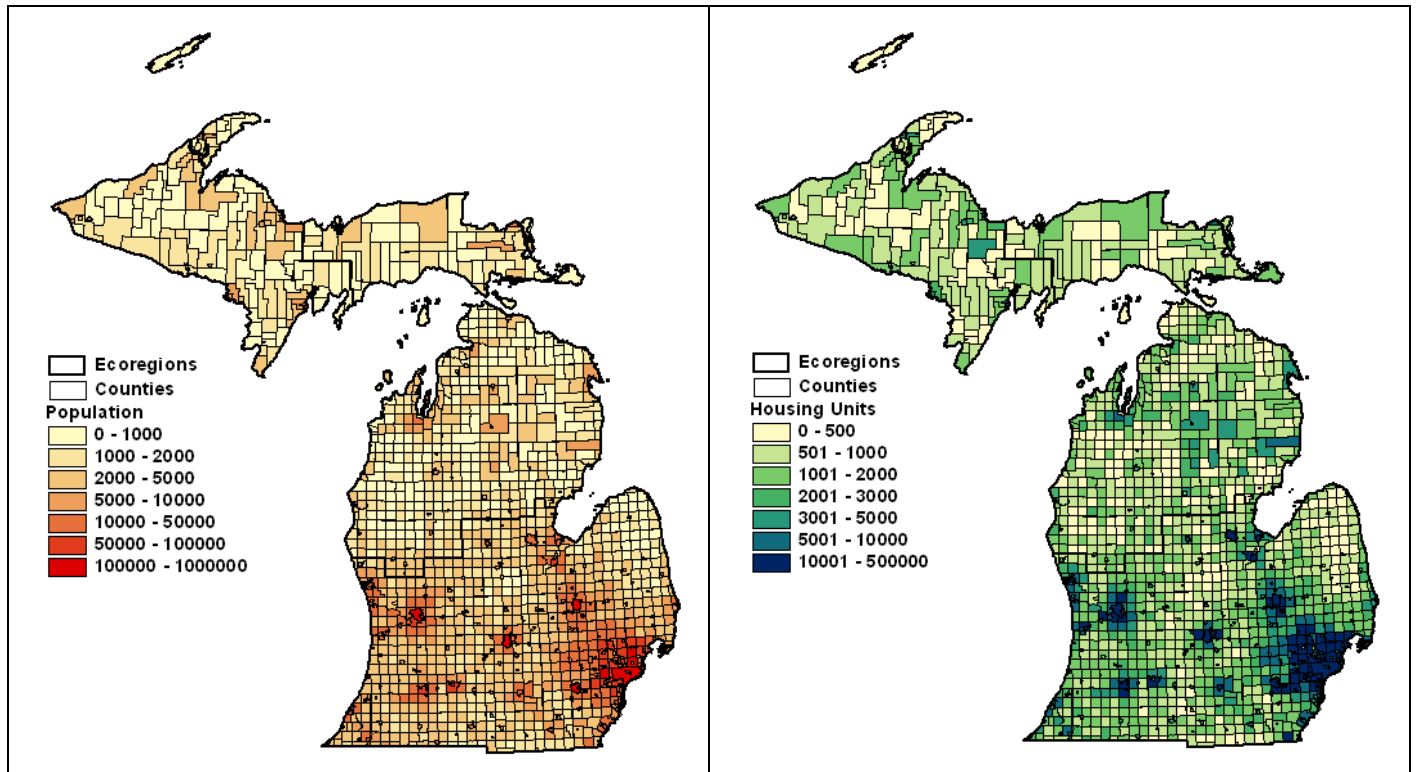
Statewide, over 83% of the population 25 years and older are high school graduates or higher—most of the WUP counties exceed this level (the exception is Baraga), whereas none of the EUP counties do. Only seven of 30 NLP counties exceed the state average. Delta, Marquette, and Otsego County also surpass the state average. Houghton and Marquette Counties are the only Upper Peninsula counties exceeding the state average for percentage of population with a bachelor's degree or higher. Emmet, Grand Traverse and Leelanau exceed the state average in the NLP.

In summary, for most educational metrics, northern Michigan ecoregions and counties fall below average performance in the state. Counties with strong links to universities fare better than others.

Housing

Housing units and seasonal homes

The number of housing units by minor civil division (MCD, generally townships) highlights the concentration of housing in the SLP (Figure 2.7). This is associated with concentration of Michigan's population. In the Upper Peninsula, MCDs located in and around Ironwood, Iron River, Iron Mountain-Kingsford, Houghton-Hancock, Escanaba, Marquette, and Sault Ste. Marie have the greatest concentration of housing units. Similarly, areas in and around towns in the NLP have the heaviest concentration of housing. The preponderance of seasonal homes is reflected in the number of housing units per person. The areas with the largest number of units per person are concentrated in the three northern ecoregions.



Data Source: US Census, 2000

Figure 2.7. Total population, housing units, and housing units per person, by minor civil division, 2000

In 2000, the WUP had the highest percentage of owner-occupied housing units (58.0%) followed by the NLP (53.2%), and the EUP (49.5%) (Table 2.7). These percentages are below the statewide average of 66.0%. The totals likely would be higher, but census data are tallied in April before the influx of summer residents. This would lead to lower April figures. The number of housing units increased for all northern Michigan ecoregions from 1990 to 2000, with a significant increase in the NLP. The number of seasonal homes increased from 1990 to 2000 in the NLP, but remained fairly static for the WUP and EUP. The WUP has a much lower concentration of seasonal homes than the EUP and NLP (Figure 2.8). Several counties had seasonal homes comprising more than 40% of the total housing units in the county.

Table 2.7. Total housing units by Michigan and ecoregion, 1990 and 2000

Impact Area	Year	Total Housing Units	Owner-Occupied Housing Units		Seasonal Homes	
		Number	Number	Percent	Number	Percent
Western Upper Peninsula	1990	123,993	68,947	55.6%	21,029	17.0%
	2000	129,162	74,958	58.0%	21,463	16.6%
Eastern Upper Peninsula	1990	42,133	18,606	44.2%	13,654	32.4%
	2000	44,515	22,049	49.5%	13,538	30.4%
Northern Lower Peninsula	1990	400,268	188,380	47.1%	131,836	32.9%
	2000	457,546	243,540	53.2%	136,167	29.8%
Michigan	1990	3,847,926	2,427,472	63.1%	224,030	5.8%
	2000	4,234,279	2,793,124	66.0%	233,922	5.5%

Data Source: US Census, 1990 and 2000

Seasonal homeowners and users participate in a variety of outdoor recreation activities, especially those associated with water; hiking and sightseeing were the most common land-based activities (Stynes et al. 1997). Seasonal homeowners provide a significant influx of money to northern Michigan counties throughout the year. Of course, seasonal homes vary in size and value—some are expensive lakefront homes while others are small rustic cabins on relatively secluded forest parcels. Stynes and others (1997) found that seasonal home use was concentrated in the summer (55%), and less use occurs in the fall (21%), spring (15%), and winter (9%). Of seasonal home users they surveyed, sightseeing, bicycling, hiking, and tennis were more likely to take place on public lands and parks (Stynes et al. 1997). However, many activities (e.g., fishing, swimming, boating, nature study, riding ORVs, etc.) also took place, in part, on public lands and waters.

Conversion of some seasonal homes to permanent homes is occurring, and this may be reflected in only slight increases of seasonal homes in the WUP and EUP between 1990 and 2000. Stynes and others (1997) found that approximately 20% of seasonal homeowners said they were “likely” or “very likely” to convert their seasonal residence to a permanent home within 5 years—this increased to almost 30% when the timeframe was extended. A slightly larger percentage of second homeowners on the Upper Manistee River area indicated they would convert their seasonal home to a permanent home within the next five years (Valentine 2003).

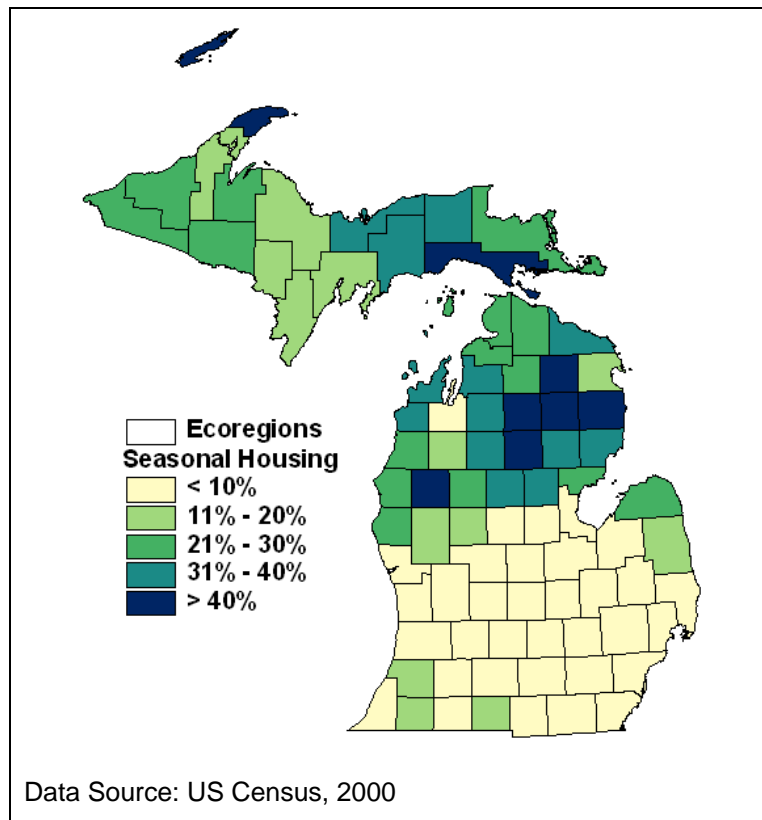


Figure 2.8. Seasonal homes as a percent of housing units, 2000

Selected studies on fragmentation and parcelization of land

Researchers at the North Central Research Station and the University of Wisconsin-Madison mapped housing density across the United States (Stewart et al. 2003). Their objective was to determine where housing development has occurred over the past six decades and to highlight the leading edge of development. Their key findings were:

- In 1940, housing density was high in urban areas and very low in rural areas.
- By 2000, low and middle density housing areas were common across the landscape.
- Housing density growth in rural areas was rapid during the 1970s and the 1990s.
- Throughout the six-decade period, growth occurred in suburban and exurban areas, but there was also low-density growth in rural areas with natural amenities, such as the upper Great Lakes region (Stewart et al. 2003).

One hypothesis is that housing patterns drive landscape change by transforming land cover, vegetation, and wildlife habitat. This and other hypotheses can be tested as more spatial data becomes available. Several studies have explored the relationship between development and forested land. The studies have increased in scope and complexity as technology has evolved and data has become more available.

Several researchers have begun exploring landscape-level change. One study particularly relevant to northern Michigan explored the relationship between parcels, forest cover and fragmentation in northern Michigan for 1970 and 1990 (Drzyzga and Brown 2002). They focused on Grand Traverse, Kalkaska, and Crawford counties in the NLP. During the 1970-1990 period, average parcel size declined from 24 acres to 10 acres for the 3-county area. Forested private land increased over time. Using Traverse City as a developed core, they found that parcel size increased and forest fragmentation decreased with distance from town. They noted that parcelization was more

likely to threaten the forest products industry than loss of forests. As parcel size declines, harvesting is less likely to occur and more owners must be contacted to meet a mill's wood requirements.

Across the Lake States, forest cover increased more rapidly on low-density residential lands and in counties with a heavier concentration of seasonal homes during the 1970-1990 period (Brown 2003, Brown 2004). As with the three-county Michigan study, forested land was expanding in all areas, regardless of county classification as High Growth Residential, High Growth Recreational, Low Growth or Medium Growth. The greatest increases in developed land use came in high growth and medium growth counties—these are associated with low density housing. Agricultural land declined in all counties, but this was also a source of increased forest land. Low Growth counties were the most remote and the most likely to have extractive (e.g., forest industry) economies.

A longer term analysis of the U.S. Midwest examined the relation between housing and forest fragmentation (Radeloff et al. 2005). They found that housing growth was strongest at the fringe of urban areas (suburbs) and in rural areas associated with lakes and forests. Sprawl or rural development is pervasive throughout the Midwest region and most forests include or are near housing. Michigan and Indiana had the greatest rural sprawl in the Midwest. The environmental effects per house are expected to be larger in the rural areas, but the ecological effects of this housing distribution are not well understood. Public land ownership is one of the few barriers to long-term development, and it provides lands valuable for conservation efforts.

Finally, Brown and others (2005) looked at rural land-use trends across the conterminous U.S. from 1950-2000. From 1950-1970, the U.S. experienced growth in urban areas. In the 1970s, this trend was reversed and widespread population increases occurred in rural areas. After waning in the 1980s, there was a "rural rebound" in the 1990s that again focused growth in nonmetropolitan areas. Smaller household size, agricultural abandonment and amenity-driven development have contributed to sprawl. Ecological consequences of these trends need further study. Drivers of land use and land cover change were beyond the scope of Brown and others. However, demographic and other driving factors of land-use change are currently being explored at Michigan State University's Land Policy Institute (www.landpolicy.msu.edu).

References

- Brown, D.G. 2003. Land use and forest cover in private parcels in the Upper Midwest USA, 1970-1990. *Landscape Ecology*, 18(8): 777-790.
- Brown, D.G. 2004. Land-use and land-cover trends in the Upper Midwest. Paper presented at New Generation Resource Policy for a Region in Transition: Land Use, Agriculture, Environment, and Health in the Great Lakes Region, Oregon OH, May 12, 2004.
- Brown, D.G., Johnson, K.M., Loveland, T.R., and Theobald, D.M. 2005. Rural land use change in the conterminous U.S., 1950-2000. *Ecological Applications* 15(6): 1851-1863.
- Drzyzga, S.A. and Brown, D.G. 2002. Spatial and temporal dynamics of ownership parcels and forest cover in three counties of Northern Lower Michigan USA, ca. 1970 to 1990. In S.J. Walsh and K.A. Crews-Meyer, Eds., *Linking People, Place, and Policy: A GIScience Approach*, Dordrecht: Kluwer, p. 155-185.
- Hobbs, F. and N. Stoops. 2002. Demographic trends in the 20th Century. U.S. Census Bureau, Census 2000 Special Reports, Series CENSR-4 Washington, DC: U.S. Government Printing Office.
- Johnson, K.M. and C.L. Beale. 2002. Nonmetro recreation counties—their identification and growth. *Rural America* 17(4): 12-19.
- Johnson, K.M., P.R. Voss, R.B. Hammer, G.V. Fuguitt, and S. McNiven. 2005. Temporal and spatial variation in age-specific net migration in the United States. *Demography* 42 (4): 791–812
- Radeloff, V.C, R.B. Hammer, and S.I. Stewart. 2005. Rural and suburban sprawl in the U.S. Midwest from 1840 to 2000 and its relation to forest fragmentation. *Cons. Bio.* 19(3): 793-805.
- Stewart, S. I., R.B. Hammer, V.C. Radeloff, J.F. Dwyer, and P.R. Voss. 2003. Mapping Housing Density across the North Central U.S., 1940-2000 [Slide show]. Available: <http://www.ncrs.fs.fed.us/IntegratedPrograms/lc/pop/hd/title.htm>
- Stynes, D.J., J. Zheng, and S.I. Stewart. 1997. Seasonal homes and natural resources: patterns of use and impacts on Michigan. General Technical Report NC-194. St. Paul, MN: USDA Forest Service, North Central Research Station.
- Valentine, B.R. 2003. Recreation specialization: management preferences and behaviors of upper Manistee River shoreline owner anglers. M.S. Thesis, Department of Park, Recreation and Tourism Resources, Michigan State University.
- Wyckoff, M.A. and R. Reed. 1995. Demographic trends: working paper. Rochester, MI: Michigan Society of Planning Officials.

Chapter 3. MI DNR Relationships with Communities

Introduction

The MiDNR and other natural resource agencies interact with communities to understand issues of mutual interest and to implement programs for management of natural resources. The interactions of agencies and communities is a widespread phenomenon (McDonough et al. 1999, Leefers et al. 2003). Intergenerational sustainability of ecosystem functions and processes that support productive biological systems is desired by the MiDNR and citizens of Michigan. Sustainability in the context of human communities is central to this view.

The draft 2006 State Forest Management Plan (2006) lists three goals related to communities

- To maintain essential ecosystem services,
- To sustain social-economic values, and
- To provide public access.

These three goals require the interaction of the MiDNR and various communities. Three objectives related to providing public access are: provide recreational opportunities, provide educational opportunities, and allow for cultural uses. This chapter draws on Leefers and others (2003) for its structure and part of its content. It provides an overview of communities of interest, acceptance of perceived natural resource changes, community capacity and well being, and institutional and other relationships.

Communities of interest

Communities of interest can be classified as place-based or affiliation-based (Leefers et al. 2003). For example, towns in close proximity to state forests are places that have geographic proximity to natural resources of interest—forests, lakes, rivers, and so on. In other cases, people may be affiliated due to common interests in hunting, fishing, horseback riding and other activities, even if they are not near state forests. Whether they are in close proximity to forests or they are linked to the forest due to interests, these citizens are affected by state forest management, and they have a stake in how state forests are managed.

Communities of interest may be statewide and/or specific to certain ecoregions (Appendix Table A3.1). For purposes of this report, we have classified communities of interest under 14 major categories (Table 3.1). The list is not exhaustive, but provides a good cross-section of the types of organizations with an interest in state forest management. Recreation-related organizations and local governments are most numerous. Given the myriad of forest-based recreation activities in Michigan, the proliferation of local communities of interest with a focus on specific wildlife habitats, hunting opportunities, recreational trails and other interests is expected.

Statewide communities include international organizations, federal agencies, Tribes, multi-state organizations, other state agencies, universities, statewide recreation and other user groups, conservation and environmental groups, and non-governmental organizations. Local communities specific to ecoregions include counties, local units of government, local chambers of commerce and regional/local groups similar to those existing at the state level. In addition, there are local permanent residents and seasonal residents. Forest landowners, whose lands are often interspersed with state forest lands, form local communities of interest and may be permanent or seasonal residents.

Table 3.1. MiDNR-identified communities of interest by category.

Type of Organization	Number of Organizations
International and Federal Government	12
Tribal Governments/Organizations	17
Multi-State Government	13
Local Government	78
Universities	12
Research, Development, and Extension	3
Forestry	26
Energy	2
Recreation	156
Conservation	16
Environmental	9
Water Resources	26
NGOs-Other	12
Media	2

Source: Appendix Table A3.1.

Acceptance of perceived natural resource changes

Communities of interest focus on many natural resource activities, conditions and issues. They are interested in the *status quo* as well as potential changes in natural resources. Research has not been completed that is specific to perceived natural resource changes for each ecoregion, but several studies provide insights to views managers will face when they propose changes in resource programs. Relevant studies include Kakoyannis, Peterson and Steffens (1999), Carr and Halvorsen (2001), Leatherberry (2003), Moser and others (2005), Clendenning, Field and Kapp (2005), McDonough (1999), and Peterson (1999).

Perceptions of the importance of natural resources

Natural resource features affect why people live in an area and visit it. People enjoy the peace, quiet and tranquility of northern Michigan, the opportunity to be close to nature, and scenic beauty (Kakoyannis et al. 1999). In the WUP, researchers found that there was widespread recognition of the contributions public forests made to the quality of life in their communities (Carr and Halvorsen 2001). In addition, people wanted to maintain the undeveloped character of the area, have a sustainable economy, and retain access to the forests. Finally, there was recognition of the importance of encouraging forest-based economic development. Citizen participation was viewed as critical to the success of agencies pursuing sustainable management.

Personal values related to natural resources were explored in a study of the EUP (Kakoyannis, Peterson and Steffens 1999). Respondents noted that water quality, air quality, and scenic beauty were among the top UP characteristics that they rated as “very important.” Access to public lands and water and outdoor recreation opportunities were also important characteristics. Respondents were more satisfied with the natural resource-related characteristics than they were with components of the human environment (e.g., taxes, health care facilities, school quality, job opportunities, etc.). Seasonal visitors (non-residents) assigned higher levels of importance to amenities, whereas permanent residents focused more on the human environment as important characteristics (e.g., jobs were more important for them). Lack of development and large tracts of public lands contribute to the attractiveness and appeal of the UP.

The National Woodland Owners Survey, completed in 2001, provides some insights regarding family woodlot ownership in the Lake States (Leatherberry 2003). Over one quarter of the land owned is held by people 70 years

old or older, and almost half of the family-owned forestland has been owned for at least 25 years. Most people own forestlands for values related to the quality of life (a homestead, a place for recreation, etc.). In the nearby states of Indiana, Illinois, and Iowa, researchers found that farm woodlot owners interested in income potential generally had higher timber volumes on their woodlots, owners interested in aesthetics had well-stocked stands with larger trees, and owners who were interested in timber management and wildlife tended to have the highest number of timber species present (Moser et al. 2005). In essence, their views on natural resources were reflected in their timberland holdings.

A recent survey of landowners in northwestern Wisconsin compared attitudes toward wildlife management between seasonal homeowners and permanent residents (Clendenning et al. 2005). They emphasized the growth of seasonal and recreational homes in northern Wisconsin and elsewhere where there are good amenity characteristics (clearly the situation in northern Michigan). The authors noted that migration into these areas came from four streams: retirees seeking a rural lifestyle, younger newcomers seeking a slower pace of life, professionals who can commute to work or work remotely, and seasonal homeowners. For many of the newcomers, preservation of amenities that drew them to the area were important. Longer term residents, as noted in the EUP, were supportive of economic development that will provide opportunities for themselves and their children. Part of the attraction of northern areas is that they have characteristics that are not as common in their urban environment (e.g., forest, rivers, access to recreation areas, etc.). Consequently, seasonal homeowners are more supportive of land use controls. Longtime residents are more supportive of managing public lands for hunting than newer residents. But both groups are supportive of endangered species protection and wilderness values. People raised in an urban environment were less supportive of hunting than those raised in rural areas or small cities. Thus, stakeholders' perceptions of natural resources depend, in part, on their personal histories.

In some cases, state forest users and others enjoy recreational activities, but cross the boundary between legal and illegal use of the natural environment. In many cases, these activities lead to citations from the MiDNR (Table 3.2). The majority of citations in 2004 were given out in the NLP. Fish and wildlife citations were most common, followed by ORV citations. Overall, the lowest number of citations issued over the 1995-2004 period were in 2004 (Appendix Table A3.2).

Table 3.2. Distribution of DNR-issued citations by ecoregion and statewide by type, 2004.

Ecoregion	Total citations	Wildlife	Fish	Land& water	Snow-mobile	Marine	ORV	Environ-mental	Gen. Criminal /Other
WUP	1,462	24.3%	18.9%	9.7%	18.5%	6.5%	17.8%	0.5%	3.8%
EUP	510	30.0%	18.6%	7.1%	22.4%	5.9%	14.5%	0.4%	1.2%
NLP	7,733	17.6%	21.1%	19.7%	12.9%	5.1%	19.0%	0.5%	4.0%
State	14,944	19.4%	25.3%	14.7%	11.9%	7.5%	16.5%	0.5%	4.2%

Source: Appendix Table A3.2

Perceptions of change

Natural resource managers deal with change on a regular basis. As a part of the EUP study (McDonough 1999), residents were asked about their perceptions of change (Figure 3.1). Several natural resource-based attributes were viewed as being largely unchanged over the past five years (Peterson 1999). Scenic beauty, water quality, air quality and access to public lands and water were viewed by most respondents as unchanged. Fishing quality, on the other hand, was viewed as decreased by the majority of respondents, and residents interviewed voiced concerns about increasing deer populations. Many attributes associated with development (e.g., traffic, hotel/motel dev., etc.) were viewed as increasing over the five-year period. Residents recognize change is underway, but many would like the EUP to remain similar to the region they know now.

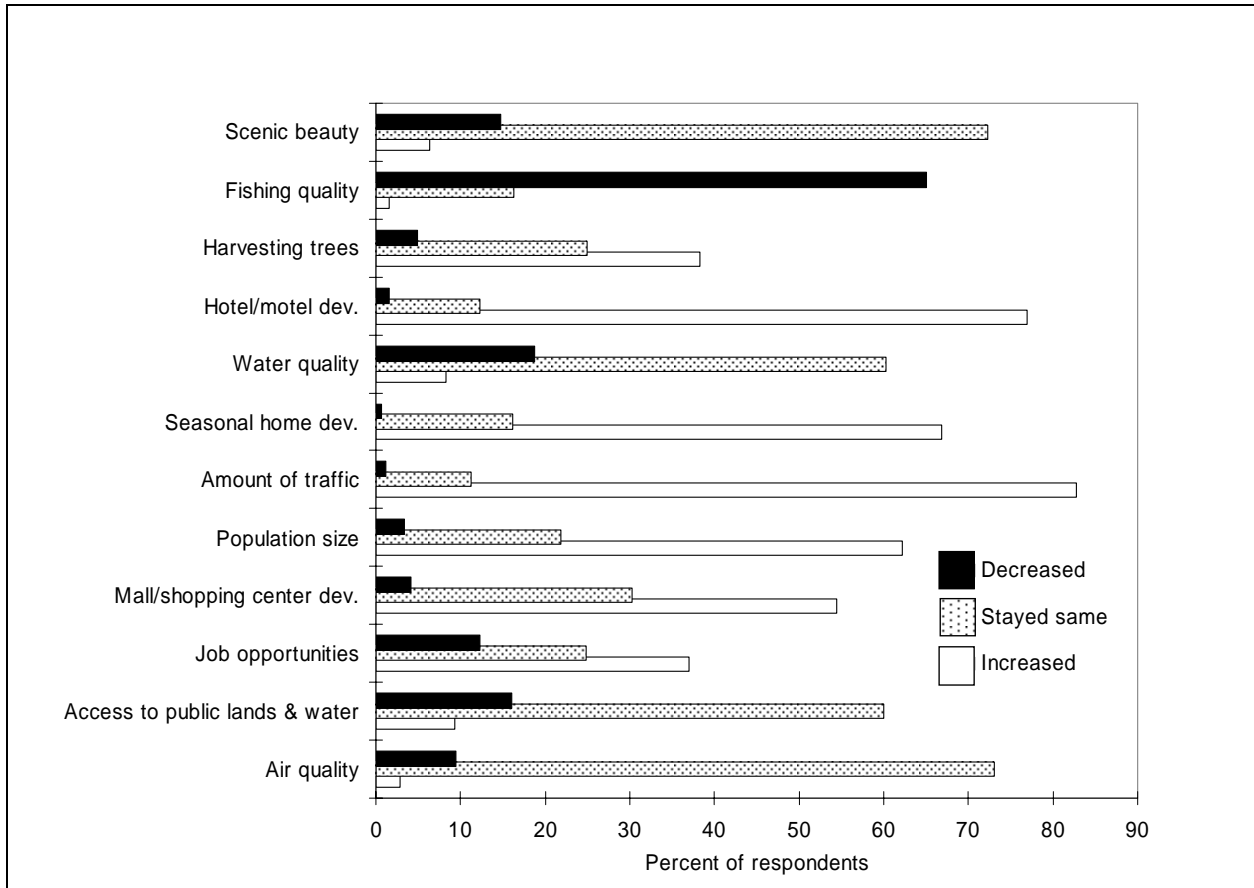


Figure 3.1. Percent of respondents who feel each characteristic of the EUP has changed over the past five years (Source: Peterson 1999).

Given the perceived changes in the EUP, residents were asked about their support for various policies for addressing future development (Figure 3.2). Setting aside natural areas, tourism, and more outdoor recreation opportunities garnered the most support with over 60% in each category. Improving and attracting various industries had widespread support, but mining, seasonal homes, casino gaming, and prisons had lower levels of support. Hence, there is a diverse set of development options that are perceived as supporting the EUP culture. Many residents feel they have little control over the future growth in the region and the policies that will affect it. WUP residents (Houghton-Ironwood-Iron River) voiced similar concerns for the need to develop economically while maintaining the quality of life (Carr and Halvorsen 2001).

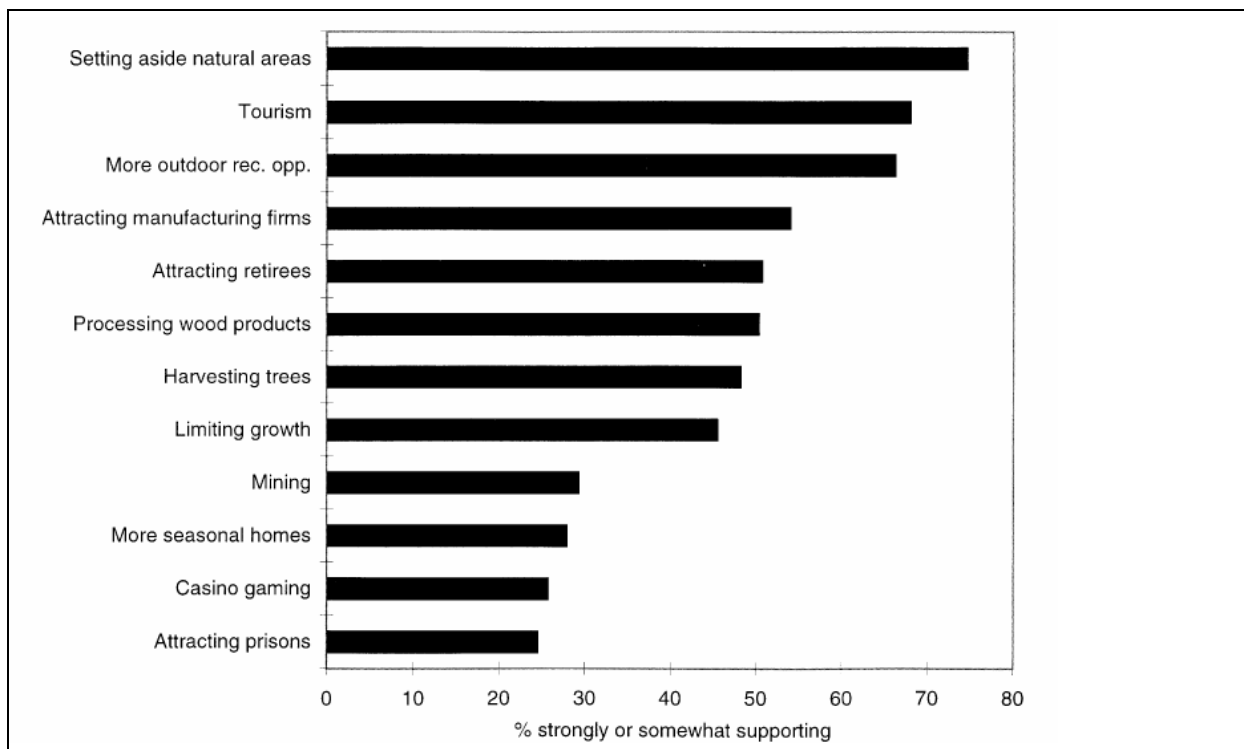


Figure 3.2. Percent of respondents who support given strategies for the future of the EUP (Source: Peterson 1999).

Community capacity and well being

The ability of communities to cope with changes in resource availability related to state forest management varies within and among communities (Leefers et al. 2003). Physical infrastructure, human capital and civic responsiveness were identified as key characteristics related to community capacity for adapting to changes in timber availability in the Pacific Northwest (USDA 1993). Human capital has many dimensions, including education, knowledge, skills, health, and values. Statistics on the civilian workforce reflect some aspects of human capital. Civic responsiveness includes leadership and institutional infrastructure including community assistance agencies and charitable organizations. These categories are similar to those of Flora and Flora (1993) who demonstrated that these factors are important components of community capacity to adapt to change. Additional measures of community well-being identified particularly in studies of forest-dependent communities include: percent of families below the poverty line, percent of families on welfare, average educational achievement, infant mortality, per capita income, incidence of social pathologies, and racial and ethnic diversity (Fortmann et al. 1989, Kusel and Fortmann 1991, McDonough et al. 1999, McDonough et al. 2002). The existence of land use policies including zoning ordinances and master plans provide an institutional metric for capacity to address change.

Following Leefers, Potter-Witter and McDonough (2003), seven measures for assessing community capacity and well being for the WUP, EUP and NLP counties are presented (Table 3.3):

- Unemployment: Percentage unemployed in the civilian labor force (US Census 2000)
- Poverty: Percentage of people below the poverty line (US Census 2000)
- Dependency: Proportion of people under 16 and over 65 to the total population (US Census 2000)
- School enrollment: Percent of population 16-19 years old not in school and not a high school graduate (US Census 2000)

- Diversity: Percent minorities (US Census 2000)
- Civic infrastructure: Public charities per thousand people. The Internal Revenue Service (IRS) defines public charities as organizations that engage in inherently public activity. These include a variety of charitable, nongovernmental and/or public service organizations. The IRS maintains an official list of these organizations (National Center for Charitable Statistics, 2000 data)
- Land use policies: The Michigan Society of Planning Officials (MSPO) maintains records on the institutional structure for land use decision making in Michigan (1995); key features include the existence of county zoning ordinances, master plans and land use studies, local planning and zoning ordinances and the number of structural features in each county. The Institute for Public Policy at Michigan State University recently updated these data (2003). Counties with comprehensive or master plans and zoning ordinances are tallied; each occurrence counts as “1”.

Of the 45 northern Michigan counties, only Leelanau and Grand Traverse counties had unemployment rates below the state average in 2000 (Table 3.3). Thirty-six of 45 counties (80%) in northern Michigan had higher rates of poverty than the state average. Only six counties had a smaller percentage of dependent residents than the state average. Seventeen of 45 counties have a higher percentage of 16-19 year olds not in school. Baraga, Chippewa and Mackinac counties have a higher level of ethnic diversity than the state as a whole. The WUP, with lower county populations, has more charitable organizations per 1000 residents than most counties in northern Michigan. Several counties in the northern part of the Lower Peninsula also have high levels of charitable organizations. Approximately 1/3 of the counties in northern Michigan have both a master plan and a zoning ordinance at the county level. Twenty-seven percent have no county-wide planning policies in place. Thus, in comparison to statewide averages, northern Michigan is characterized by relatively high unemployment, high rates of poverty, high percentages of dependent residents, and low ethnic diversity. But, the counties have higher percentages of students enrolled in school than the state as a whole.

Table 3.3. Community capacity and well being measures for ecoregion counties, 2000.

Counties by Ecoregion	Unemployment (%)	Poverty (%)	Dependency (%)	School enrollment	Diversity (%)	Civic Infrastructure	Land Use Policies
Western Upper Peninsula							
Baraga	6.4	11.1	39.2	8.5	21.4	1.83	0
Delta	5.2	9.8	40.8	3.7	4.2	2.93	2
Dickinson	4.1	8.6	43.2	4.6	2.0	2.62	0
Gogebic	6.2	14.2	43.1	7.8	5.8	3.40	0
Houghton	4.8	13.8	37.3	3.9	4.5	3.50	0
Iron	5.6	12.4	45.8	3.3	3.7	4.34	0
Keweenaw	6.1	10.4	42.8	5.3	5.0	3.48	2
Marquette	4.3	9.7	34.9	3.4	4.9	3.34	1
Menominee	4.1	10.0	41.3	4.9	3.8	1.54	0
Ontonagon	6.3	12.1	41.8	7.5	2.8	3.33	1
Eastern Upper Peninsula							
Alger	5.3	11.4	37.7	5.7	12.2	2.94	0
Chippewa	6.3	13.8	34.0	8.2	24.1	2.54	0
Luce	6.0	16.5	36.8	18.3	17.2	2.28	2
Mackinac	7.5	10.5	40.4	11.5	19.9	3.35	0
Schoolcraft	8.0	12.8	41.3	10.4	11.3	2.58	2
Northern Lower Peninsula							

Counties by Ecoregion	Unemployment (%)	Poverty (%)	Dependency (%)	School enrollment	Diversity (%)	Civic Infrastructure	Land Use Policies
Alcona	6.7	12.4	43.5	10.5	2.0	1.37	1
Alpena	5.5	11.3	40.8	5.7	1.8	2.84	1
Antrim	4.5	8.8	41.8	7.7	3.0	2.42	1
Arenac	5.7	14.2	39.9	10.4	4.6	1.22	1
Benzie	4.5	8.4	40.9	6.6	3.6	3.00	2
Charlevoix	4.4	8.2	40.8	6.7	3.7	3.76	1
Cheboygan	8.0	11.2	41.6	7.5	5.2	2.19	2
Clare	5.3	14.9	41.7	9.7	2.6	1.47	0
Crawford	4.6	13.3	41.1	6.6	3.6	2.17	2
Emmet	5.4	7.5	39.6	7.2	5.7	4.07	2
Gladwin	5.2	12.6	41.6	12.2	2.4	1.19	2
Grand Traverse	3.4	6.7	38.5	8.1	3.5	3.75	0
Iosco	6.3	12.5	44.0	11.3	3.1	2.23	0
Kalkaska	4.6	11.0	39.3	13.4	2.5	1.63	2
Lake	5.6	19.0	41.6	25.1	15.3	2.12	2
Leelenau	3.0	6.8	41.8	2.8	6.5	2.75	1
Manistee	5.3	11.2	40.7	9.6	5.8	2.81	1
Mason	4.8	10.9	41.0	10.1	4.2	2.05	2
Mecosta	4.2	14.0	35.7	5.1	7.3	2.10	2
Missaukee	4.4	11.3	41.9	10.0	2.5	2.14	1
Montmorency	7.9	12.9	44.2	7.3	1.6	2.33	1
Newaygo	4.6	10.9	41.9	10.2	5.2	1.78	1
Oceana	5.8	13.7	42.2	12.7	9.6	2.01	1
Ogemaw	5.3	14.4	42.3	7.5	2.5	1.80	1
Osceola	4.5	12.7	41.3	8.6	2.5	2.20	1
Oscoda	6.0	15.3	43.5	16.1	2.2	1.59	1
Otsego	4.1	8.4	40.5	4.3	2.5	2.92	2
Presque Isle	8.2	10.2	43.3	6.5	1.9	2.57	2
Roscommon	5.3	13.8	43.8	8.2	2.0	1.81	1
Wexford	5.3	11.0	40.8	11.2	2.7	2.46	2
Michigan							
Michigan	3.7	9.7	38.4	8.7	19.8	2.24	NA

Each county has a unique set of characteristics associated with community capacity and well being. An examination of three counties, one from each ecoregion, illustrates the array of characteristics. Iron County in the WUP has relatively high unemployment levels, high rates of poverty, high percentages of dependent residents, low ethnic diversity and no county-wide land-use policies. These attributes clearly pose challenges for county residents and institutions. However, it has a high number of charitable organizations per 1000 residents; this is a strength for the area because a more extensive network of community organizations engage in many public activities (Leefer et al. 2003). Chippewa County in the EUP has similar characteristics, but a very diverse population, and diversity can be a source of new ideas for addressing community issues. Finally, Leelanau County in the NLP had the lowest unemployment rate in northern Michigan, a low level of poverty, and some county-wide planning. The latter highlights some local desire to manage natural resources for the future. Overall,

their civic infrastructure is above average compared to others in the state; this is due mostly to the high levels of civic infrastructure in the WUP and the EUP. Hence, these data must be viewed relative to others and in a local context in order to get an accurate picture of the well being and capacity of individual counties.

Institutional and other relationships

Relationships that the MiDNR has with other organizations and people in communities near state forests are important for communicating agency and publics' concerns regarding forest management, creating public support for the forest management, and extending resources available for forest management activities. Citizens are involved in many forest-related activities to help insure that forests are meeting community needs. Moreover, public involvement provides a sense of ownership of state forests and creates an interest in forest-based activities. This involvement includes relationships with Tribes and other government units, public participation, partnerships with other organizations, the use of volunteers and off-forest education activities. In addition, institutional policies influence management of state forests. These policies exist at the federal, state and local level.

Tribal governments

The U.S. and Michigan governments have unique legal and political relationships with Indian tribes. Tribes are independent sovereign nations, and there are 12 federally recognized Tribes in Michigan (Figure 3.3). The U.S. government has a trust responsibility for protecting the rights of Federally Recognized Indian Tribes. Trust responsibilities are "those duties that relate to the reserved rights and privileges of Federally Recognized Indian Tribes as found in treaties, executive orders, laws and court decisions that apply to the national forests and grasslands" (USDA-Forest Service 1997).

State forests collaborate with Tribes in the management of state forest lands (Forest Certification Work Instruction 9.1, 2006). In part, the MiDNR identifies and protects "sites of special cultural, ecological, economic, or religious significance to indigenous peoples on State Forest Lands." Further, there is a MiDNR statewide coordinator for tribal issues. Tribal contacts and involvement in on-the-ground management activities include identification of tribal geographic areas of interest and invitations to MiDNR Forest Management Unit (FMU) open houses and compartment reviews, and to statewide and ecoregional public planning events. In addition MiDNR coordinates activities, when appropriate, with Tribal Historic Preservation Officers (THPO) and the State Historical Preservation Office (SHPO) regarding activities associated with tribal archaeological sites, tribal cultural property, and tribal sites of historic significance. Finally, an annual meeting between the MiDNR and the 12 Federally Recognized Indian Tribes is held to discuss topics of mutual interest.

Many treaties define the relationships between the Tribes, the U.S. and Michigan. For example, Reinhardt (2004) identified 17 treaties signed between the Anishinaabe Three Fires Confederacy tribes and the United States of America that contain educational provisions. Treaty cessions in which Tribes ceded their lands occurred over a five-decade period starting in the 1790s (Figure 3.4). Some of these treaties (e.g., 1836 and 1842) also cover tribal hunting, fishing and gathering rights in Michigan forests.

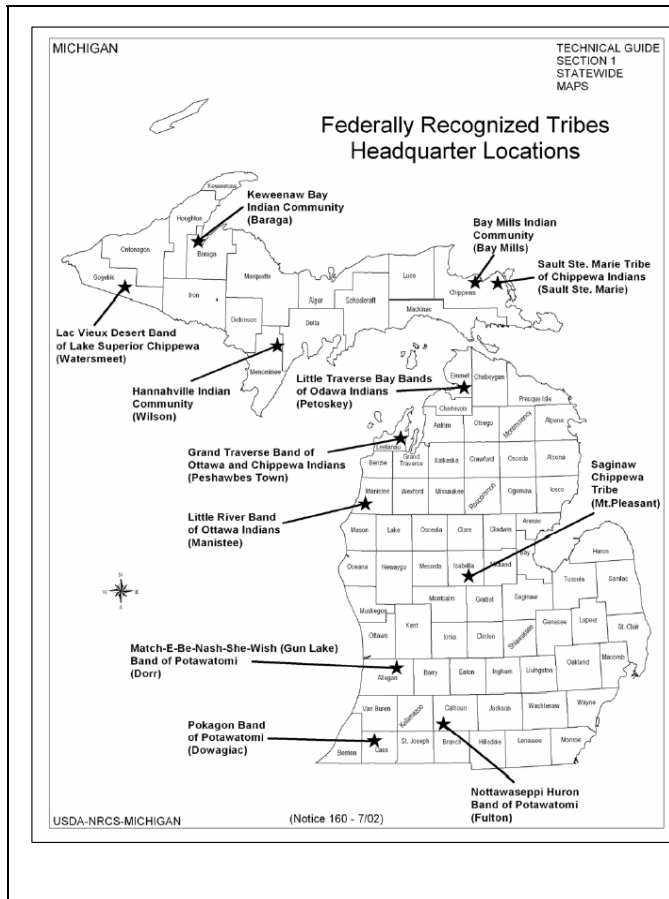
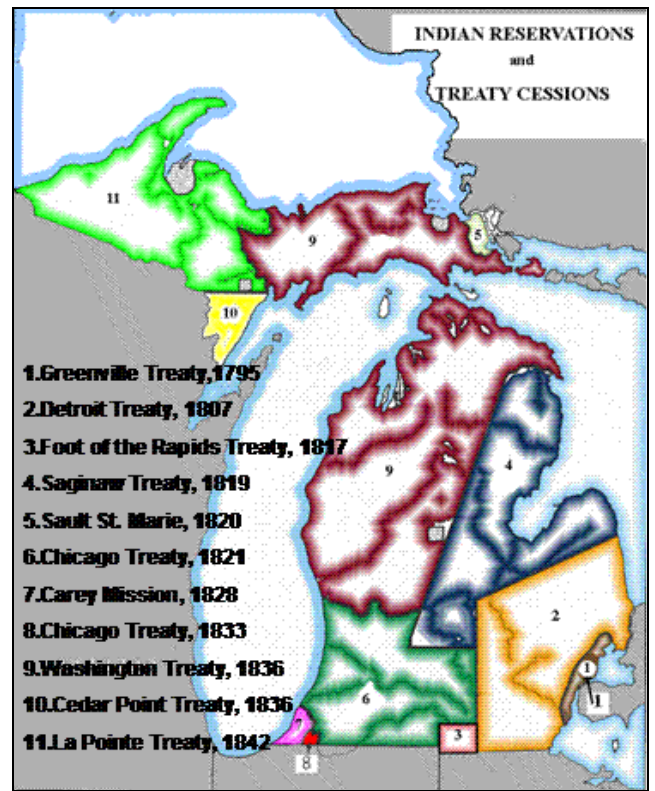


Figure 3.3. Federally recognized Tribes in Michigan.



Source: Clarke Historical Library, Central Michigan University.

Figure 3.4. Treaty cessions in Michigan, 1795-1842.

Public participation/partnerships/volunteers

Public participation is helpful in state forest decision making and in developing approaches to natural resource management. Public participation occurs at three primary administrative levels: at the State or Division level, at the Ecoregional or District Level, and at the Forest Management Unit Level (Forest Certification Work Instruction 1.5, 2005). In addition, there is substantial public participation in a wide variety of MiDNR programmatic and project work. At all levels, mailings are used to communicate information and announcements to various publics. And personal contacts with interested publics occur at all levels.

At the State Level, a portion of each Natural Resource Commission (NRC) public meeting has time for public comments. Other administrative bodies associated with the NRC also provide for public input. MiDNR employees, when appropriate, can attend meetings of various interest groups. A relatively new addition for public participation is the DNR Forest Management Advisory Committee. It is a broad, balanced group with many interests aimed at providing advice to the MiDNR Director in terms of policy and practices. Other examples of statewide advisory boards include: Snowmobile Advisory Committee, ORV Advisory Board, Recreational Trails Program Advisory Council, Citizens Waterfowl Advisory Council, Hunter Recruitment and Retention Work Group, and Michigan State Parks Citizens' Committee. Another statewide board is the Michigan Forest Finance Authority which has responsibility for managing the financing of forest management operations, implementing a system of forest management, issuing bonds or notes, and contracting for timber cutting rights.

At the Ecoregional or District Level, social values and impacts will be considered as part of special projects that cross FMU boundaries. MiDNR and external expertise will be used on these projects when appropriate. Public involvement will also be used in developing ecoregional plans. Public meetings and written comments will be

used in this process. Finally, public input and review will be used in developing and reviewing criteria and indicators for the ecoregional planning efforts.

At the Forest Management Unit Level, there are three formal opportunities for public input: during the annual FMU open house, via the FMU web page or through written or oral comments to FMU staff, or during compartment reviews. In addition, there are other opportunities for input. For example, the Pigeon River Country Advisory Council provides advice to the MiDNR Director regarding management and policies for the Pigeon River Country Forest Management Unit.

Partnerships are commonplace in contemporary natural resource management. Partnerships involve two or more groups which have shared goals. By combining efforts on shared activities, the partnership can have better access to needed and timely capital (financial, human, social) and act with greater efficiency (Leefers et al. 2003).

Partnerships with other organizations and agencies help state forests get more work done and integrate the state forests more directly in the communities in which they are located. Michigan's state forests have extensive relationships with diverse partners across the state (Table 3.4). The representative list includes diverse groups such as church organizations, federal agencies, local law enforcement agencies, and sportsman clubs. In total, there are more than 1,100 volunteer and partnership organizations. Though data are only partial, volunteers contributed close to 3,500 hours over nine months in 2004 (Table 3.5). The major programs were Urban & Community Forestry (planting and caring for trees, exotic plant removal), Adopt-a-Forest, River and Trails programs (trash abatement), Project Learning Tree (educational), Campground Hosts, and Lime Island (general maintenance). The volunteer hours capture only part of their contribution—preparation and travel are not counted, and many activities are not recorded.

Statewide, thousands of acres of state forests have been adopted by local groups which assist primarily in cleanup activities (Table 3.6). Illegal dumping of trash is a major problem on public lands throughout northern Michigan (Table 3.7). The majority of dump sites are on MiDNR lands, the largest public landowner. And the majority of the sites are associated with the NLP, an area with greater population densities than the UP. Volunteers provide tremendous assistance in cleaning these sites (Table 3.8).

Public education and outreach are important MiDNR activities. Project Learning Tree is one example of educational programs aimed at increasing knowledge about forested systems (Table 3.9). The MiDNR conducts public educational outreach through a variety of methods including printed materials, web sites, workshops, interpretive signing, and other means.

Table 3.4. Groups of organizations involved in Michigan DNR volunteer and partnership activities (self reported).

Type of Organization
Banks and Credit Unions
Business Organizations (e.g. Chambers of Commerce)
Church Organizations and Camps
Civic Organizations (e.g. Kiwanis)
Conservation Districts
Private Conservation Groups (Friends of...)
Federal Agencies (National Forests, National Parks, Rural Development, Coast Guard)
Individual Families
Industrial Firms
Landowner and Homeowner Associations
Local Community Governments
Local Law Enforcement Agencies
Military Units
National Interest Groups
Educational Nature Centers
Other State Government Units
Outdoor Recreation Clubs

Outdoor Recreation Outfitters and Guides
 Public and Private Schools
 Retail Establishments
 Sportsman Clubs (Hunting, Fishing, Wildlife)
 Tribal Groups and Interests
 Universities
 Youth Programs (4-H, Boy and Girl Scouting Organizations)

Table 3.5. Summary of volunteer activity by program area and hours, Jan.1 –Oct. 8, 2004 (self reported).

Program	# of Volunteers	Total Hours Reported
Urban & Community Forestry	1,430	5,177
Adopt-a-programs	1,915	10,459
Project Learning Tree	23	218
Campground Host	27	14,080
Lime Island	15	123
Total:	3,410	30,057

Table 3.6. Number of State Forest acres "Adopted" by interested groups (self reported).

Ecoregion/ County	Total Acres
Western Upper Peninsula	
Marquette	720
WUP Total	720
Eastern Upper Peninsula	
Alger	1,280
Mackinac	1,280
EUP Total	2,560
Northern Lower Peninsula	
Alcona	3,520
Alpena	440
Charlevoix	2,425
Cheboygan	5,600
Clare	762
Crawford	5,240
Emmet	2,512
Gladwin	2,360
Iosco	16,880
Kalkaska	6,180
Lake	1,280
Manistee	520
Mason	320
Missaukee	920
Montmorency	1,600

Ecoregion/ County	Total Acres
Newaygo	120
Ogemaw	3,120
Oscoda	22,400
Otsego	2,720
Presque Isle	1,560
Roscommon	18,850
Wexford	200
NLP Total	99,529
Michigan	213,258

Table 3.7. Number of forest dump sites tracked by Michigan DNR.

Ecoregion	DNR	USFS	Other	Total Sites	DNR Acres	DNR Sites per 1,000 Acres
Western Upper Peninsula	93	70	1	164	960,895	0.097
Eastern Upper Peninsula	47	24	0	71	1,116,699	0.042
Northern Lower Peninsula	539	82	3	624	2,073,890	0.260
Michigan	894	177	4	1075	4,581,428	0.195

Source: Ada Takacs, Michigan DNR

Note: Includes sites on all lands managed by the Other = private, county, township, or city/town lands.

Table 3.8. Volunteer Forest Dumpsite Cleanup Activities, 1991-2005.

Year	Projects	Participants	Acres
1991	8	282	41,622
1992	50	495	51,778
1993	43	380	68,650
1994	41	381	53,041
1995	84	889	80,095
1996	59	540	116,840
1997	59	584	89,050
1998	106	2,629	165,813
1999	96	1,071	72,365
2000	117	1,144	93,485
2001	117	1,277	139,200
2002	105	923	82,452
2003	86	878	65,947
2004	106	1,915	69,612
2005	100	1,818	59,840

Note: Includes sites on both state and federal lands.

Table 3.9. Project Learning Tree (PLT) Workshops conducted by DNR staff, 2003 to 2005.

Year	Workshops	Participants
2003	9	42
2004	17	181
2005	17	251

Data Source: Ada Takacs, Michigan DNR

Land Use, Planning, and Policy

State forests exist in a political and social environment of national, state and local land use policies. Some of these policies do not directly influence state forest management, but they drive management decisions on adjacent and nearby lands. Land use policies, for purposes of this report, are legislative and other policies that influence land allocation decisions and management activities. Federal statutes directly affecting national forest management and other federal statutes that affect national forest management are presented first (Table 3.10), followed by Michigan statutes that impact state and local land use, and finally local land-use policies by ecoregion are presented.

Major federal statutes

Policies related to national forests are emphasized in Table 3.10; they are managed by the USDA Forest Service. National forests have the most significant land holdings of any federal agency. However, the USDI National Park Service and USDI Fish and Wildlife Service also have lands in northern Michigan. They have their own organic legislation and management policies that flow from legislation. The “other federal statutes” apply to all federal agencies.

Table 3.10. Major federal statutes affecting national forest management.

Major USDA Forest Service statutes
Cooperative Forestry Assistance Act of 1978
Forest and Rangeland Renewable Resources Planning Act of 1974
Forest and Rangeland Renewable Resources Research Act of 1978
Multiple-Use Sustained-Yield Act of 1960
National Forest Management Act of 1976
Organic Administration Act of 1897
Weeks Law of 1911
Other federal statutes
American Indian Religious Freedom Act
Americans with Disabilities Act
Antiquities Act
Archaeological Resources Protection Act
Civil Rights Act
Clean Water Act
Endangered Species Act
Land and Water Conservation Fund Act
National Environmental Policy Act

National Historic Preservation Act
Native American Grave Protection and Repatriation Act
Rehabilitation Act
Religious Freedom Restoration Act
Resource Conservation and Recovery Act
Wild and Scenic Rivers Act
Wilderness Act

Source: Vincent et al. 2001

Major state statutes

Historically, Michigan had numerous statutes related to natural resource management. In 1994, these disparate statutes were combined into the Natural Resources and Environmental Protection Act (P.A. 451) (Table 3.11). Most chapters and parts associated with state forest and other resource management are in Article III, Natural Resource Management. Natural Resource Commission and other MiDNR policies implement the legislative intent of P.A. 451.

Table 3.11. State statutes affecting state forest planning.

Article I - General Provisions (324.101...324.2521)	
Part 1	Short Title And Savings Clauses
Part 3	Definitions
Part 5	Department Of Natural Resources
Part 7	Forest And Mineral Resource Development
Part 9	Joint Environmental Management Authorities
Part 11	General Appellate Rights And Public Access To Government
Part 13	Permits
Part 15	Enforcement
Part 16	Enforcement Of Laws For Protection Of Wild Birds, Wild Animals, And Fish
Part 17	Michigan Environmental Protection Act
Part 18	Uniform Transboundary Pollution Reciprocal Access
Part 19	Natural Resources Trust Fund
Part 20	Michigan Conservation And Recreation Legacy Fund
Part 21	General Real Estate Powers
Part 23	Agriculture And The Environment
Part 25	Environmental Education
Article II - Pollution Control (324.3101...324.21552)	
Chapter 1	Point Source Pollution Control
Chapter 2	Nonpoint Source Pollution Control
Chapter 3	Waste Management
Chapter 4	Pollution Prevention
Chapter 5	Recycling And Related Subjects
Chapter 6	Environmental Funding
Chapter 7	Remediation
Chapter 8	Underground Storage Tanks

Article III - Natural Resources Management (324.30101...324.83109)	
Chapter 1	Habitat Protection
Chapter 2	Management Of Renewable Resources
Chapter 3	Management Of Nonrenewable Resources
Chapter 4	Recreation
Article VII - Codification Of Pa 451 (324.90101...324.90106)	
Part 901	

Major local planning and zoning statutes

Local planning and zoning combine to direct local land use. Planning authorities focus on developing comprehensive plans at various governmental levels (region, county, township, and municipality), whereas zoning authorities implement the planning direction (Table 3.12). Various levels of intergovernmental or interagency coordination are required under these statutes (Leefers et al. 2003). A number of other statutes affect state forest lands. For example, the Subdivision Control Act of 1967 (P.A. 288) influences how private lands are subdivided. This, in turn, may affect habitat conditions near state forests.

Table 3.12. Principal local planning and zoning statutes affecting state forest planning.

Principal planning authorities	
P.A. 168 of 1959	Township Planning Act
P.A. 285 of 1931	Municipal Planning Act
P.A. 282 of 1945	County Planning Act
P.A. 281 of 1945	Regional Planning Act
	Joint Planning Act
Principal zoning authorities	
P.A. 184 of 1943	Township Zoning Act
P.A. 207 of 1921	City and Village Zoning Act
P.A. 183 of 1943	County Zoning Act

Table 3.13. Master plans and zoning ordinances by county and ecoregion.

Counties by Ecoregion	Master Plan	Zoning Ordinance
Western Upper Peninsula		
Baraga		
Delta	Yes	Yes
Dickinson		
Gogebic		
Houghton		
Iron		
Keweenaw	Yes	Yes
Marquette	Yes	
Menominee		
Ontonagon	Yes	

Counties by Ecoregion	Master Plan	Zoning Ordinance
Eastern Upper Peninsula		
Alger		
Chippewa		
Luce	Yes	Yes
Mackinac		
Schoolcraft	Yes	Yes
Northern Lower Peninsula		
Alcona	Yes	
Alpena	Yes	
Antrim	Yes	
Arenac	Yes	
Benzie	Yes	Yes
Charlevoix	Yes	
Cheboygan	Yes	Yes
Clare		
Crawford	Yes	Yes
Emmet	Yes	Yes
Gladwin	Yes	Yes
Grand Traverse		
Iosco		
Kalkaska	Yes	Yes
Lake	Yes	Yes
Leelenau	Yes	
Manistee	Yes	
Mason	Yes	Yes
Mecosta	Yes	Yes
Missaukee	Yes	
Montmorency	Yes	
Newaygo	Yes	
Oceana	Yes	
Ogemaw		Yes
Osceola	Yes	
Oscoda	Yes	
Otsego	Yes	Yes
Presque Isle	Yes	Yes
Roscommon	Yes	
Wexford	Yes	Yes

Source: Institute for Public Policy and Social Research, 2004

References

- Carr, D.S. and K. Halvorsen. 2001. An evaluation of three democratic, community-based approaches to citizen participation: surveys, conversations with community groups and community dinners. *Society and Natural Resources*. 14: 104-126.
- Clendenning, G.; D.R. Field; and K.J. Kapp. 2005. A comparison of seasonal homeowners and permanent residents on their attitudes toward wildlife management on public lands. *Human Dimensions of Wildlife* 10:3-17.
- Flora, C.B. and J.L. Flora. 1993. Entrepreneurial social infrastructure: a necessary ingredient. *The Annals of the Academy of Social and Political Sciences*.
- Fortmann, L.P.; J. Kusel; and S.K. Fairfax. 1989. Community stability: the foresters' fig leaf. In: D. Lemaster and J.H. Beuter, eds. *Community stability in forest-based economies*. Portland, OR: Timber Press:44-50.
- Institute for Public Policy and Social Research. 2004. To plan or not to plan: current activity within Michigan's local governments. *Policy Brief 8*(January):1-4.
- Kakoyannis, C.; G. Peterson; and K. Steffens. 1999. Population profile. In: M.H. McDonough, ed., *The role of natural resources in community and regional economic stability in the eastern Upper Peninsula*. East Lansing, MI: Michigan Agricultural Experiment Station Research Report 568:11-26.
- Kusel, J.; Fortmann, Louise. 1991. Wellbeing in forest dependent communities. California Department of Forestry and Fire Protection: Forest and Rangeland Resources Assessment Program.
- Leatherberry, E.C. 2003. Family forestland owners of the Lake States: timber harvest activities and implications for sustainable forest management. In: L.J. Buse and A.H. Perera (comp.), *Meeting emerging ecological, economic and social challenges in the Great Lakes Region: popular summaries*. Sault Ste. Marie, ON: Ont. Min. Nat. Resour., Ont. For. Res. Inst. For. Res. Inf. Pap. No. 155.
- Leefers, L., K. Potter-Witter, and M. McDonough. 2003. Social and economic assessment for the Michigan national forests. 244 p. Report submitted to Robert Brenner, James DiMaio, David Maercklein, and Fred P. Clark for the Michigan national forests on July 25, 2003.
- McDonough, M.H.; D. Callaway; L.M. Magelby; and W. Burch. 1999. Social classification in ecosystem management. In: N.C. Johnson; A.J. Malk; R.C. Szaro; and W.T. Sexton, eds., *Ecological stewardship: a common reference for ecosystem management*. Oxford, England: Elsevier Science: 227-244.
- McDonough, M.; L.A. Spence; and W.H. Sanders. 2002. *Sustainable forest management community handbook for the Great Lakes region*. Hayward, WI: Great Lakes Forest Alliance: 134 p.
- McDonough, M.H. (ed.). 1999. *The role of natural resources in community and regional economic stability in the eastern Upper Peninsula*. East Lansing, MI: Michigan Agricultural Experiment Station Research Report 568.
- Michigan Department of Natural Resources (MiDNR). 2006. 2006 State Forest Management Plan. DRAFT Rev. 3/27/2006. Lansing, MI: Michigan Department of Natural Resources. 230 p.
- Michigan Society of Planning Officials. 1995. *Institutional structure for land use decision making in Michigan*.: working paper. Rochester, MI: 120p.
- Moser, W.K., E.C. Leatherberry, M.H. Hansen, and B. Butler. 2005. Farmers and woods: a look at woodlands and woodland owner intentions in the Heartland. In: K.N. Brooks and P.F. Ffolliott (eds.), *Moving agroforestry into the mainstream*. Proc. 9th N. Am. Agroforest Conf., Rochester, MN. 12-15 June 2005. St. Paul, MN: Dept. Forest Resources, Univ. Minnesota.
- Peterson, G. 1999. Perceptions of change, alternative futures and development strategies. In: McDonough, Maureen H. ed., *The role of natural resources in community and regional economic stability in the eastern Upper Peninsula*. East Lansing, MI: Michigan Agricultural Experiment Station Research Report 568:67-72.

- Reinhardt, M. 2004. A comparative socio-historical content analysis of treaties and current American Indian education legislation with implications for the state of Michigan. Doctoral dissertation. The Pennsylvania State University, State College, Pennsylvania.
- United States Department of Agriculture. 1993. Forest ecosystem management: an ecological, economic and social assessment. Report of the Forest Ecosystem Management Assessment Team. Washington, D.C.: U.S. Department of Agriculture, Forest Service IX Vol.
- USDA-Forest Service. 1997. Section 2: Treaty Rights and Forest Service Responsibilities. In: Forest Service National Resource Guide to American Indian and Alaska Native Relations.
<http://www.fs.fed.us/people/tribal/>.
- Vincent, C.H.; B.A. Cody; M.L. Corn; R.W. Gorte; S.L. Johnsson; and D. Whiteman. 2001. Federal land management agencies: background on land and resource management. CRS Report RL 30867. Congressional Research Service, The Library of Congress, Washington, D.C.

Chapter 4. Economic Vitality and Natural Resource Dependence

Introduction

Economic activity within a MiDNR ecoregion can be characterized by the structure of the economy, labor force and employment, forest-related economic activities, government activities and regional economic well-being. Combinations of economic snapshots and changes over time provide insights into the economies of the ecoregions and their respective counties. In this chapter, the economies of the individual counties surrounding the state forests and the larger ecoregions are described in terms of number of establishments¹ by economic sector², wages, labor force, unemployment, employment seasonality, forest products economic activity, recreation and tourism economic activity, government employment, payment in lieu of taxes, household income, housing characteristics and values and land values. These household and local economic factors help characterize the economic sectors and people who use, benefit from or have an impact on the areas surrounding the state forests. State forests along with private and federal forest lands play an important role in these regional economies and contribute directly or indirectly to the economic well-being of the people living in the WUP, EUP and NLP. The role of state forests has changed over the past 10 years, especially in terms of MiDNR employment. Additional related details on natural resource production are presented in Chapter 5.

Structure of the Economy
The structure of the economy is commonly depicted by the number of establishments within economic sectors within a region. In addition, the amount of wages and employment within those sectors provide an absolute and relative depiction of the importance of various sectors in the regional economy. Nineteen main industrial sectors are used to describe the economy (Table 4.1). The Agriculture, Fishing and Hunting sector, the Mining sector, the Manufacturing sector, and the Accommodation and Food Services sector have economic sub-sectors directly associated with natural resources (e.g., Forestry and Logging sub-sector), and they are listed to emphasize the linkages to state forest activities. In addition, three government sectors are included to highlight the relative contributions of federal, state and local governments to the regional economies. Also, additional transportation, trade, and service sectors are directly or indirectly related to state forest activities, but these sectors are not split out. Industry and government data are additive.

Number of Establishments

Approximately 12% of the industrial establishments in Michigan were in the WUP, EUP and NLP in 2005 (Table 4.1). However, 29% of government establishments were located in northern Michigan—government, especially local government, is needed in more and less populated areas. Local Government establishments exceeded federal and state government establishments combined. A large majority of Forestry and Logging establishments were located in northern Michigan, especially in the WUP. Wood Products Manufacturing was concentrated in the NLP, and Paper Manufacturing was split between the WUP and NLP. Likewise, Accommodation and Food Services establishments, often associated with tourism, were concentrated in the NLP followed by the WUP. The number of establishments has been declining in all regions over the past six years (Appendix Tables A4.1-A4.4).

¹ Establishments are economic units, business or industrial, at a single geographic location, where business is conducted or where services or industrial operations are performed. An establishment is not necessarily identical to an enterprise or company, which may consist of one or more establishments.

² Sectors are groups of establishments by industry based on the activities in which they are primarily engaged, e.g. Agriculture, Forestry, Fishing and Hunting, Mining, Utilities, and so on. These sectors can be aggregated or disaggregated based on data availability. For NAICS sector definitions, see: <http://www.census.gov/epcd/www/naicsect.htm>.

Table 4.1. Number of establishments, for selected economic sectors by ecoregion, 2005.

Industry	WUP	EUP	NLP	State
Ag, forestry, fishing and hunting	228	81	429	2,217
>>Forestry and logging	174	55	91	378
>>Fishing, hunting and trapping		12	8	41
>>Ag and forestry support activities	7		14	253
Mining	11	8	134	441
>>Oil and gas extraction			25	77
>>Mining, except oil and gas	7	8	9	198
>>Support activities for mining	4		72	166
Utilities	19	6	46	406
Construction	880	325	3,624	28,859
Manufacturing	363	59	1,194	15,739
>>Wood product manufacturing	64	15	119	557
>>Paper manufacturing	3		5	257
Wholesale trade	219	54	643	15,622
Retail trade	1,096	408	3,463	35,001
Transportation and warehousing	213	78	474	5,522
Information	105	30	277	3,585
Finance and insurance	337	97	856	12,729
Real estate and rental and leasing	188	49	700	7,961
Professional and technical services	397	106	1,354	24,477
Mgmt. of companies and enterprises	6		10	765
Administrative and waste services	227	47	899	13,070
Educational services	21	3	92	2,113
Health care and social assistance	554	126	1,644	21,666
Arts, entertainment, and recreation	102	39	475	3,784
Accommodation and food services	723	370	2,083	18,651
>>Accommodation	137	142	439	1,847
>>Food services and drinking places	583	228	1,615	16,804
Other services, exc, public admin.	672	155	1,843	21,291
Total, All Industries	6,426	2,059	20,367	233,899
Federal Government	151	57	334	1,717
State Government	130	56	268	1,482
Local Government	333	137	884	4,946

Data Source: Michigan Department of Labor and Economic Growth (<http://www.milmi.org/>)

Note: Sectors marked with ">>" are subsets of the more aggregate sector above.

Wages

Over \$1.2 billion in wages were paid by the Forestry and Logging, Wood Products Manufacturing, and Paper Manufacturing sectors in 2005 (Table 4.2). Most of these wages were in the SLP reflecting the heavy concentration of wood product and paper manufacturing in that region. Wage patterns reflected the pattern of establishments in 2005. Government wages exceeded industry wages in the EUP. Though wage patterns over the past six years vary by region, the statewide trend is less reliance on manufacturing and extractive industries (e.g., logging and mining) and more reliance on service sectors (Appendix Tables A4.5-A4.8).

Table 4.2. Total wages (million \$) for selected economic sectors by ecoregion, 2005.

Industry	WUP	EUP	NLP	State
Ag, forestry, fishing and hunting	\$29.0	\$7.1	\$73.3	\$521.2
>>Forestry and logging	\$21.4	\$5.1	\$15.9	\$51.9
>>Fishing, hunting and trapping		\$0.7	\$0.2	\$2.9
>>Ag and forestry support activities	\$0.3		\$3.3	\$50.0
Mining	\$87.9	\$9.2	\$69.9	\$346.7
>>Oil and gas extraction			\$11.5	\$33.2
>>Mining, except oil and gas	\$87.4	\$9.2	\$5.1	\$238.4
>>Support activities for mining	\$0.7		\$35.4	\$75.1
Utilities	\$15.4	\$6.8	\$51.4	\$1,562.1
Construction	\$177.1	\$30.7	\$489.3	\$8,102.5
Manufacturing	\$455.5	\$62.4	\$1,403.1	\$37,956.6
>>Wood product manufacturing	\$58.8	\$4.8	\$73.0	\$378.7
>>Paper manufacturing	\$13.5		\$21.2	\$753.2
Wholesale trade	\$62.5	\$11.4	\$174.3	\$9,451.3
Retail trade	\$220.4	\$59.4	\$782.5	\$11,757.0
Transportation and warehousing	\$51.0	\$14.1	\$144.7	\$4,424.7
Information	\$41.4	\$6.7	\$111.2	\$3,515.4
Finance and insurance	\$79.1	\$24.5	\$262.8	\$8,470.2
Real estate and rental and leasing	\$16.4	\$2.1	\$54.3	\$1,680.5
Professional and technical services	\$81.1	\$11.0	\$225.9	\$15,867.8
Mgmt. of companies and enterprises	\$1.4		\$4.9	\$6,203.3
Administrative and waste services	\$41.9	\$6.6	\$177.8	\$8,344.2
Educational services	\$2.9	\$1.9	\$39.5	\$1,696.6
Health care and social assistance	\$398.3	\$30.1	\$950.3	\$18,166.4
Arts, entertainment, and recreation	\$12.9	\$5.0	\$71.6	\$1,507.8
Accommodation and food services	\$79.6	\$50.8	\$349.5	\$4,192.7
>>Accommodation	\$16.8	\$26.6	\$105.6	\$572.6
>>Food services and drinking places	\$62.2	\$24.2	\$226.7	\$3,620.1
Other services, exc, public admin.	\$62.9	\$8.2	\$157.5	\$3,256.6
Total, All Industries	\$1,972.0	\$365.2	\$5,680.9	\$147,023.7
Federal Government	\$79.1	\$30.3	\$116.7	\$2,979.7
State Government	\$229.3	\$122.2	\$235.5	\$6,465.9
Local Government	\$459.5	\$232.7	\$1,263.7	\$16,143.0

Data Source: Michigan Department of Labor and Economic Growth (<http://www.milmi.org/>)

Note: Sectors marked with ">>" are subsets of the more aggregate sector above.

Average weekly wages in northern Michigan for the Forestry and Logging, Mining, Wood Products Manufacturing, and Paper Manufacturing sectors exceeded the average for all industries (Table 4.3). Mining and Paper Manufacturing had some of the highest weekly wages. Accommodation and Food Services wages were considerably lower than the average for all industries, reflecting both lower wages of many part-time employees. Statewide and regional trends indicate there has been more growth in extractive industry wages than in service sector wages over the past six years (Appendix Tables A4.9-A4.12). Government employees, on average, earn more per week than the average industry employee. State Government employees earn more than Local Government employees.

Table 4.3. Average weekly wages, for selected economic sectors by ecoregion, 2005.

Industry	WUP	EUP	NLP	State
Ag, forestry, fishing and hunting	\$541	\$500	\$380	\$402
>>Forestry and logging	\$605	\$509	\$561	\$572
>>Fishing, hunting and trapping		\$518	\$708	\$398
>>Ag and forestry support activities	\$458		\$358	\$419
Mining	\$1,088	\$1,170	\$942	\$986
>>Oil and gas extraction			\$1,010	\$1,150
>>Mining, except oil and gas	\$1,087	\$1,170	\$914	\$1,008
>>Support activities for mining	\$1,308		\$944	\$873
Utilities	\$1,251	\$1,119	\$1,262	\$1,445
Construction	\$689	\$552	\$614	\$837
Manufacturing	\$786	\$731	\$738	\$1,076
>>Wood product manufacturing	\$606	\$434	\$654	\$639
>>Paper manufacturing	\$1,140		\$1,033	\$980
Wholesale trade	\$665	\$616	\$675	\$1,074
Retail trade	\$333	\$361	\$389	\$452
Transportation and warehousing	\$609	\$467	\$654	\$837
Information	\$527	\$469	\$680	\$1,010
Finance and insurance	\$598	\$651	\$714	\$1,036
Real estate and rental and leasing	\$380	\$361	\$406	\$574
Professional and technical services	\$649	\$627	\$686	\$1,236
Mgmt. of companies and enterprises	\$851		\$1,257	\$1,839
Administrative and waste services	\$469	\$418	\$459	\$582
Educational services	\$271	\$489	\$435	\$549
Health care and social assistance	\$598	\$485	\$610	\$710
Arts, entertainment, and recreation	\$239	\$370	\$305	\$462
Accommodation and food services	\$165	\$262	\$227	\$236
>>Accommodation	\$197	\$364	\$289	\$321
>>Food services and drinking places	\$158	\$200	\$202	\$226
Other services, exc, public admin.	\$338	\$274	\$389	\$471
Total, All Industries	\$525	\$459	\$526	\$776
Federal Government	\$855	\$955	\$818	\$1,051
State Government	\$921	\$895	\$904	\$901
Local Government	\$563	\$566	\$604	\$685

Data Source: Michigan Department of Labor and Economic Growth (<http://www.milmi.org/>)

Note: Sectors marked with ">>" are subsets of the more aggregate sector above.

Employment by sector

The Local Government sector was the largest employer in the WUP, EUP and NLP in 2005 (Table 4.4). Health Care and Social Assistance was the largest industrial sector in the WUP followed closely by Retail Trade and Manufacturing. Accommodation and Food Services and Retail Trade were the largest industrial sectors in the EUP. Retail Trade and Manufacturing were the largest industrial sectors in the NLP. Overall, employment in Michigan has been declining in the past six years; this trend is reflected in Manufacturing and extractive industries (Appendix Tables A4.13-A4.16).

Table 4.4. Average annual employment, for selected economic sectors by ecoregion, 2005.

Industry	WUP	EUP	NLP	State
Ag, forestry, fishing and hunting	1,032	271	3,703	24,955
>>Forestry and logging	679	192	545	1,743
>>Fishing, hunting and trapping		27	6	140
>>Ag and forestry support activities	13		175	2,293
Mining	1,554	152	1,427	6,759
>>Oil and gas extraction			219	555
>>Mining, except oil and gas	1,546	152	107	4,550
>>Support activities for mining	10		722	1,654
Utilities	236	117	783	20,787
Construction	4,945	1,071	15,321	186,221
Manufacturing	11,146	1,643	36,547	678,346
>>Wood product manufacturing	1,864	212	2,148	11,397
>>Paper manufacturing	227		395	14,779
Wholesale trade	1,806	355	4,964	169,189
Retail trade	12,733	3,167	38,635	500,621
Transportation and warehousing	1,608	581	4,254	101,624
Information	1,511	275	3,146	66,924
Finance and insurance	2,544	724	7,073	157,190
Real estate and rental and leasing	833	110	2,571	56,324
Professional and technical services	2,402	336	6,334	246,864
Mgmt. of companies and enterprises	31		75	64,881
Administrative and waste services	1,714	306	7,444	275,821
Educational services	205	73	1,747	59,387
Health care and social assistance	12,802	1,193	29,970	491,726
Arts, entertainment, and recreation	1,039	262	4,519	62,716
Accommodation and food services	9,288	3,728	29,596	341,713
>>Accommodation	1,642	1,406	7,026	34,282
>>Food services and drinking places	7,576	2,322	21,593	307,431
Other services, exc, public admin.	3,581	574	7,777	132,972
Total, All Industries	72,270	15,307	207,787	3,645,020
Federal Government	1,779	611	2,745	54,529
State Government	4,788	2,624	5,011	138,063
Local Government	15,690	7,910	40,241	452,939

Data Source: Michigan Department of Labor and Economic Growth (<http://www.milmi.org/>)

Note: Sectors marked with ">>" are subsets of the more aggregate sector above.

Labor Force and Employment

The employment in the NLP has been growing at 1.5% per year for the past 10 years. Over the same period, WUP employment has been growing at 1.0% per year and EUP employment has been stagnant (Figure 4.1). These trends are mirrored in the civilian labor force (Appendix Table A4.17). Unemployment peaked in 1992 in northern Michigan and declined until 2000, a census year often used for comparative purposes (Figure 4.2). Unemployment rates have increased since then. Unemployment rates are generally higher in northern Michigan than in the state as a whole with the highest rates in the EUP, but there is significant variation on a county-by-county basis.

In 2005, the unemployment rate exceeded 10% in three UP counties: Baraga, Keweenaw, and Schoolcraft, and four NLP counties: Alcona, Montmorency, Oscoda, and Presque Isle (Figure 4.3, Appendix Table A4.18). The statewide rate was 6.7%. Geographically, southern counties have lower unemployment rates than most northern counties, and overall unemployment was much higher in 2005 than in 2000. In the NLP in 2005, there is a much higher rate of unemployment in the northeast Lower Peninsula, centered around Alpena County when compared to the northwest NLP.

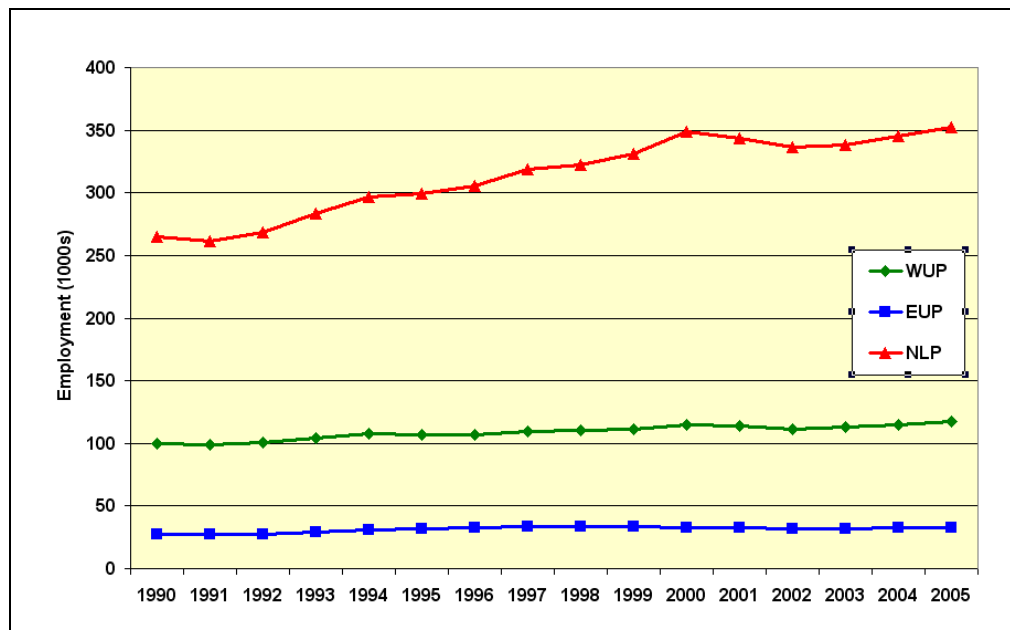


Figure 4.1. Employment by ecoregion, 1990 to 2005

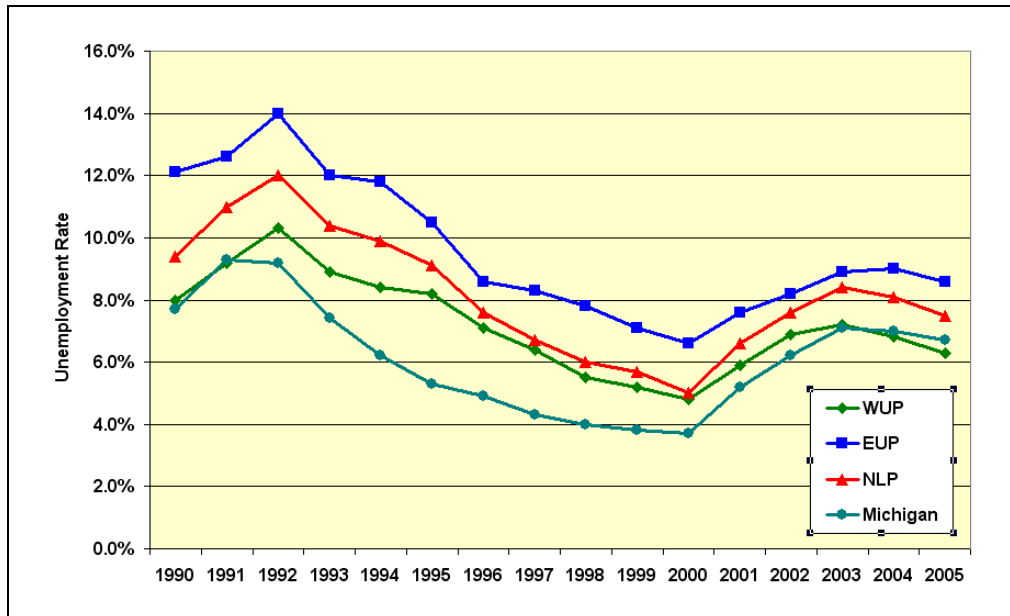


Figure 4.2. Unemployment rate by ecoregion and Michigan, 1990 to 2005

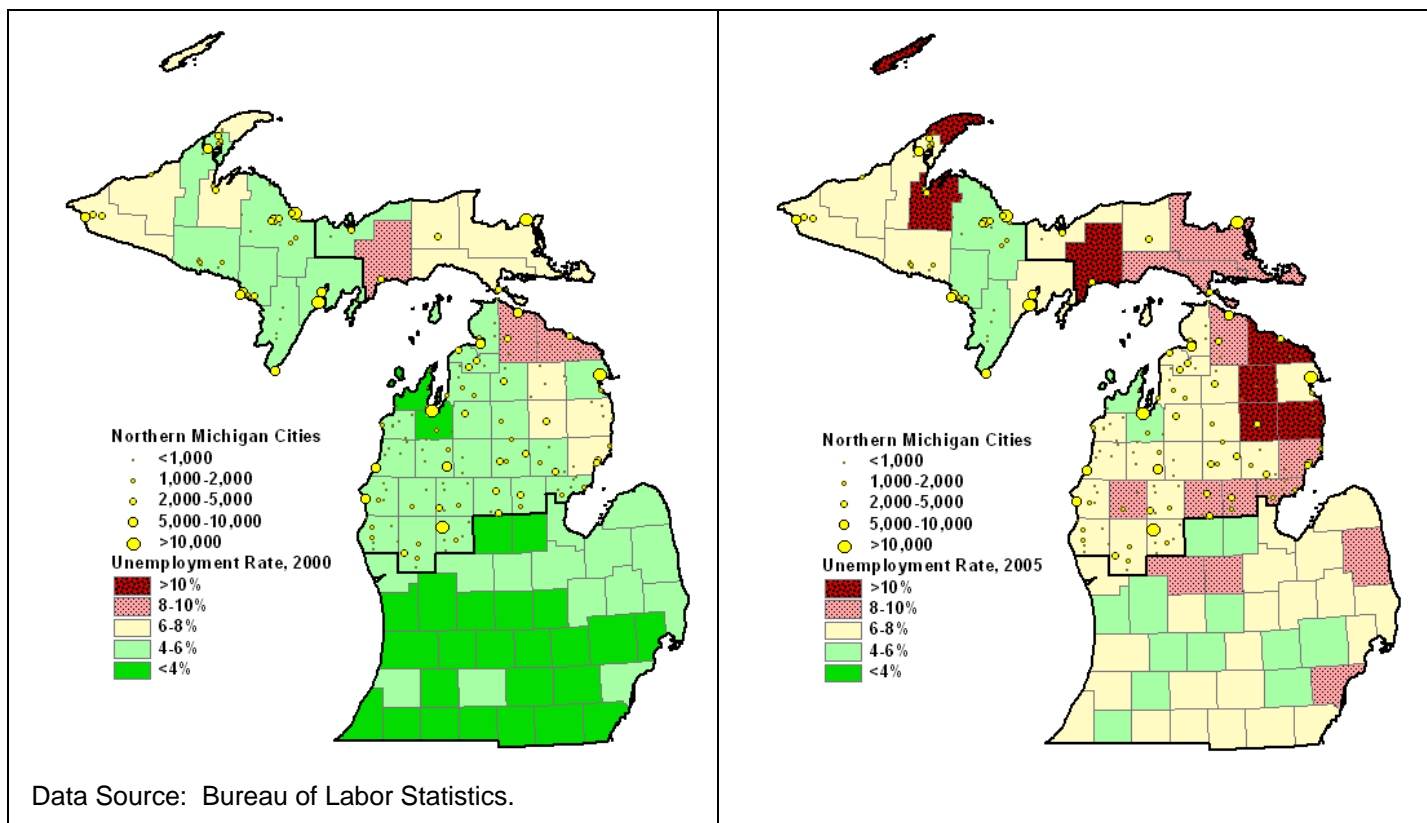


Figure 4.3. Unemployment rate by county, 2000 and 2005

Employment Seasonality

Seasonality is a distinct unemployment feature of northern Michigan (Figure 4.4, Appendix Table A4.19). High unemployment rates in the winter and spring are followed by relatively low rates during the summer and early fall. This corresponds with the tourist and seasonal home users visitation patterns. The seasonal trend is most pronounced in the EUP, followed by the NLP. Statewide trends are negligible. Another metric for seasonality is a measure of the month to month stability in employment (Figure 4.5). Stability is based on the standard deviation of monthly unemployment rates using the scale: Very Low (StDev < 1%), Low (1-2%), Medium (2-3%), High (3-4%), and Very High (> 4%). The counties near the Mackinac Straits have the highest variability. Variation in month-to-month unemployment is more pronounced in years with relatively high statewide unemployment (2005) and less in years with relatively lower statewide unemployment rates (e.g. 2000).

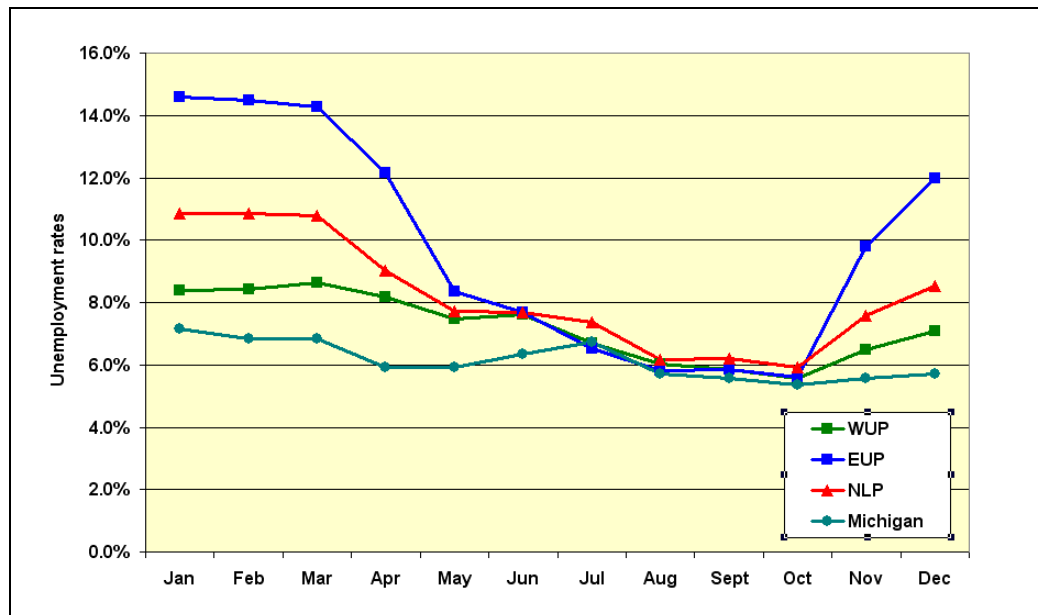


Figure 4.4. Average monthly unemployment rate by ecoregion, 1990 – 2005.

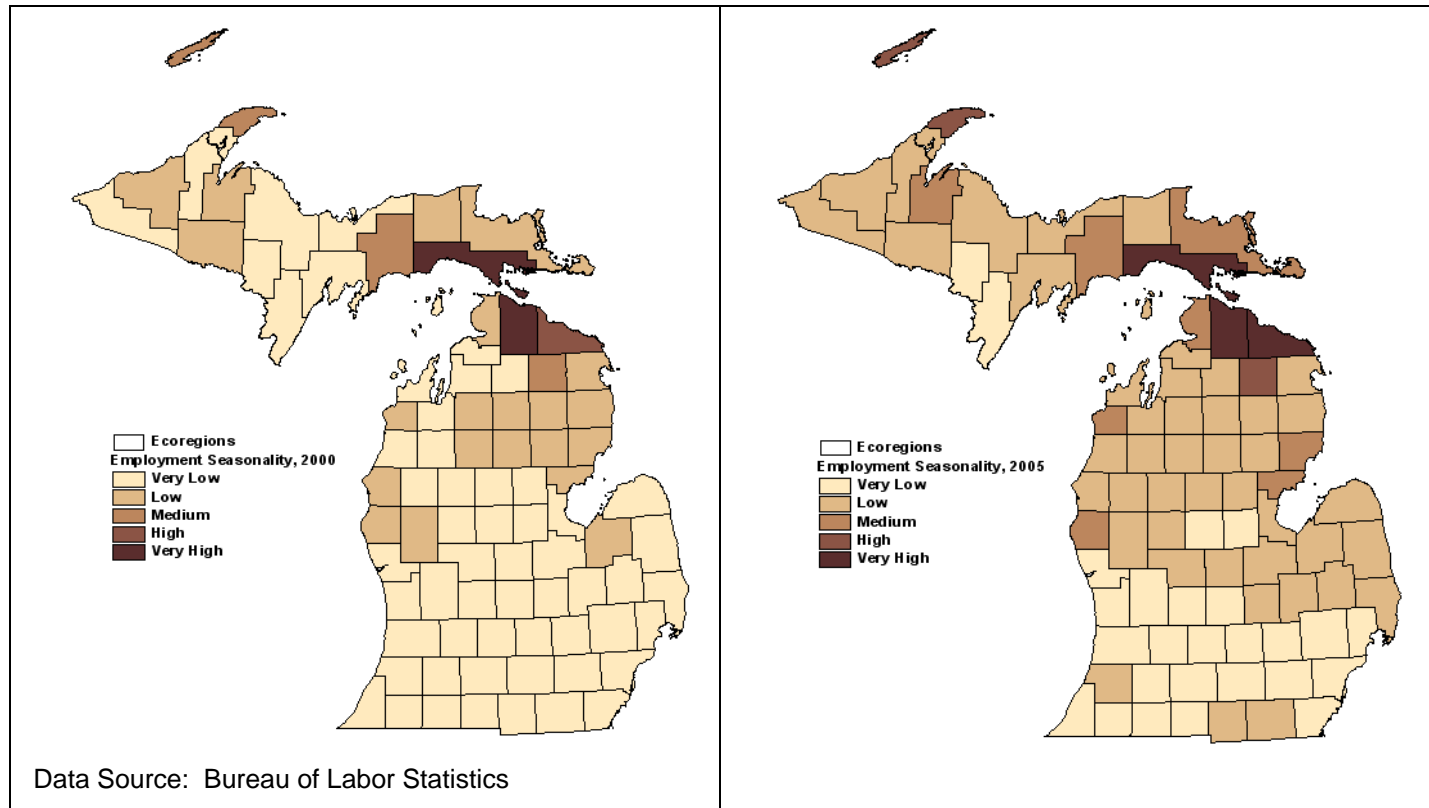


Figure 4.5. Variation in unemployment rate by county for 2000 and 2005.

Forest-related economic activities

Forest-related economic activities of primary interest include timber harvesting, wood products manufacturing, recreation and tourism, and minerals extraction.. For recreation and tourism and minerals extraction, forests often provide the settings for the activities. Due to data limitations, we can not distinguish between activities that are exclusively forest-related and those that are not. Hence, some portions of the activities are not associated with forests.

Timber and wood products

The MiDNR compiles data on employment of producers (logging/trucking firms), primary manufacturers, and secondary manufacturers (Table 4.5, Appendix Table A4.20). Primary manufacturers use products directly from the woods; secondary manufacturers add value to primary products (e.g., using boars to manufacture flooring). Some companies may have primary and secondary operations and do their own logging. In some cases, employment numbers are estimated and based on the employee range reported by firms. Most forest products employees are in the SLP, and are associated with secondary manufacturing. Logging operations are concentrated in northern Michigan where wood raw materials dominate the landscape. Delta County, home of NewPage Corporation's mill (formerly MeadWestvaco), has the largest number of employees.

The economic vitality of these industries is important regionally and for the State of Michigan. A recent study highlights some trends regarding the logging sector in Wisconsin and the Upper Peninsula of Michigan. (Rickenbach et al. 2005). Their findings regarding the business environment, timber production and supply, markets, and firm retention include

- The duration or length of ownership is fairly long, with the average number of years in which firms have been in business is over 20 years
- The average firm owner is 47 years old

- Most firms are characterized as one-person owner-operators
- Almost 2/3 's of the firms are fully mechanized
- Firms using feller-buncher systems and cut-to-length harvesting are the most productive, and chain-saw based firms are the least productive
- Most firms focus their harvest efforts on large timber sales
- Private, non-industrial forestlands are the primary source of stumpage for the region's logging sector
- Pulpwood is the primary output of the region's logging sector
- Almost 1/4 of the firms do not expect to be in business in five years.

Combined with large, recent sales of commercial forest program lands in the UP, the trends in the logging sector raise concerns about the long-term consequences of these changes. Older firm owners and expectations of leaving the industry may reduce the vitality of the logging sector and the firms that rely on timber supplies.

A Minnesota-based study provides some insights regarding Michigan's competitiveness with Minnesota's primary forest products industry (Minnesota Governor's Advisory Task Force. 2003). The Task Force findings indicated that Michigan was more competitive in the areas of wood and fiber availability and price, transportation (vehicle weight limits), wood and fiber quality, research and forestland productivity. Minnesota was viewed as more competitive in terms of energy costs and education. Neither state had a clear advantage in taxation and labor/construction costs.

Table 4.5. Employment and firms in the forest products industries by county and ecoregion, 2005.

Region/County	Estimated Employees	Logging/ Trucking Firms	Primary Manufacturing Firms	Secondary Manufacturing Firms
WUP total	10,397	335	61	87
EUP Total	1,976	111	19	21
NLP Total	7,092	287	147	169
Michigan	88,774	840	339	1,291

Data Source: Data compiled by Jack Pilon, Michigan DNR, Gaylord, MI.

Note: Data are generally based on 2005 information.

Recreation and Tourism

Recreation and tourism are important economic activities in northern Michigan. Unlike the forest products industries, recreation and tourism do not align well with governmental data collected on traditional economic sectors. Rather, their economic activities are scattered among many sectors including Retail Trade, Arts, Entertainments, and Recreation, and Accommodations (Table 4.4). Many recreation activities, including hunting and fishing, involve trips away from home. To account for travel, the standard definition used by the industry for tourism is all trips of 50 miles or more (one way), with minor exceptions (commuting for work or school). This definition includes business trips, visiting friends and relatives as well as pleasure trips (D. Stynes, Michigan State University, pers. com., August 8, 2006).

Michigan estimates of tourism-related expenditures drew on estimates of trips from those reported by D.K. Shifflet, Travel Industry Association, for spending and on tourism satellite accounts that were based on Minnesota IMPLAN Groups' IMPLAN model sales data for key tourism-related industries (Table 4.6, Figures 4.6 and 4.7). Estimates of the percentage of sales in each industry to tourists were used to adjust total visitation downward. Spending profiles developed from various sources were used in the final step of estimating expenditures, but these may provide an underestimate because some en route expenditures may be lost due to using a 30-mile (rather than 50-mile) distance from the destination for collecting data.

Spending profiles have been developed for different types of visitors based largely on where they stayed. The segments are Motel, Camping, Seasonal Home, Visit Friends and Relatives, and Day Trips. Based on empirical data, visitor segments spend more money if they stay in a hotel or motel than if they stay in other types of lodging. And people on day trips spend the least amount.

Tourism-related spending associated with Motels, followed by Seasonal Homes, provide the majority of spending in the WUP and EUP (Table 4.6). Interestingly, the WUP, which has a much larger population base than the EUP, has comparable tourism-related spending. This is due to the tourism associated with Mackinaw Island. The NLP, in contrast, has the highest level of spending associated with Seasonal Homes. Given the predominance of spending in the southeast SLP, statewide, Motels are the largest segment. Grand Traverse, Mackinac and Emmet counties had the highest tourism-related spending in northern Michigan in 2000 (Appendix Table A4.21).

Table 4.6. Tourism-related spending by segment and ecoregion, 1995, 1997, and 2000.

Year	Motel	Camping	Seasonal Home	Visit Friends and Relatives	Day Trips	Total
Million dollars and percent						
Western Upper Peninsula						
1995	\$115.0	\$14.1	\$91.6	\$49.1	\$23.3	\$293.1
1997	\$114.0	\$16.0	\$103.0	\$53.0	\$36.0	\$322.0
2000	\$135.8	\$16.7	\$105.2	\$61.2	\$39.8	\$358.7
2000	37.9%	4.7%	29.3%	17.1%	11.1%	100.0%
Eastern Upper Peninsula						
1995	\$172.9	\$15.6	\$56.0	\$23.8	\$31.1	\$299.5
1997	\$200.0	\$17.0	\$66.0	\$15.0	\$61.0	\$362.0
2000	\$184.6	\$18.5	\$68.3	\$19.4	\$52.9	\$343.6
2000	53.7%	5.4%	19.9%	5.6%	15.4%	100.0%
Northern Lower Peninsula						
1995	\$530.2	\$113.4	\$663.4	\$127.4	\$94.2	\$1,528.5
1997	\$555.0	\$129.0	\$633.0	\$155.0	\$162.0	\$1,634.0
2000	\$532.3	\$129.2	\$671.7	\$190.3	\$172.3	\$1,695.5
2000	31.4%	7.6%	39.6%	11.2%	10.2%	100.0%
Michigan						
1995	\$2,567.0	\$340.0	\$1,041.0	\$1,860.0	\$570.0	\$6,378.0
1997	\$2,708.0	\$361.0	\$1,042.0	\$2,181.0	\$938.0	\$7,230.0
2000	\$3,731.0	\$373.0	\$1,116.0	\$2,519.0	\$1,152.0	\$8,891.0
2000	42.0%	4.2%	12.6%	28.3%	13.0%	100.0%

Note: Excludes air-related travel expenditures in counties with major airports.

Data Source: Stynes, D. Michigan county-level tourism spending estimates by lodging segments,

1995, <http://www.msu.edu/course/prr/840/econimpact/michigan/MIltsm95.htm>;

1997, <http://www.msu.edu/course/prr/840/econimpact/michigan/michtsm97.htm>;

2000, <http://www.prr.msu.edu/miteim/michtsm00.htm>.

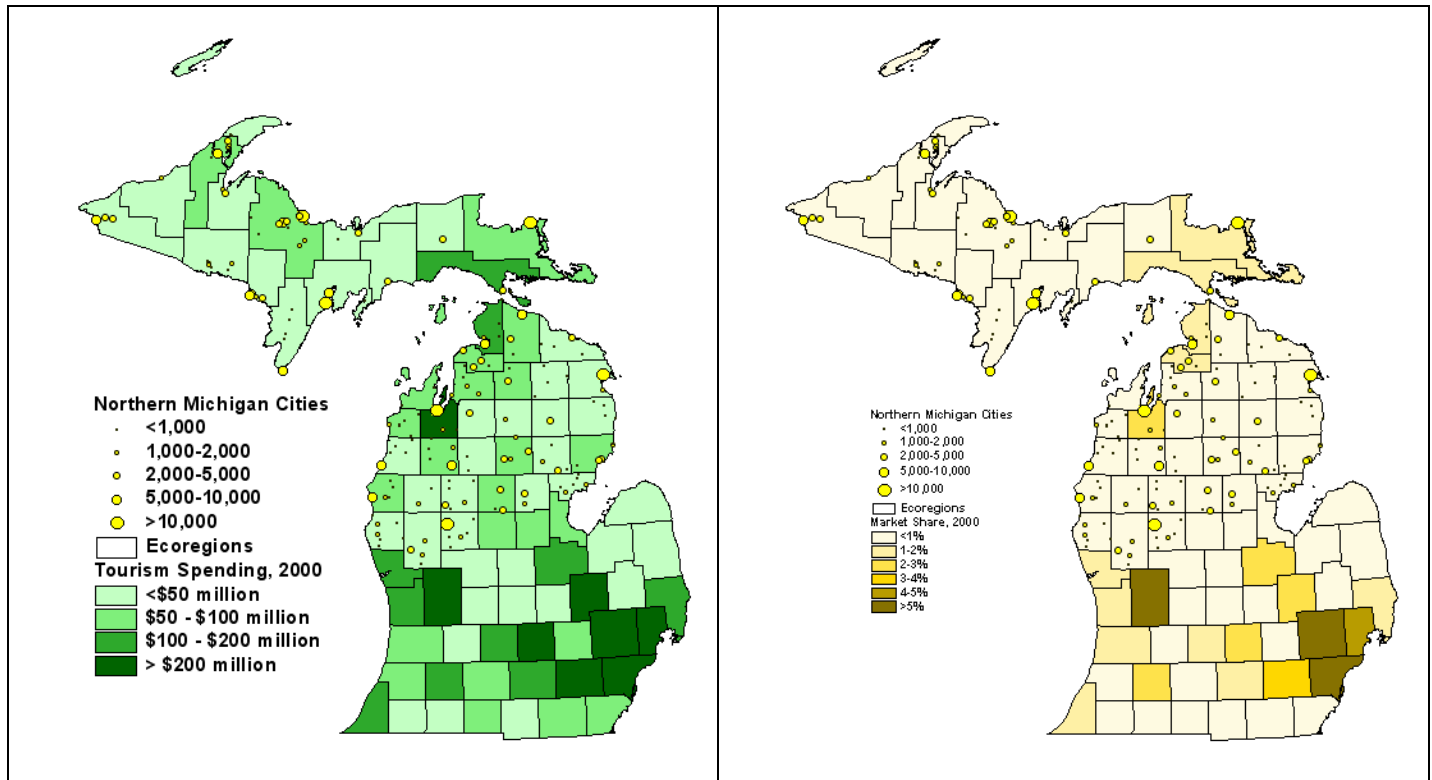


Figure 4.6. Tourism-related spending and state market share by county, 2000.

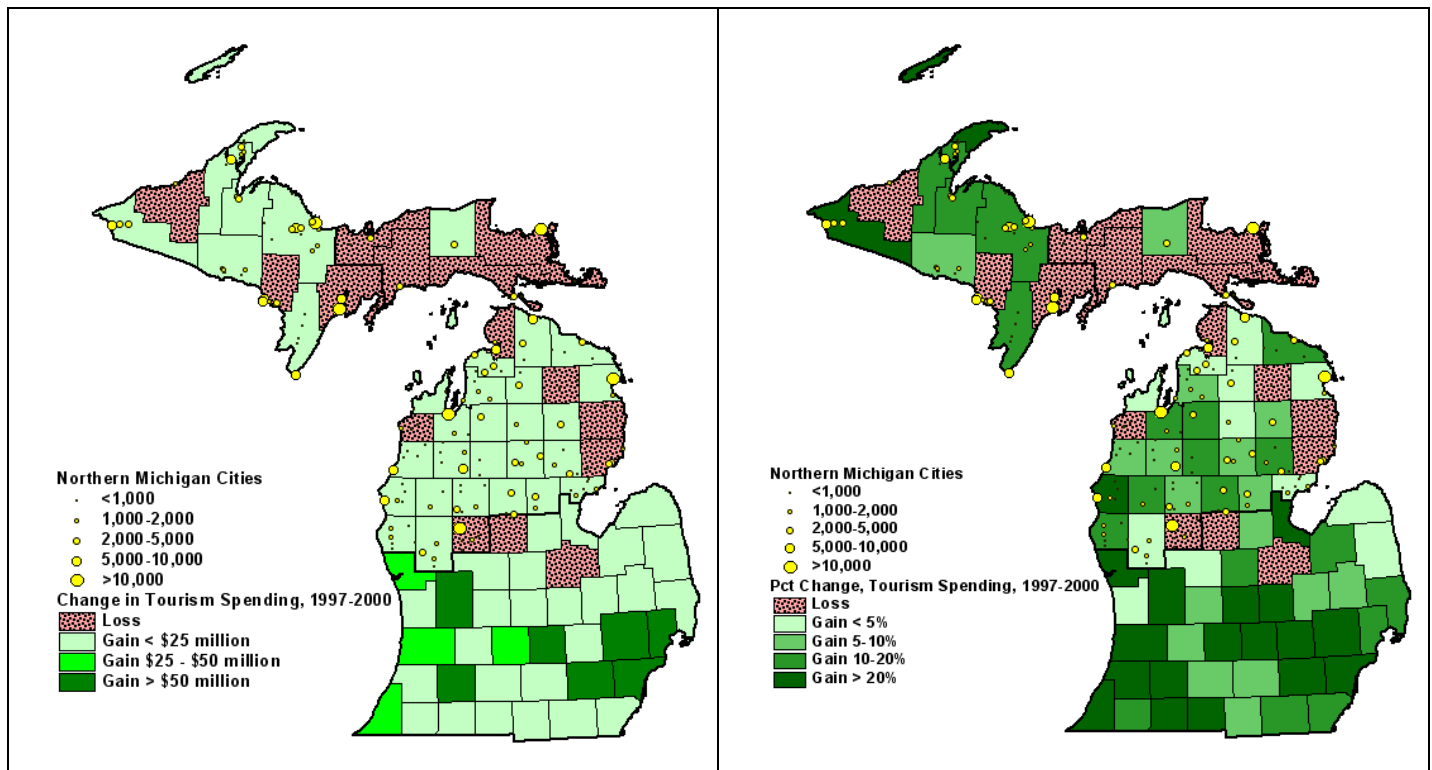


Figure 4.7. Change and percent change in tourism spending, by county, 1997 to 2000.

Minerals, oil and gas

Mining establishments are largely concentrated in the SLP and NLP, but there is a controversial proposal for a large new nickel and copper mine in the UP near Marquette (Table 4.1). There are other mining opportunities in the UP, too. Oil and Gas Extraction are solely in those ecoregions. During the 2000-2005 period, the number of Mining establishments has been fairly constant (Appendix Table A4.4.), but the number of employees has declined considerably (Appendix Table A4.16). Increased weekly wages (Appendix Table A4.12) have offset the decline in employee numbers yielding a steady level of income (total wages) for workers (Appendix Table A4.8). The separation of surface and subsurface rights makes minerals management a complex forest-related natural resource. Surface rights may, for example, be part of the state forest system whereas subsurface rights may be privately held. This leads to access issues in some instances.

Government Activities

Two direct economic activities with which the MiDNR affects economies of northern Michigan are MiDNR employment and payments to counties in lieu of taxes. Employment brings important wages to rural communities and generates additional economic activity through spending by the agency and by its employees. Conceptually, payments in lieu of taxes are simply government's substitution for taxes they would pay on their lands if they were not MiDNR lands. However, they are government payments to local taxing units, and therefore send revenue to local communities that contribute to economic well being.

DNR Employment

The number of MiDNR employees declined over the 1995-2005 period (Figure 4.8, Appendix Table A4.22). Counts are based on payroll processing figures on July 4 for all years. The payroll processing system changed in 2001, so Full Time/Other classifications changed for some employees (Mecosta County data not included.). Though detailed data from 1995-2000 and 2001-2005 are not directly comparable, there are downward trends in the WUP, EUP and NLP for the entire period and for the early and later years. The largest loss of MiDNR employees was in the NLP, especially in Roscommon and Crawford counties. Marquette County had the largest loss of MiDNR employees.

A second trend compounds the economic losses due to reduced overall employment, namely the switch from full-time to part-time or seasonal employees (Figure 4.9, Appendix Table A4.23). As with total employment, comparisons between early and later data must be made with care. But, clearly there has been a significant shift away from reliance on full-time employees as the mainstay of the MiDNR workforce. From a regional perspective, there are fewer wages flowing to northern counties due to reduced employment and to a shift away from full-time employees.

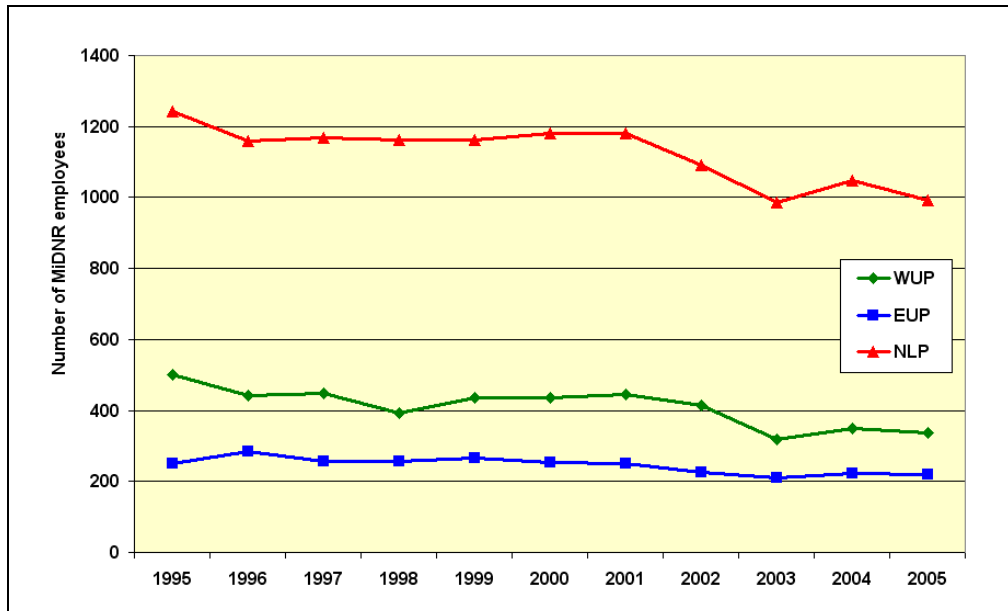


Figure 4.8. Number of MiDNR employees by ecoregion, 1995 – 2005. Note: Mecosta County data not included.

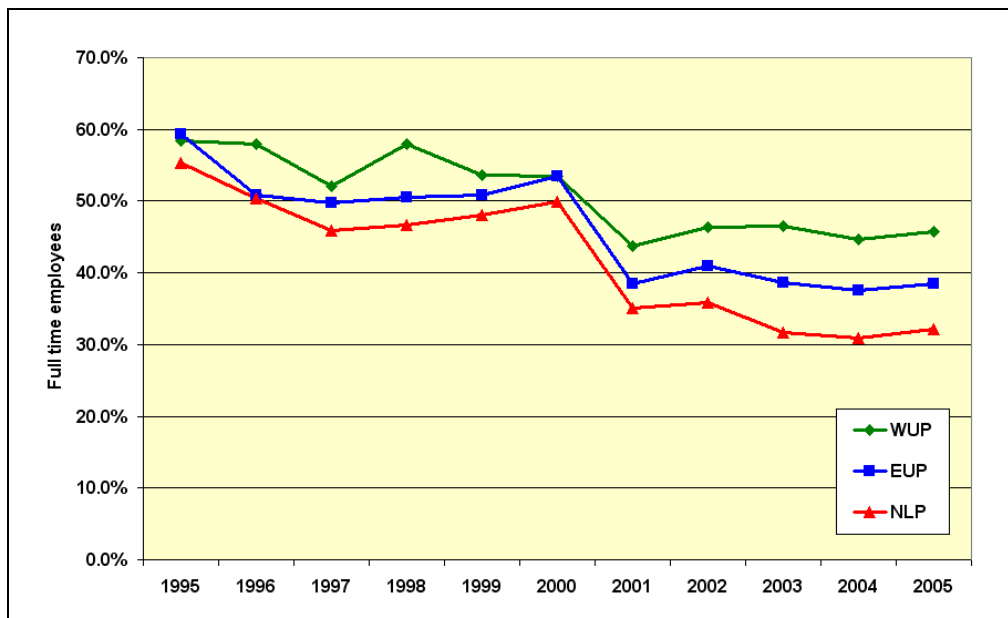


Figure 4.9. Percent of full-time MiDNR employees by ecoregion, 1995 – 2005. Note: Mecosta County data not included.

Payments in Lieu of Taxes (PILT)

The Natural Resources and Environmental protection Act of 1994 (P.A. 451) requires the state of Michigan to assess the value of state lands in each municipality and assessment district annually. This assessment is the basis for paying local units the “payment in lieu of taxes” for the state lands within their boundaries.

The payments have increased in recent years, with the largest payments in the Southern Lower Peninsula where land has a higher assessed value (Table 4.7). Tax-reverted lands (classified as swamp lands) are paid an annual rate of \$2/acre rather than being paid at an assessed value (Appendix Table A4.24). PILT payments are based on

multiplying the appropriate Taxable Valuation for the year times the appropriate millage rate. Currently, PILT property falls under the category of “agricultural” for tax purposes.

A new policy, Public Act 513 of 2004, modified the PILT payment structure. It amended the Natural Resources Environmental Protection Act by eliminating reimbursements for the State education tax from PILT funds to the school aid fund. Beginning in Fiscal Year 2005-06, the portion of the payments that represent assessments by local school districts, intermediate school districts, or community college districts will be charged against the School Aid Fund rather than the state general fund. Therefore the Tax Year 2005 report is several million dollars less than the Tax Year 2004 figure. The State Tax Commission (STC) issued Bulletin #15 of 2005 related to P.A. 513 of 2004. The bulletin instructs assessors to record PILT property on a separate tax roll to be known as the “Act 513 Roll” and to attach it to their ad valorem roll. All PILT property is to be removed from the ad valorem assessment roll by taking an ‘equalization loss’ and ‘capped value (Headlee) losses’. The separate roll is being established due to constitutional issues and negative values for agricultural properties.

Table 4.7. MI DNR payments to counties in lieu of taxes by ecoregion, 1999-2004.

Year	Western Upper Peninsula	Eastern Upper Peninsula	Northern Lower Peninsula	Michigan
1999	\$2,129,949	\$2,195,574	\$5,942,185	\$15,341,511
2000	\$2,176,385	\$2,225,961	\$6,120,201	\$15,784,038
2001	\$2,207,840	\$2,234,230	\$6,260,134	\$16,205,448
2002	\$2,223,197	\$2,240,409	\$6,402,834	\$16,511,842
2003	\$2,212,380	\$2,213,753	\$6,295,149	\$16,279,408
2004	\$2,363,807	\$2,241,728	\$6,537,225	\$17,028,568
Average Annual Increase	\$151,426	\$27,975	\$242,076	\$749,161

Regional economic well-being

Regional economic well-being is defined in the context of households’ income, per capita personal income, income sources, housing characteristics, and land values. These measures provide a broad context for understanding economic dimensions of northern Michigan that affect people at the household or personal level, helping to characterize people who live near state forests.

Household and per capita income

Median household income in 2000 was lowest in the WUP and highest in the SLP (Table 4.8, Figure 4.10). Most of the lowest income counties were located in northern Michigan; Lake County in the NLP had the lowest median household income, \$26,622, followed by Gogebic County in the WUP at \$27,405 (Appendix Table A4.25). A higher percentage of households with annual incomes of less than \$10,000 and less than \$25,000 per year were also concentrated in northern Michigan. For household incomes of less than \$10,000 per year, the range was from 5.4% in Grand Traverse County to 17.5% for Lake County. The overall pattern shows the WUP with the lowest median household income and largest percentage of households with annual incomes less than \$10,000 and \$25,000. The WUP is followed by the EUP and finally the NLP. The NLP has the highest percentage of households with annual incomes greater than \$100,000. However, this percentage is still less than half of the statewide rate. The study region had fewer households with an annual income of \$50,000 or more than the state as a whole. Only 29 to 31 percent of the households in the three ecoregions exceeded this level while 44 percent of the households statewide had incomes above \$50,000 in 2004.

Per capita personal income mirrors the household income patterns with lower per capita incomes concentrated in northern Michigan (Figure 4.11). The lowest per capita personal income in northern Michigan was in Luce County, and the highest was in Emmet County (Appendix Table A4.26). There were gains in per capita income between 2000 and 2004, but a portion of this was due to inflation.

Table 4.8. Households and household income by ecoregion, 2000

Ecoregion	Median HH Income	Households	HH < \$10,000 income		HH < \$25,000 income	
			Count	Percentage	Count	Percentage
WUP	\$32,856	98,260	11,464	11.7%	37,144	37.8%
EUP	\$33,822	28,462	3,221	11.3%	10,444	36.7%
NLP	\$35,507	298,375	28,103	9.4%	100,082	33.5%
Michigan	\$44,667	3,788,780	313,905	8.3%	1,002,138	26.5%
			HH > \$50,000 income		HH > \$100,000 income	
WUP	\$32,856	98,260	28,860	29.4%	4,629	4.7%
EUP	\$33,822	28,462	8,149	28.6%	1,160	4.1%
NLP	\$35,507	298,375	93,603	31.4%	17,901	6.0%
Michigan	\$44,667	3,788,780	1,691,897	44.7%	480,461	12.7%

Source: US Census 2000.

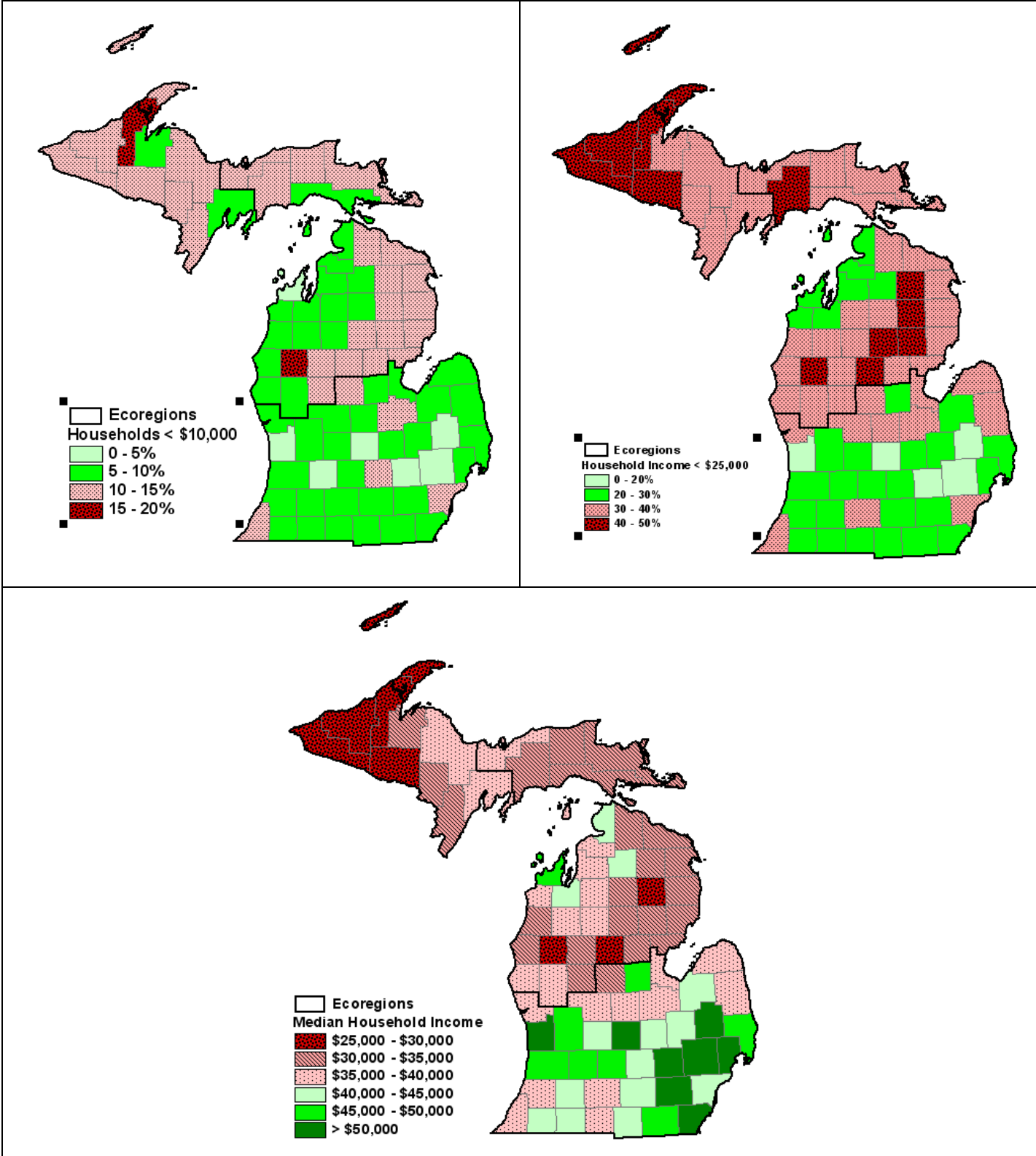


Figure 4.10. Median household income by county and ecoregion, 2000

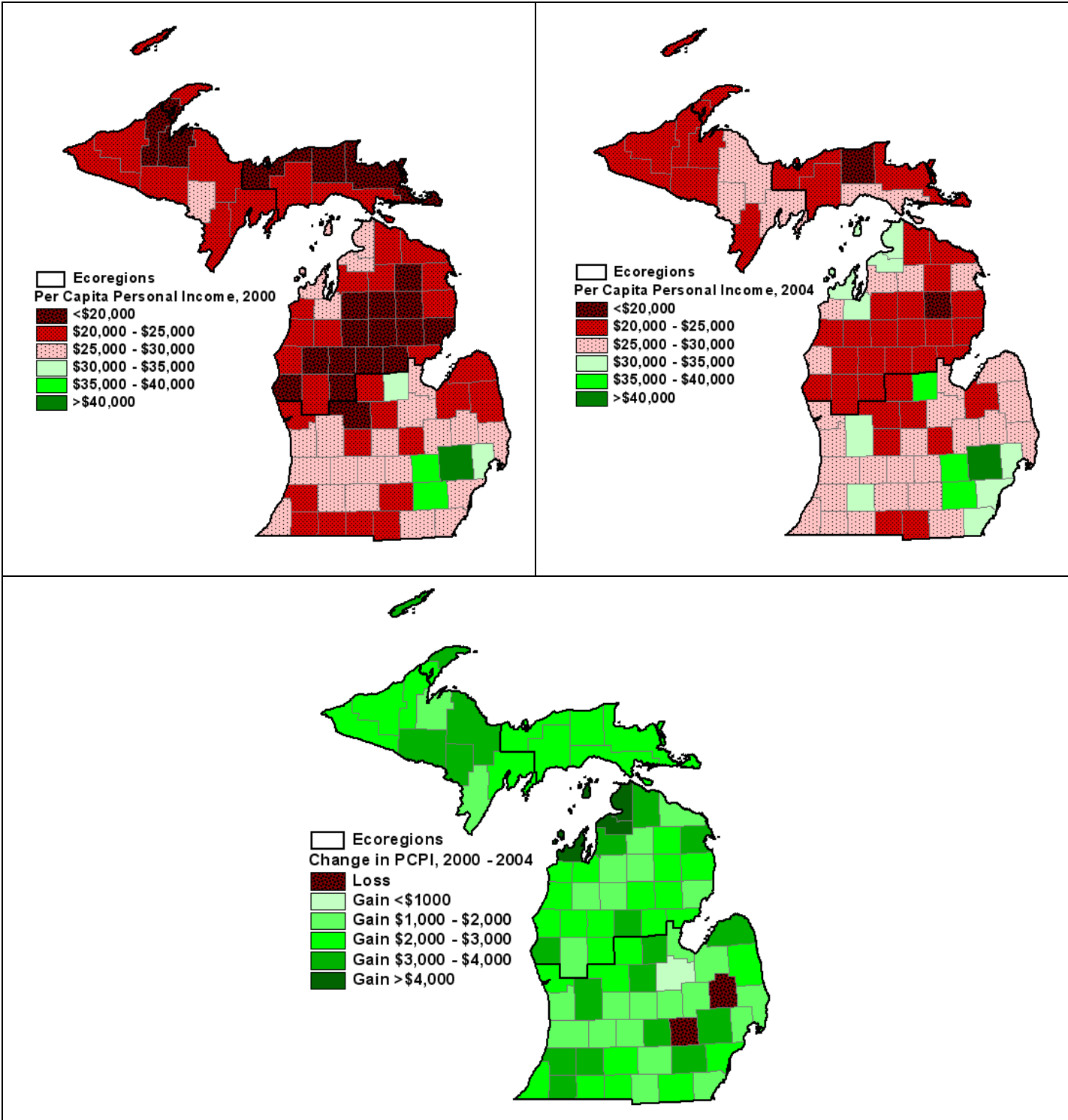


Figure 4.11. Per capita personal income trends by county and ecoregion, 1970-2004

There are multiple sources of income for households, including earnings (wages and salaries), social security, and public assistance. The WUP, EUP and NLP had lower percentages of households with income from earnings than the statewide average (Table 4.9). Alcona County had the lowest percentage of households with earnings income, 57.9%, and Grand Traverse County had the highest, 82.6% (Appendix Table A4.27). Ten counties had over 40% of the households with Social Security as a source of income: Gogebic, Iron, Keweenaw, Alcona, Iosco, Lake, Montmorency, Oscoda, Presque Isle, and Roscommon. Northern Michigan ecoregions had less dependence on public assistance than the SLP. Retirement income was very important to northern ecoregions; all had more reliance on it than the state as a whole. Thirty-seven percent of Alcona County households had income from retirements whereas only 17.8% of Emmet County households had retirement as a source of income.

Table 4.9. Household with earnings and income sources by county and ecoregion, 2000

Ecoregion	1999	2000	With Earnings income	With Social Security Income	With Supplemental Security Income	With Public Assistance Income	With Retirement Income
	Households		Percent of Households (1999)				
Western Upper Peninsula	98,260	98,291	72.8%	33.6%	3.9%	3.2%	22.7%
Eastern Upper Peninsula	28,462	28,413	73.8%	33.2%	4.3%	3.5%	24.6%
Northern Lower Peninsula	298,375	298,068	73.2%	34.1%	4.7%	3.4%	24.5%
Michigan	3,788,780	3,785,661	80.2%	26.2%	4.2%	3.6%	19.2%

Data Source: Bureau of Census, 2000.

Notes: Social Security Income - Social Security pensions, survivor's benefits and permanent disability insurance payments made by the Social Security Administration prior to deductions for medical insurance and railroad retirement insurance payments from the U.S. Government. Medicare reimbursements are not included. Supplemental Security Income (SSI) is a nationwide U.S. assistance program administered by the Social Security Administration that guarantees a minimum level of income for needy, aged, blind, or disabled individuals. Public Assistance Income - Public assistance income includes general assistance and Temporary Assistance for Needy Families (TANF). Separate payments received for hospital or other medical care (vendor payments) are excluded. This does not include Supplemental Security Income. Retirement or Disability Income - Retirement pensions and survivor benefits from a former employer, labor union or federal, state, county or other governmental agency; disability income from sources such as worker's compensation, companies or unions, federal, state or local government and the U.S. military; periodic receipts from annuities and insurance and regular income from IRA and KEOGH plans.

Housing Characteristics and values

Housing information provides another dimension to a social and economic assessment and gives indications on the structure and wealth of local communities. Housing values are quite variable, as are forest land values.

The number of housing units reflects the population within a given ecoregion. Hence, the largest number of housing units in northern Michigan were in the NLP in 2000 (Table 4.11). Grand Traverse County had the largest number of housing units in the NLP, and Marquette County had the largest number in the UP—both have over 30,000 units (Appendix Table A. 4.28). Seasonal homes and their owners play an important economic and social role in northern Michigan. Six counties have 45% or more of their housing units classified as seasonal: Keweenaw, Alcona, Lake, Montmorency, Oscoda, and Roscommon. Only Grand Traverse County has less than 10% of the housing units classified as seasonal. The WUP has the highest percentage of owner occupied housing units in northern Michigan, and the NLP has the lowest. Only two counties, Dickinson and Grand Traverse, exceed the statewide average of 66% of housing that is owner occupied. Marquette is the only county that exceeds the

statewide percentage of renter-occupied housing units. Finally, the patterns of median rent and median home value are similar with the WUP lowest and the NLP highest. Gogebic County had the lowest median home value, \$39,700, in northern Michigan, and Leelanau County had the highest, \$165,400.

Table 4.11. Housing units and median value by county and ecoregion, 2000

Region/ county	Total Housing Units	Seasonal	Owner Occupied	Renter Occupied	Heat with Wood	Median Rent	Median Home Value
WUP Region	129,162	16.6%	58.0%	18.1%	4.8%	\$378	\$64,700
EUP Region	44,515	30.4%	49.5%	14.3%	5.9%	\$413	\$77,219
NLP Region	457,546	29.8%	53.2%	11.9%	4.4%	\$464	\$92,971
Michigan	4,234,279	5.5%	66.0%	23.4%	1.3%	\$546	\$115,600

Data Source: Census 2000

Land values from selected studies and MI DNR data (acquisition/disposal)

Few data are readily available to assess forest land property values in northern Michigan. One source of data, based on a very limited sample, is the annual survey of Michigan land values and leasing rates conducted by Michigan State University (Table 4.12). Recreational lands are probably the closest category to forest lands, and the northern Michigan per acre value was approximately half as much as the SLP value. Recent MiDNR purchases of forest land in the UP reflect a considerably lower value (Table 4.13). The price differences reflect market conditions and property characteristics. Most of these purchases were aimed at expanding deer habitat on wetter sites in the UP.

Two studies related to effects of state forests (public lands) on forest land values were found. Jones (2001) and White and Leefers (In review) found very little effect of public lands on property values of undeveloped lands. White and Leefers hypothesized that the small effect was due to a lack of scarcity. Public lands are very common in northern Michigan so proximity to them is not very important given an abundance of forests and public lands. Leefers and White examined sales of properties in Wexford County and observed a flattening of price per acre if parcel sizes exceeded 20 acres (Figure 4.12).

Table 4.12. Value of undeveloped, non-agricultural land by region, 2003 - 2005

Region	Year	Type of Land Use		
		Residential	Commercial/ Industrial	Recreational
SLP	2003	10,274	23,558	4,422
SLP	2004	11,499	35,168	4,869
SLP	2005	14,351	41,669	5,021
WUP + EUP + NLP	2003	4,211	64,500	2,406
WUP + EUP + NLP	2004	3,788	10,408	3,305
WUP + EUP + NLP	2005	3,426	29,930	2,594

Data Source: Department of Agricultural Economics, Michigan State University.

Table 4.13. Recent purchases of forestland parcels by the MiDNR

Parcel	Acres	County	Price	Price/acre
Escanaba Paper Co.	600	Chippewa	\$240,000	\$400
Escanaba Paper Co.	905	Chippewa	\$491,000	\$543

Forster Estate	75	Chippewa	\$42,000	\$560
Carolo Trust	40	Dickinson	\$73,000	\$1,825
Dittrich	624	Chippewa	\$550,000	\$881
Keweenaw Land Co.	120	Dickinson	\$150,000	\$1,250
Renner	40	Mackinac	\$44,000	\$1,100
Al Weecks	635	Dickinson	\$350,000	\$551
Burt Carly	154	Schoolcraft	\$177,000	\$1,149
Pat Carly	117	Schoolcraft	\$141,000	\$1,205
Cedarwood, LLC	5,100	Chippewa	\$3,300,000	\$647
Total	8,410		\$5,558,000	\$661

Source: Michigan DNR

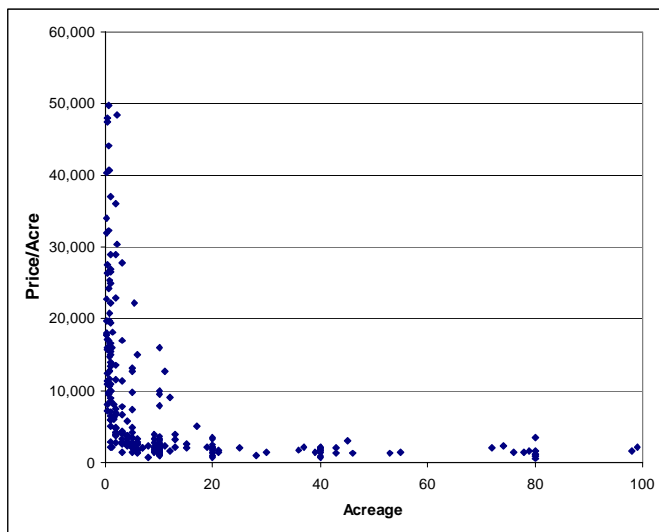


Figure 4.12. Per acre price for undeveloped parcels sold in Wexford County, 2000-01 (Source: Leefers and White 2003).

Natural resource dependency

The dependence of Michigan communities, counties and regions on natural resources is not well studied. Two unpublished sources provide some insights regarding dependence of Michigan counties on natural resources. Many northern Michigan counties are dependent on wildland-based earnings derived from four broad industries—timber, grazing, mining, and recreation and wildlife (Figure 4.13, Appendix Table A4.29). Ontonagon had the highest dependency (50%) followed closely by Alger County (49%). Many northern Michigan counties are fairly dependent on these industries. In a similar type of study on dependency on forest products industries, counties were classified as dependent if 15% or more of their economic sales were associated with selected forest products industry sectors (Table 4.14). Ten counties met this standard for dependency; most were in the Upper Peninsula. Hence, dependence can be defined in several ways, but recent studies of dependence related to natural resources are lacking.

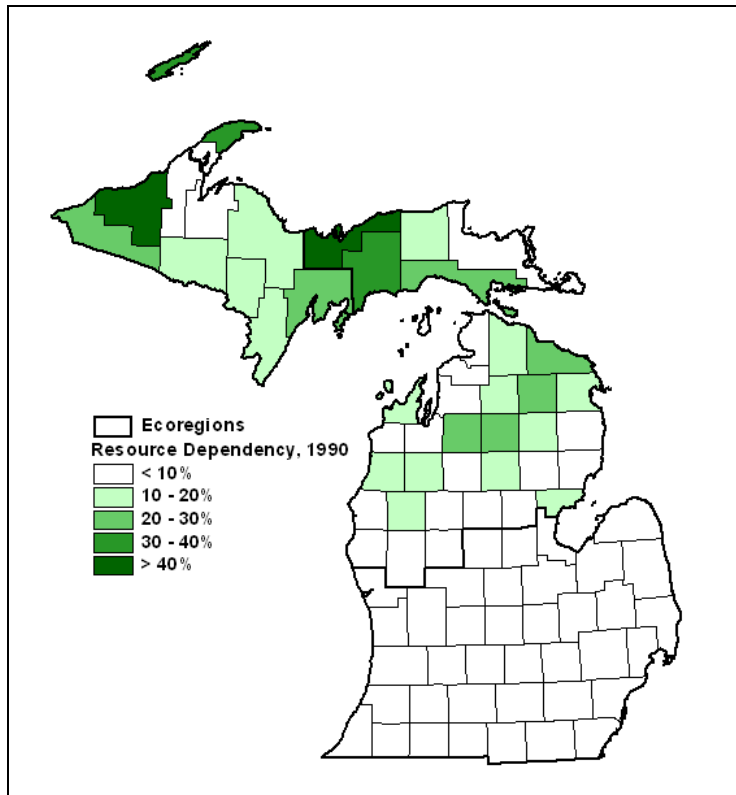


Figure 4.13. Percent of total county earnings (dependency measure) from wildland-based industries, 1990
 Source: E. Schuster, USDA-Forest Service, unpublished data, 1993.

Table 4.14. Percent of total county earnings (dependency measure) from forest products industries, 1996

Area Name	Output percent from forest products	Employment percent from forest products
Crawford County	15.0	7.0
Gogebic County	18.8	7.9
Menominee County	22.0	6.8
Dickinson County	26.9	5.7
Ontonagon County	27.1	11.7
Manistee County	28.0	6.1
Schoolcraft County	29.3	10.5
Delta County	29.5	10.1
Luce County	45.5	16.0
Alger County	47.4	21.2

Source: M.Vasievich, USDA-Forest Service, unpublished data, 2000.

References

- Jones, D.M. 2001. Effects of proximity to public lands on private property values: an hedonic price analysis. Ph.D. dissertation, Michigan State University. 176 p.
- Leefers, L.A. and E.M. White. 2003. Hedonic pricing: analysis of property values and land use. In Web Accessible Natural Resource Information/Decision Support System Final Report (July 2003), Michigan State University, Victor Institute for Responsible Land Use and Development. Section 14, 5 p.
- Minnesota Governor's Advisory Task Force. 2003. Governor's advisory task force report on competitiveness of Minnesota's primary forest products industry. Minneapolis, MN: Governor's Office. 34 p.
- Rickenbach, M., T.W. Steele, and M. Schira. 2005. Status of the logging sector in Wisconsin and Michigan's Upper Peninsula, 2003. Madison, WI: University of Wisconsin Extension. 40 p.
- White, E.M, and L.A. Leefers. In review. Influence of natural amenities on residential property values in a rural setting. *Society and Natural Resources*.

5. Natural Resources Production

Introduction

The USDA Forest Service conducts a continuous inventory of forest lands throughout the United States. According to 2002 USDA-Forest Service statistics (Smith et al. 2003), Michigan ranks sixth in the nation in terms of timberland. Michigan is the only Midwestern or Northeastern state listed in the in the top ten (Table 5.1).

Table 5.1. Top twenty states in terms of timberland area (thousand acres) in 2002.

State	Timberland	State	Timberland
1. Oregon	23,831	11. Maine	16,952
2. Georgia	23,802	12. Idaho	16,824
3. Alabama	22,922	13. Pennsylvania	15,853
4. Montana	19,185	14. Wisconsin	15,701
5. North Carolina	18,664	15. Virginia	15,371
6. Michigan	18,616	16. Minnesota	14,723
7. Mississippi	18,572	17. Florida	14,636
8. Arkansas	18,373	18. Tennessee	13,956
9. California	17,781	19. Louisiana	13,722
10. Washington	17,347	20. Kentucky	12,347
	16,952	United States	503,540

Source: Smith, et al. 2003.

Michigan timberland is slightly more than one-third in public ownership (35%) with 14% in National Forests and 20% in State ownership according to 2002 USDA statistics (Smith et al. 2003), shown in Table 5.2. County and municipal ownership is minor in Michigan, about 1%, with most land in this ownership category located in Gogebic county. Private timberland makes up 65%. More than half of all timberland (57%) is owned by nonindustrial private owners (NIPF).

Michigan's timberland area has declined slightly since 1953, however, timberland area has increased from levels in the 1980's. Although timberland area statistics are reported for 2002 by the Forest Service in this national report, the inventory data are actually based on the most recent periodic forest inventory measurements (1993) available at the time the data were compiled. Additional information on trends based on more recent inventory data are presented below.

The USDA classifies timberland as follows: forest land that is producing or is capable of producing crops of industrial wood and not withdrawn from timber utilization by statute or administrative regulation. Areas qualifying as timberland are capable of producing in excess of 20 cubic feet per acre per year of industrial wood in natural stands. Currently inaccessible and inoperable areas are included.

Table 5.2. Trends in Michigan timberland area and ownership, 1953 to 2002.

Year	All owners	Total public	National Forest	State	County/Municipal	Total Private	Forest Industry	NIPF
1953	19,121	33%	13%	19%	0%	67%	8%	59%
1977	18,199	35%	13%	21%	1%	65%	12%	53%
1987	17,364	36%	14%	21%	1%	64%	11%	52%
1997	18,667	36%	14%	20%	1%	64%	8%	56%
2002	18,616	35%	14%	20%	1%	65%	8%	57%

Source: Smith, et al. 2003.

Land use

A recent study of land cover conducted by the USDA-Forest Service, North Central Research Station, in collaboration with scientists at the University of Michigan provides a look at Michigan's changing landscape (Potts, et al. 2004). The researchers used satellite imagery from 1980 and 2000 to classify land cover into six classes: urban or built-up, agriculture, forest, non-forest wetlands, open water, and barren. Figures 5.1 and 5.2 present comparative images of land cover changes for 1980 and 2000. These maps were constructed with a one square kilometer grid. GIS datasets are available for download from the author's web site (<http://esa.snre.umich.edu/projects/NCLands/CMAWebpage11.4.html>).

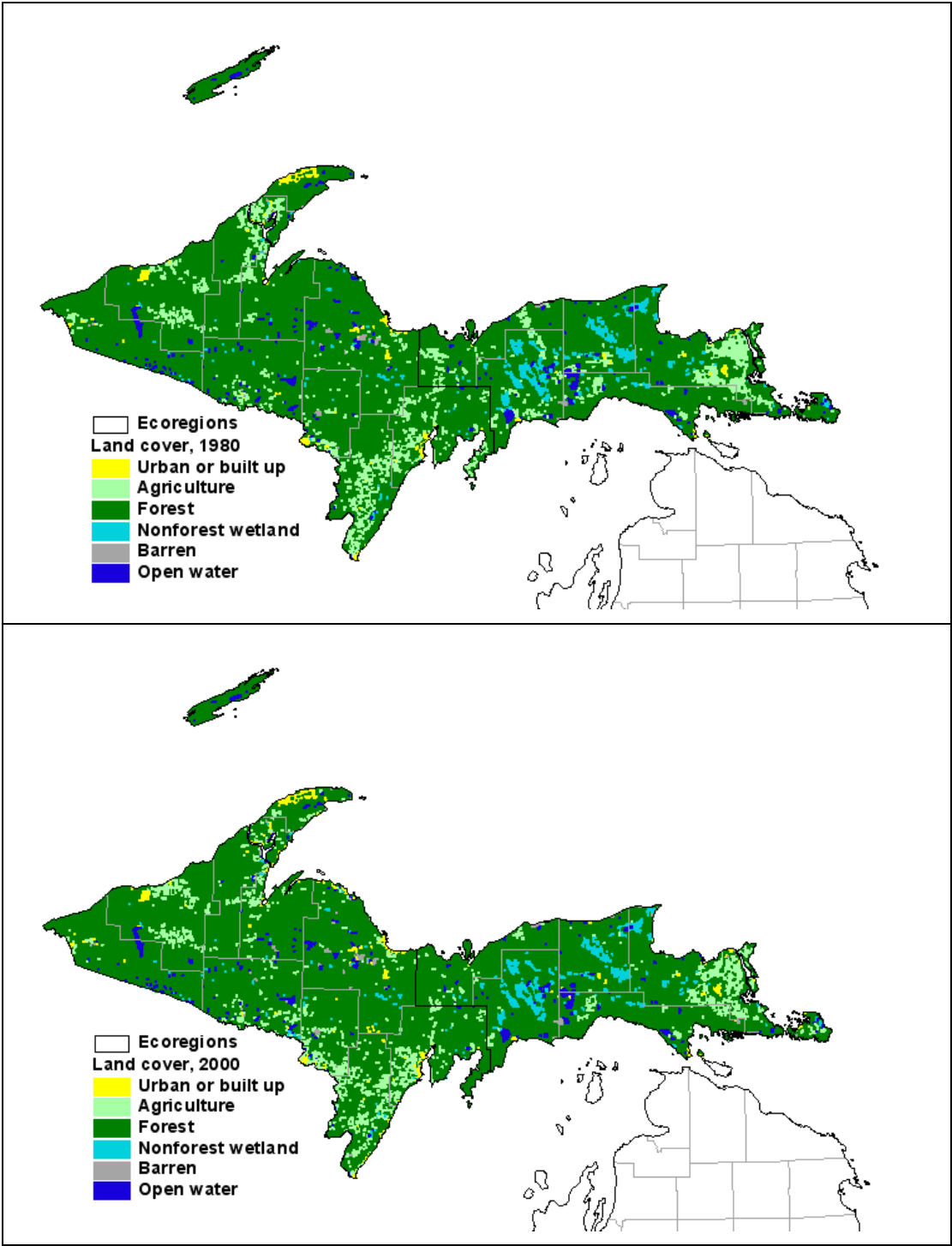


Figure 5.1. Distribution of land cover in the Upper Peninsula, 2000.

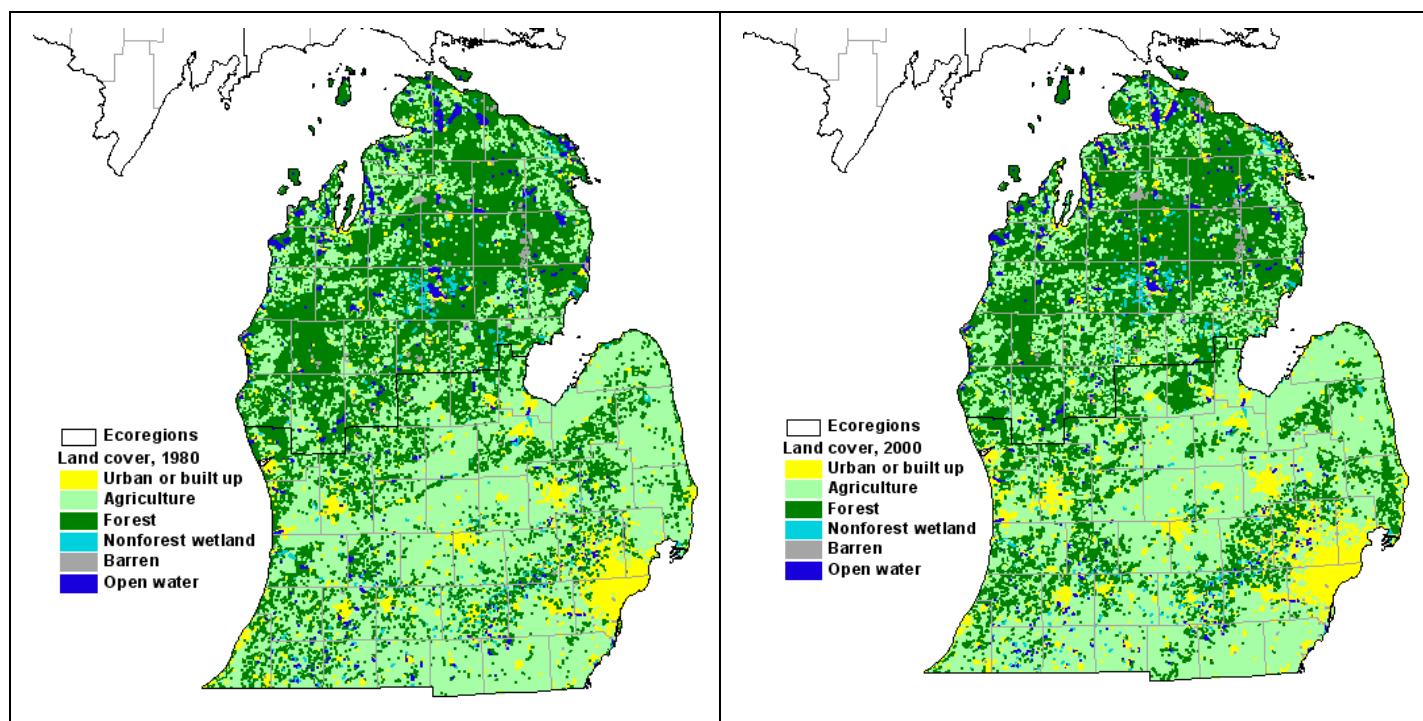


Figure 5.2. Distribution of land cover in the Lower Peninsula, 1980 and 2000.

Based on comparative analysis of remotely sensed data, forest cover increased statewide from 52% in 1980 to 54% in 2000. Table 5.3 compares 1980 and 2000 land cover data by ecoregion. The Eastern UP increased by one percent from 86% to 87% and the Northern LP increased from 70% to 74%. These gains in forest land mostly came at the expense of declines in agricultural lands.

Urban or built-up land increased from 3% of Michigan's total surface area in 1980 to 5% in 2000. Urban growth was particularly high in the Southern Lower Peninsula which increased from 7% to 9% of that region. Urban land in the Northern Lower Peninsula increased from 1% to 2%. No significant change was found in the amount of urban land in the Upper Peninsula.

These land cover classifications were based on interpretation of satellite imagery. The methods have some inherent limitations and the potential for misclassification exists. For example, cutover lands that have not yet regenerated may be classified as agricultural in some cases. Also, the methods may classify areas with low-density housing but continuous or nearly continuous forest canopy as forest cover. County level data are available in appendix table A5.1.

Table 5.3. Percent of ecoregions by land cover, 1980 and 2000

Year	Urban or Built-up	Agriculture	Forest	Nonforest wetlands	Open water	Barren
Western Upper Peninsula						
1980	1%	5%	92%	0%	1%	0%
2000	1%	5%	92%	0%	1%	0%
Eastern Upper Peninsula						
1980	0%	7%	86%	5%	2%	0%
2000	0%	6%	87%	5%	2%	0%
Northern Lower Peninsula						

Year	Urban or Built-up	Agriculture	Forest	Nonforest wetlands	Open water	Barren
1980	1%	25%	70%	1%	3%	1%
2000	2%	20%	74%	1%	3%	1%
Southern Lower Peninsula						
1980	7%	79%	13%	1%	1%	0%
2000	9%	74%	15%	1%	1%	0%
State						
1980	3%	42%	52%	1%	1%	0%
2000	5%	39%	54%	1%	1%	0%

Source: Land coverage summary data for 1980 and 2000 were compiled from land coverage GIS layers produced for the Changing Midwest Assessment. GIS data are available from <http://esa.snre.umich.edu/projects/NClands/CMAWebpage11.4.html>. The Changing Midwest Assessment is documented in Potts, et al. 2004.

Analysis of the GIS data by the authors of this report show that forest cover changed considerably in several counties over the 1980 to 2000 time span. In the Western UP, Dickinson county showed a 6.9% decline in forest area though this is likely due to classification of cutover lands as nonforest. Forest area in Houghton county showed a 5.9% increase. In the Northern LP, forest area in Lake county declined by 15.3% and Oceana county declined by 5.4%. This finding is likely due to classification of harvested lands as agriculture. These remote sensing classifications should be followed up to verify specific conditions on the ground.

Forest area in Newaygo, Grand Traverse, Montmorency, Emmet, Kalkaska and Leelanau counties increased from 5 to 10% over the same time period. Alpena, Presque Isle, Arenac, Mecosta, Antrim, and Missaukee counties increased forest area more than 10%. No changes greater than 5% were found in the Eastern UP.

Table 5.4. Counties by ecoregion with greater than 5% change in forest area from 1980 to 2000.

Ecoregion/ County	Forest Area Change 1980-2000
Western Upper Peninsula	
Dickinson	-6.9%
Houghton	5.9%
Northern Lower Peninsula	
Lake	-15.3%
Oceana	-5.4%
Newaygo	5.2%
Grand Traverse	5.4%
Montmorency	5.9%
Emmet	6.4%
Kalkaska	7.5%
Leelanau	9.5%
Alpena	12.7%
Presque Isle	13.6%
Arenac	14.3%
Mecosta	16.6%
Antrim	19.1%
Missaukee	20.2%
Charlevoix	20.6%

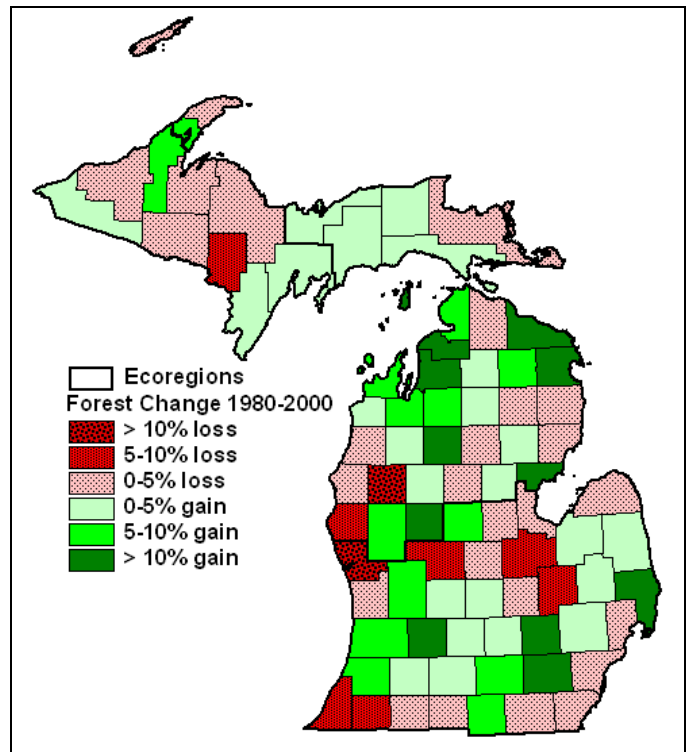


Figure 5.3. Change in forest cover from 1980 to 2000 by county.

Source: Potts, et al. 2004.

Forest area, type, distribution and ownership

The series of inventories conducted by the USDA Forest Service provide a detailed look at changing forest conditions in the State over the past several decades. Periodic inventories were conducted in 1980 and 1993 with plots throughout Michigan measured over a relatively short period (1 to 2 years). Earlier periodic inventories conducted in 1935, 1955, and 1966 are not reported here. Results of the 1980 inventory is documented in (Raile and Smith, 1983). The 1993 inventory is documented in (Leatherberry and Spencer, 1996). Some of the plots in these inventories were remeasured from earlier inventories and some plots were modeled. Starting in 2000, the Forest Service, Forest Inventory and Analysis (FIA) staff, implemented the sixth Michigan inventory cycle as an annual inventory in which one-fifth of the plots throughout the State are measured each year. With this system, some plots are measured each year and a full inventory requires plot measurements over a five-year period. The 2004 inventory reflects results measured over a five-year period, 2000 to 2004. The annual inventory changed some inventory procedures to conform to national standards. For example, changes were made in forest type, size, and landowner classification standards.

In 2006, the Forest Service released a “snapshot” report of the entire state based on the first five years of plot measurements. The 2004 inventory is documented in Hansen and Brand, 2006. The dataset for the 2004 collection of plot measurements was analyzed along with datasets for the 1980 and 1993 inventories to compile the information reported below. A glossary of specific FIA forest inventory terms is included in the appendix.

As with any inventory, there are errors associated with estimates derived from summaries of sampled plot data. The magnitude of errors typically increase as data are more finely subdivided for any grouping represented by fewer plots. For example, the error percent for estimates of timberland are smaller for the entire State than for an

individual ecoregion, and an individual county. Although a detailed analysis of the error terms and confidence intervals is beyond the scope of this study, the reader is cautioned that all estimates presented in this report (and in all other similar analyses of these inventory data) contain estimation errors due to sampling and analysis methods.

One specific difference between the 2004 inventory and earlier inventories involves the determination of reserved lands and some other categories where the extent of the land base is known (such as area of National or State forests). In the 1980 and 1993 inventories, classification of reserved lands was enumerated, or adjusted to the known area of legally reserved forest area. In the 2004 inventory, the extent of reserved land is based on the sampled data and not adjusted for known areas of reserved land. Also, for the 2004 inventory, the industrial landowner class was grouped with all other private in order to protect landowner privacy. This change, in effect, obscures the separate identification of the industrial land base in the most recent inventory data. While industrial timberland was once a clearly defined landowner category related to mill ownership, the distinction is no longer quite as clear. Changes in land ownership, particularly by institutions that do not own or operate mills, yet manage timberland for timber and other values blur the industrial landowner distinction. For example, some lands in Michigan are owned by timber investment and management companies who have no controlling interest in processing mills, but produce timber as one of their primary management objectives.

The forest inventory data represents a rich source of information to describe the characteristics of forest resources and many descriptive subdivisions are possible. This study presents basic data on area classification of forest land, timber volumes, growth, and removals summarized by ecoregions and broad forest types for the three most recent inventories – 1980, 1993, and 2004.

The total land base of Michigan is about 36.4 million acres as shown in Table 5.5. According to the 2004 forest inventory, the State is 53% forested with 19.3 million acres of forest land for all land ownership classes. The Western UP is 87% forest; the Eastern UP is 83% forest, and the Northern Lower Peninsula is 67% forest according to the most recent forest inventory (FIA) conducted by the USDA-Forest Service. Ninety seven percent of the forest land in the state, or 18.7 million acres, is classified as timberland. Michigan timberland increased from 17.4 million acres in 1980 to 18.7 million acres in 2004. Thirty percent of the State’s timberland is located in the Western Upper Peninsula ecoregion; 15% of the timberland is located in the Eastern Upper Peninsula, and 37% is in the Northern Lower Peninsula. Comparable county-level data are contained in appendix table A5.2.

The area of timberland increased slightly by 1 percent statewide from 1993 to 2004. Change in timberland was less than 1 percent in all regions, except the Eastern Upper Peninsula ecoregion. The area of timberland in the Eastern UP increased by 8% from 2.7 to 2.9 million acres from 1993 to 2004. The Eastern UP also showed a decline in reserved timberland area which could be due to sampling error since this is the smallest ecoregion with only five counties.

Table 5.5. Forest area (thousand acres) by land class for all owner groups, by ecoregion, 1980, 1993, and 2004.

Year	Total Land	Timberland	Reserved Timberland	Other Forest Land	Non-forest Land	Total Forest	Percent Forest
Western Upper Peninsula							
1980	6,806	5,606	271	54	875	5,930	87.1%
1993	6,937	5,708	232	23	973	5,963	86.0%
2004	6,917	5,686	240	80	911	6,006	86.8%
Eastern Upper Peninsula							
1980	3,526	2,734	144	57	592	2,935	83.2%
1993	3,572	2,690	118	41	723	2,849	79.8%
2004	3,613	2,903	29	65	617	2,996	82.9%
Northern Lower Peninsula							
1980	10,361	6,449	180	77	3,656	6,706	64.7%

Year	Total Land	Timberland	Reserved Timberland	Other Forest Land	Non-forest Land	Total Forest	Percent Forest
1993	10,360	6,896	170	27	3,267	7,093	68.5%
2004	10,402	6,870	44	98	3,390	7,012	67.4%
Southern Lower Peninsula							
1980	15,433	2,704	87	7	12,634	2,799	18.1%
1993	15,489	3,321	54	0	12,114	3,375	21.8%
2004	15,475	3,286	8	2	12,178	3,297	21.3%
State							
1980	36,126	17,493	682	194	17,757	18,369	50.8%
1993	36,358	18,616	575	90	17,077	19,281	53.0%
2004	36,408	18,746	321	245	17,096	19,312	53.0%

Source: 1980 and 1993 data are derived from the Eastwide Forest Inventory datasets. 2004 data are derived from the 2004 FIA Snapshot dataset (<http://www.ncrs2.fs.fed.us/FIADatamart/fiadatamart.aspx>) which includes plots taken in 2000 to 2004.

Table 5.6 provides a breakdown of Michigan forest land in State ownership for 1980, 1993, and 2004. Ninety to 98% of the forest land in State ownership is classified as timberland, depending on ecoregion. The WUP has 898 thousand acres of state-owned forest land; the EUP has 998 thousand acres of forest land; and the NLP has 1.93 million acres of forest land. Collectively, state ownership makes up 24% of all forest land in the three northern ecoregions. The Western UP has 20% of State-owned timberland. The Eastern UP has 24% of State-owned timberland, and the Northern LP has 47% of the State-owned timberland. Estimates for reserved land varied considerably between inventories due to sampling error and further investigation is merited. Overall, land in State ownership climbed almost 13% from 3.57 million acres in 1980 to 4.03 million acres in 2004, based on FIA sample data. Figure 5.4 shows the distribution of state-owned timberland for 2004. County-level data on area by land class for state-owned lands is available in appendix Table A5.4.

Table 5.6. Forest area (thousand acres) by land class for State ownership, by ecoregion, 1980, 1993, and 2004.

Year	Timberland	Reserved Timberland	Other Forest	Nonforest	Total Forest
Western Upper Peninsula					
1980	763	69	12	6	844
1993	751	69	8	7	828
2004	823	70	5	NA	898
Eastern Upper Peninsula					
1980	834	56	34	43	924
1993	803	28	19	13	849
2004	978	3	17	NA	998
Northern Lower Peninsula					
1980	1,788	5	12	51	1,805
1993	1,886	38	8	22	1,932
2004	1,887	6	42	NA	1,934
Southern Lower Peninsula					
1980	186	11	2	2	199
1993	288	48	0	10	336

Year	Timberland	Reserved Timberland	Other Forest	Nonforest	Total Forest
2004	339	2	0	NA	342
State					
1980	3,571	141	61	102	3,773
1993	3,728	182	35	51	3,946
2004	4,027	82	64	NA	4,172

Source: 1980 and 1993 data are derived from the Eastwide Forest Inventory datasets. 2004 data are derived from the 2004 FIA Snapshot dataset (<http://www.ncrs2.fs.fed.us/FIADatamart/fiadatamart.aspx>) which includes plots taken in 2000 to 2004.

Table Notes: Nonforest areas were not assigned to landowner group in the 2004 FIA Snapshot dataset and are indicated as NA above.

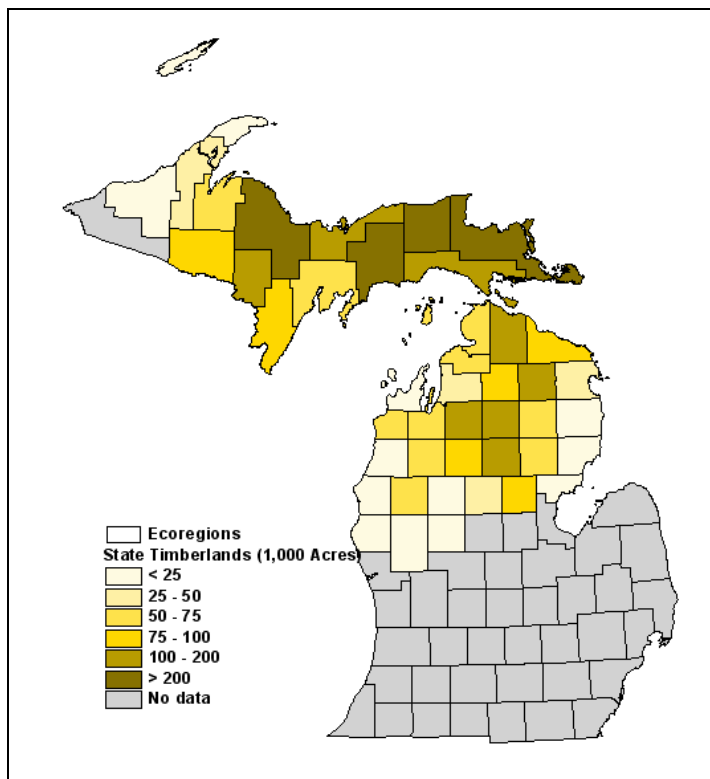


Figure 5.4. Distribution of State-owned timberlands as determined by the USDA-Forest Service Inventory, 2000-2004.

Timberland area by forest type

Figures 5.5 and 5.6 present information on the timberland area by softwood and hardwood forest types for all owners for 1980, 1993, and 2004 inventories. Figures 5.7 and 5.8 present comparable information for State-owned timberlands. Tabular summaries of timberland areas by forest type are contained in appendix Tables A5.5 to A5.8.

Because the methods used for classifying forest type changed with the implementation of an annual inventory, some differences in metrics by forest type occurred between 1993 and 2004. For example, the oak-pine type is classified in the 2004 inventory but was not classified at all in earlier inventories because of type definition changes.

The most common softwood forest type in 2004 on all ownerships throughout the State was Northern white cedar with 1.31 million acres. Red pine was the second most common type with 850 thousand acres.

Northern white cedar (527 thousand acres) is the most common type in the Western UP, followed by black spruce (243) and balsam fir (186) in the Western UP. The most recent inventory shows a significant decline for all owners in balsam fir type but a considerable increase in the other softwoods type. This is most likely due to changes in the methods for determining forest type implemented with the 2004 inventory.

In the Eastern UP, Northern white cedar (423 thousand acres) is most common followed by jack pine (185) and black spruce (183) types. Area of northern white cedar type increased in this region as did tamarack from the previous inventory.

Softwood types in the Northern Lower Peninsula are dominated by red pine with 557 thousand acres on all ownerships. Jack pine is the second most common type (361 thousand acres) followed by northern white cedar (350). The northern white cedar type declined from 417 thousand acres in 1993 and the white pine type increased from 95 to 115 thousand acres in the Northern Lower Peninsula.

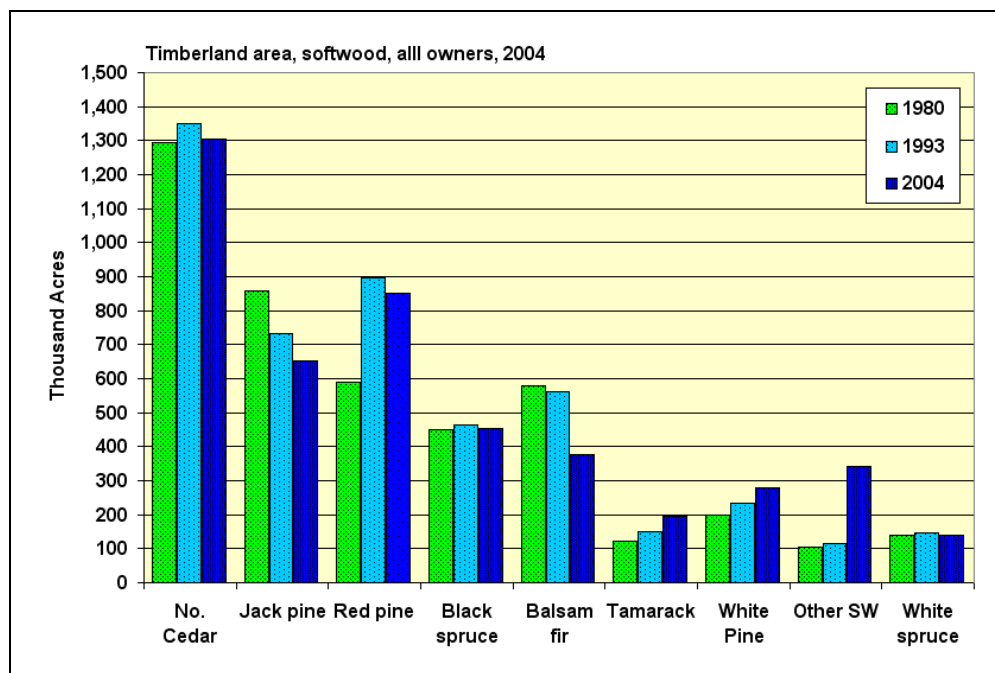


Figure 5.5. Timberland area by softwood forest types for all owners, 1980, 1993, and 2004.

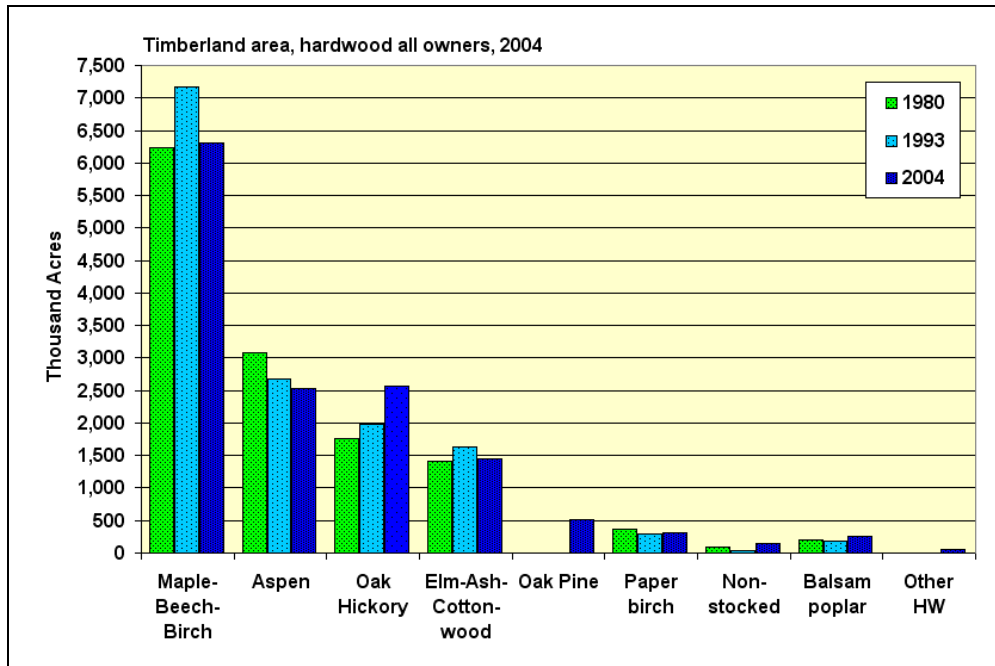


Figure 5.6. Timberland area by hardwood forest types for all owners, 1980, 1993, and 2004.

On state-owned lands, the most common softwood forest type is northern white cedar (406 thousand acres) followed by jack pine (278) and red pine (235) as shown in Figure 5.7. Northern white cedar is fairly evenly distributed on State lands through all three northern ecoregions with 143 thousand acres in the Eastern UP, 136 thousand acres in the Western UP, and 127 thousand acres in the Northern Lower Peninsula. The Northern Lower Peninsula dominates the red and jack pine forests on State lands with 165 thousand acres of red pine (70%) and 161 thousand acres of jack pine (58%).

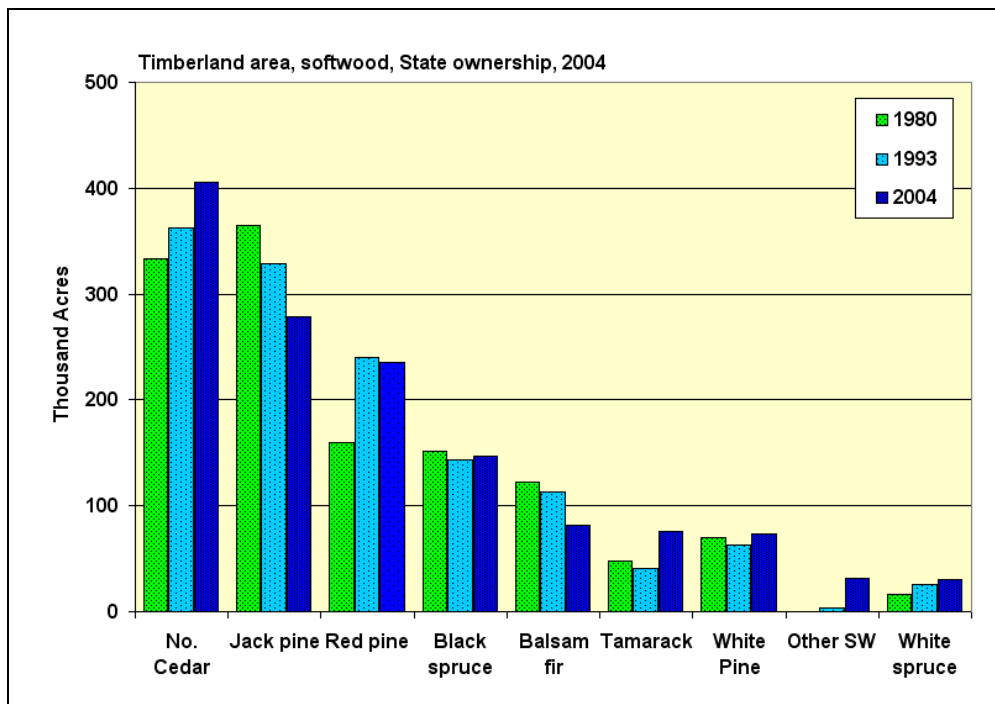


Figure 5.7. Timberland area by softwood forest types for State ownership, 1980, 1993, and 2004.

The most common State-owned hardwood forest types in 2004 were maple-beech-birch (915 thousand acres), aspen (725), and oak-hickory (497) as shown in Figure 5.8. The oak-hickory type has shown a steady increase in the FIA estimates over the 1980 to 2004 period from 336 thousand acres in 1980.

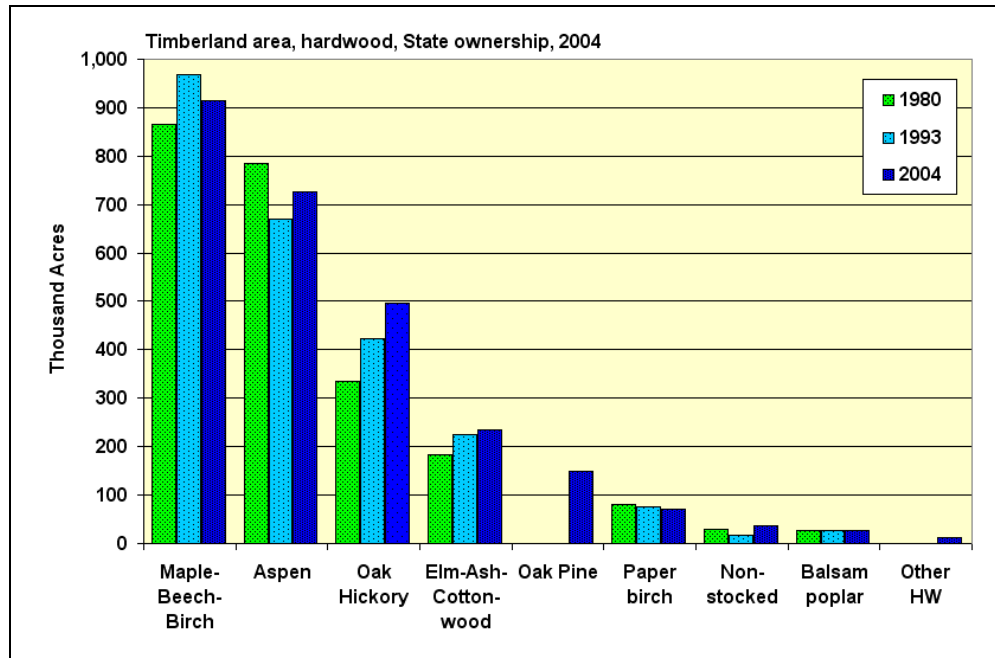


Figure 5.8. Timberland area by hardwood forest types for State ownership, 1980, 1993, and 2004.

Figures 5.9 to 5.12 compares timberland area by forest type and ecoregion for all owners and State-owned lands. Maple-beech-birch type dominates on all ownerships in all three ecoregions. In the Western UP there are 2.75 million acres of this type. Aspen is the second most common hardwood type in all ecoregions. The Western UP has 817 thousand acres of aspen type and the Northern LP has 1.2 million acres. Maple-beech-birch is also the most common in the Eastern UP with 978 thousand acres followed by aspen with 302 thousand acres.

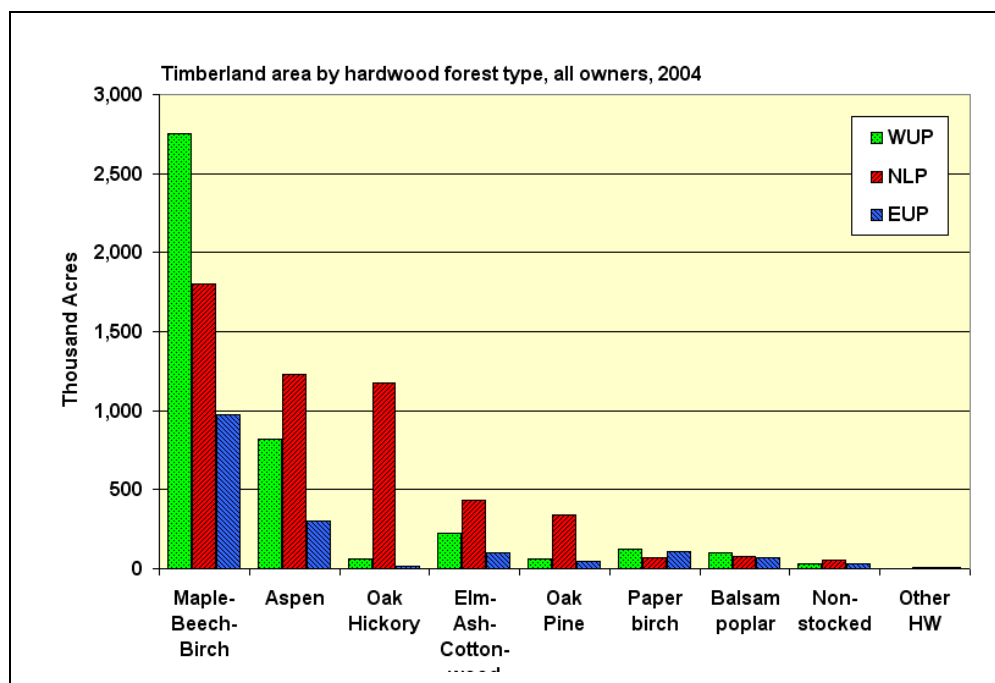


Figure 5.9. Timberland area by hardwood forest type and ecoregion, all owners, 2004.

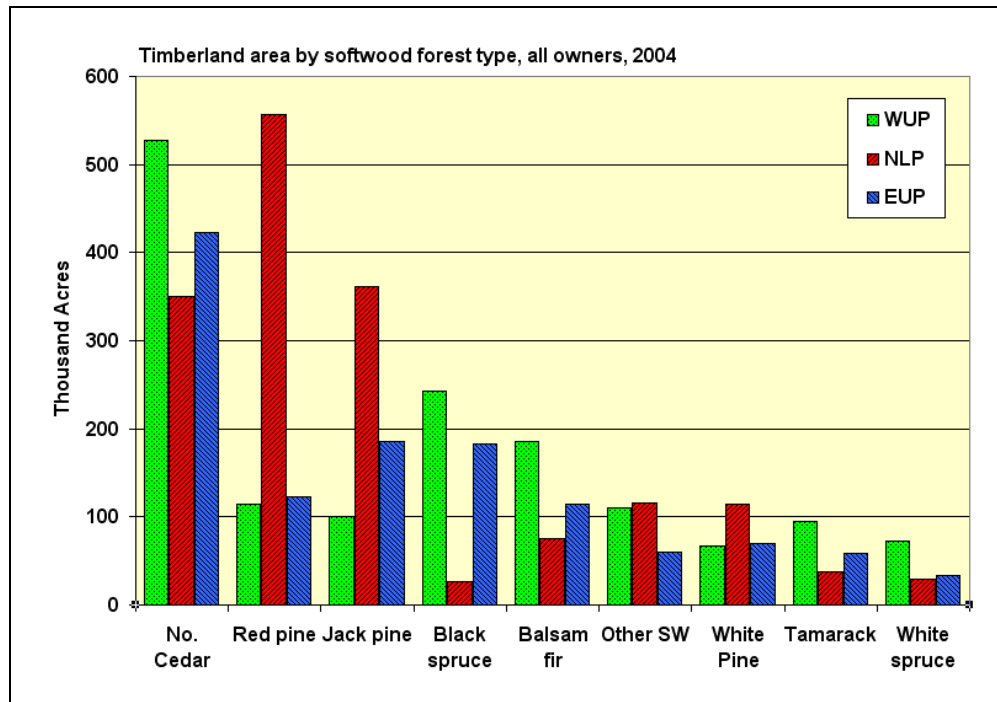


Figure 5.10. Timberland area by softwood forest type and ecoregion, all owners, 2004.

Aspen is the most common hardwood type in the Northern Lower Peninsula, followed by maple-beech-birch and oak-hickory. Red pine and jack pine are the most common softwood types followed by northern white cedar in the NLP. In the WUP, maple-beech-birch and aspen are the most common hardwood types. Northern white cedar and black spruce are the most common softwood types. Maple-beech-birch and aspen are the most common hardwood types and northern white cedar, jack pine, and red pine are the most common softwood types in the EUP.

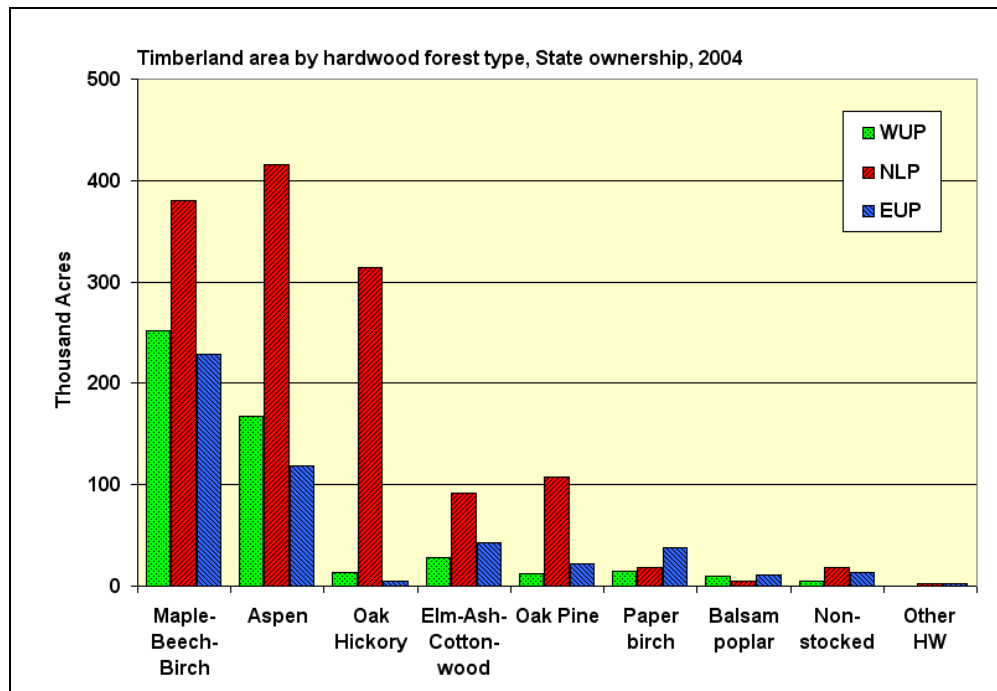


Figure 5.11. Timberland area by hardwood forest type and ecoregion, State ownership, 2004.

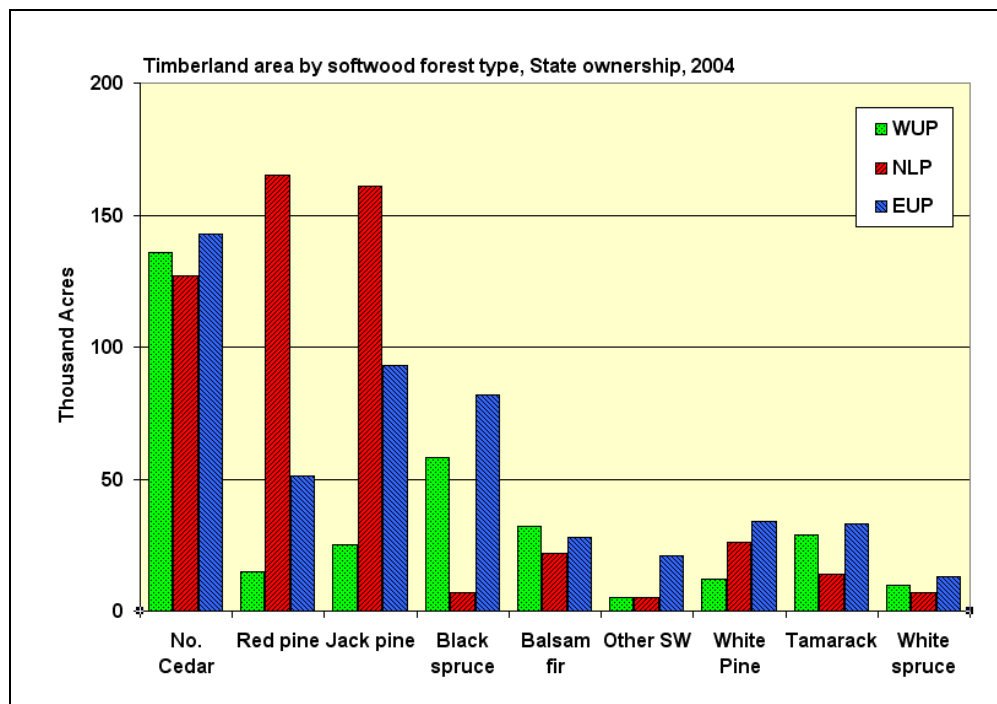


Figure 5.12. Timberland area by softwood forest type and ecoregion, State ownership, 2004.

Volume of growing stock trees

The volume of growing stock timber on Michigan's 18.75 million acres of timberland is very large – about 27.3 billion cubic feet on all ownerships. That translates into 1,456 cubic feet per acre or roughly 18 cords of wood per

acre. On the 4.03 million acres of State-owned timberland, there are 5.1 billion cubic feet of timber or roughly 1,275 cubic feet of growing stock volume per acre.

All this timberland and wood volume is not evenly distributed geographically or by forest type because of physical, biological and human factors. Figure 5.13 shows the distribution of growing stock volume by county in the three ecoregions. County-level data on timber volume and growth are shown in appendix Table A5.3.

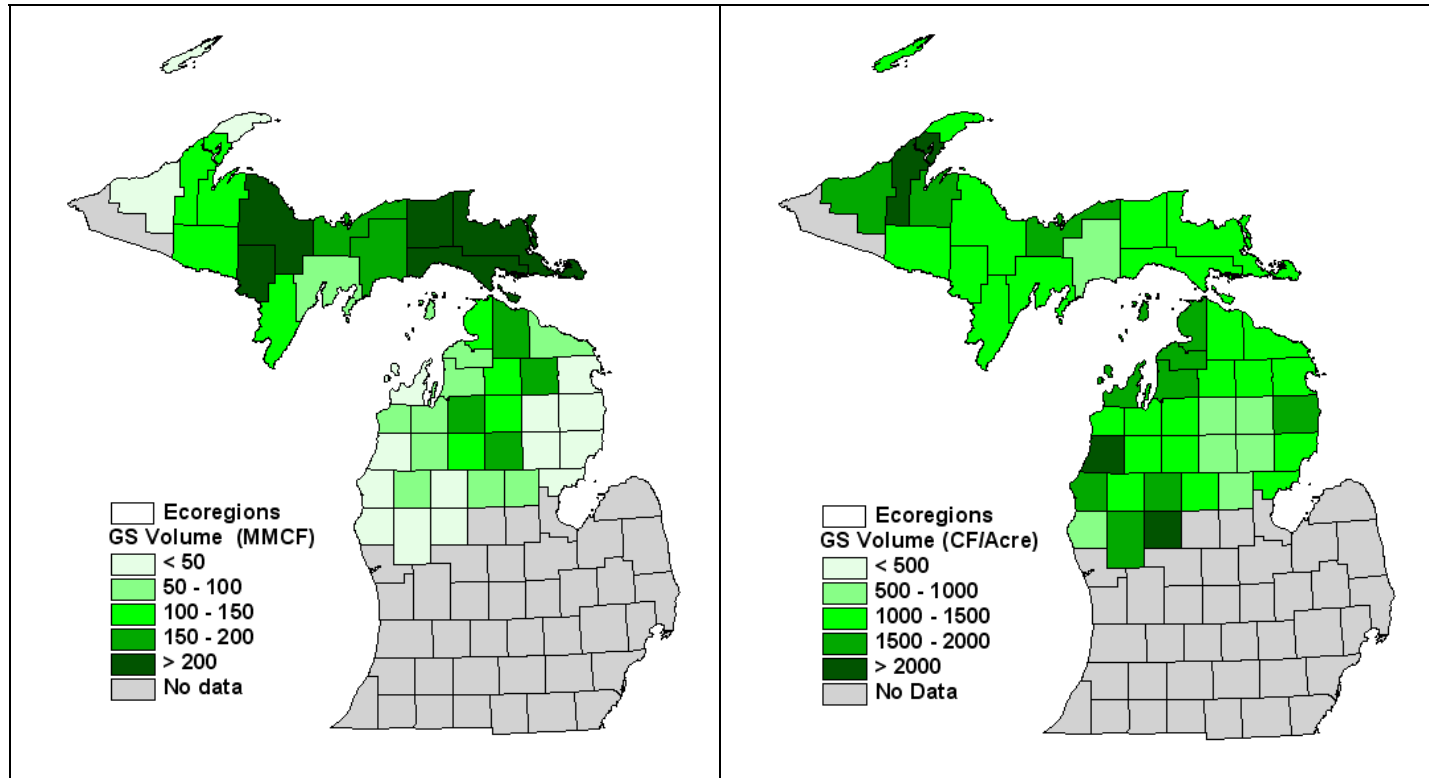


Figure 5.13. Total growing stock volume and volume per acre for all forest types on State-owned timberlands, 2004.

The distribution of growing stock volume by ecoregion and forest type is detailed in Table 5.7 for all owners and State-owned timberlands. Although the State owns about 21% of all timberland in Michigan, state forests contain about 19% of the total growing stock timber volume with 5.1 billion cubic feet on DNR timberlands. Sixty two percent of the volume on DNR timberlands is in four forest types – maple-beech-birch (29.6%), aspen (11.6%), oak-hickory (11.3%), and red pine (10.1%). For comparison, volume of all live trees by forest type are shown for all owners in appendix Table A5.9 and for state-owned lands in Table A5.10.

Table 5.7. Volume of all growing stock trees (million cubic feet) on timberland, all owners and State ownership, by forest type and ecoregion, 2004.

Forest type group	EUP	NLP	WUP	State	EUP	NLP	WUP	State
	All Owners				State Ownership			
Aspen	311	1,371	798	2,678	120	328	131	598
Balsam fir	90	55	169	315	22	20	18	60
Balsam poplar	75	67	61	204	11	4	5	21
Black spruce	147	19	205	372	57	3	48	108
Elm-Ash-Cottonwood	92	492	266	1,878	45	95	37	284
Jack pine	160	263	91	521	82	111	21	214

Forest type group	EUP	NLP	WUP	State	EUP	NLP	WUP	State
	All Owners				State Ownership			
Maple-Beech-Birch	1,624	2,866	5,065	10,733	396	578	468	1,521
Nonstocked	1	2	3	9	1	1	1	3
Northern white-cedar	777	599	978	2,363	217	218	244	679
Oak Hickory	13	1,532	90	3,802	5	295	23	583
Oak Pine	37	427	75	614	12	89	7	116
Other Hardwoods	8	13		99	4	3		23
Other Softwoods	142	124	244	597	45	3	12	61
Paper birch	134	95	160	395	47	24	23	93
Red pine	204	1,231	237	1,797	84	377	41	519
Tamarack	42	26	86	155	29	8	36	73
White Pine	138	226	173	599	56	43	37	139
White spruce	46	26	88	173	18	11	17	45
Total	4,043	9,437	8,787	27,303	1,250	2,210	1,168	5,141

Growth

Net annual growth of growing stock trees on timberland is detailed in Table 5.8. Growth on all timberlands and all forest types averages 49 cubic feet per acre per year. Annual growth on State-owned timberlands averages 41 cubic feet per acre. Net annual timber growth on DNR lands is 163.5 million cubic feet annually, more than 2 million cords annually, based on FIA inventory data for the 2000 to 2004 measurement period. Average annual removals from DNR timberlands are estimated by FIA at 58.4 million cubic feet, roughly 730,000 cords.

Table 5.8. Average net annual growth (million cubic feet) on timberland, all owners and State ownership, by forest type group and ecoregion, 2004.

Forest type group	EUP	NLP	WUP	State	EUP	NLP	WUP	State
	All owners				State ownership			
Aspen	3.0	55.2	30.3	97.2	2.5	19.0	7.4	31.2
Balsam fir	1.8	5.1	4.7	11.6	0.3	0.1	0.5	0.8
Balsam poplar	3.0	2.7	4.6	10.3	0.2	0.5	1.7	2.4
Black spruce	6.9	0.3	5.5	12.7	3.5		0.1	3.6
Elm-Ash-Cottonwood	0.8	8.9	9.4	61.7	0.5	0.8	0.4	4.9
Jack pine	2.9	6.8	5.7	15.8	1.8	3.7	2.7	8.2
Maple-Beech-Birch	50.6	74.0	142.8	325.3	10.0	12.2	14.5	47.9
Nonstocked	-0.1	0.8	1.0	1.7	-0.1	0.6	0.7	1.2
Northern white-cedar	25.2	6.5	31.6	63.2	5.9	-1.7	4.8	9.0
Oak Hickory	0.1	51.9	2.6	142.2	0.1	8.0		16.5
Oak Pine	1.5	14.0	1.2	19.4	0.9	1.8	0.2	3.0
Other Hardwoods				3.0				0.0
Other Softwoods	6.1	4.8	11.2	29.9	5.0	0.5	0.9	6.5
Paper birch	2.1	3.5	4.1	10.8	0.7			0.7
Red pine	6.4	67.2	5.5	85.4	0.7	15.2	1.1	18.6

Forest type group	EUP	NLP	WUP	State	EUP	NLP	WUP	State
	All owners				State ownership			
Tamarack	1.3	1.2	4.5	7.6	0.5	0.4	2.0	3.0
White Pine	3.7	2.2	4.0	12.9	2.3		0.2	2.5
White spruce	2.5	0.1	8.5	11.1	0.8		2.8	3.5
Unclassified	0.1	0.8	-0.2	1.7				
Total	117.8	306.0	276.9	923.3	35.6	61.2	40.0	163.5

Removals

Annual timber removals is described in Table 5.9. Net annual growth exceeds annual removals by a considerable margin for all species combined. On state lands, the growth/removals ratio is 2.8 and on all lands, the ratio is almost 3.2. The 2004 inventory shows total annual removals of 291.2 million cubic feet on all lands and 58.4 million cubic feet on State lands. Average removals from all lands were 15.6 cubic feet per acre in the 2004 inventory. On State lands, average annual removals averaged 14.4 cubic feet. Removals from the maple-beech-birch forest type exceeded any other type on both all lands (111.1 million cubic feet) and State lands (16.3 million cubic feet). Removals from the oak-hickory type ranked second with 43 million cubic feet statewide and 11 million cubic feet annually from State lands.

Table 5.9. Average annual removals of merchantable volume (million cubic feet) from growing stock trees on timberland, all owners and State ownership, by forest type and ecoregion, 2004.

Forest type group	EUP	NLP	WUP	State	EUP	NLP	WUP	State
	All owners				State ownership			
Aspen	2.4	13.3	12.6	28.4	0.9	4.6	3.1	8.7
Balsam fir	0.8	0.3	2.0	3.1	0.8		1.7	2.5
Balsam poplar		1.4	3.1	4.5				0.0
Black spruce	1.1		0.6	1.7	0.3			0.3
Elm-Ash-Cottonwood	2.0	3.8	1.5	13.5	0.3		0.8	1.0
Jack pine	1.5	3.2	1.8	6.5	1.5	3.0	0.3	4.8
Maple-Beech-Birch	17.4	26.7	54.1	111.1	3.4	2.4	8.8	16.3
Nonstocked		5.1	0.4	5.4		3.8	0.4	4.2
Northern white-cedar	3.8		5.0	8.8				0.0
Oak Hickory	0.4	32.4	1.4	43.0	0.4	10.6		11.0
Oak Pine		1.2	2.9	4.0		0.5	2.3	2.8
Other Hardwoods				0.0				0.0
Other Softwoods	2.9	2.7	5.2	10.8		0.1		0.1
Paper birch			0.4	0.4				0.0
Red pine	0.9	12.9	5.2	19.3		4.7		4.7
Tamarack			1.8	1.8				0.0
White Pine	1.6	0.6	2.3	4.5	1.6		0.3	1.9
White spruce	1.1	1.0	0.2	2.2				0.0
Unclassified	0.7	6.7	0.8	22.0				
Total	36.8	111.2	101.2	291.2	9.3	29.8	17.7	58.4

Timberland, volume, growth, and removals from State-owned timberlands are not proportional to similar measures for all timberlands in the State. Figure 5.14 compares the value of these measures on State-owned timberlands with all lands as a percentage. For example, the State owns 21% of all timberland, but these lands hold only 19% of the total growing stock volume. Growth on State-owned timberlands was 18% of the State total from all lands and removals were 20%.

For the jack pine forest type, the State owns 43% of the total timberland which holds 41% of the growing stock volume, produces 52% of the growth, and accounts for 74% of the removals.

Data used for Figure 5.14 on timber volume, growth, and removals by forest type on state-owned lands for the 2004 FIA inventory are shown in appendix Table A5.11.

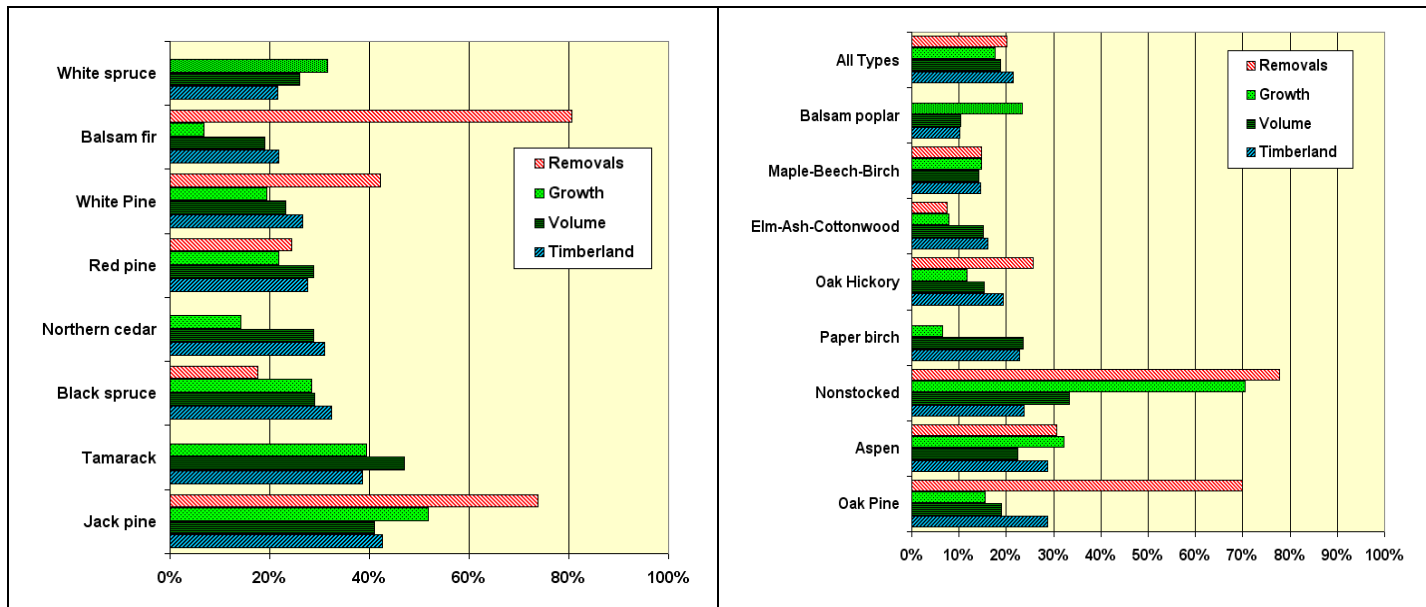


Figure 5.14. Percent of timberland, volume, growth, and removals from State lands by forest type, 2004.

Source: USDA Forest Service, 2004 FIA inventory.

Timber production

Detailed production data for pulpwood and sawlogs are available from the USDA-Forest Services annual pulpwood production reports compiled in cooperation with the Michigan DNR and the periodic sawlog production reports (Piva, 1999-2006; Haugen and Pilon, 2002; and Haugen and Weatherspoon, 2003). These Timber Product Output data offer a long time-series of pulpwood and sawtimber removals by county and by species. These data do not, however, provide a method for identifying State-owned timberlands as the source of harvested wood.

Figure 5.15 provides a history of pulpwood production in the State. State pulpwood production has declined since 1997 and current levels are similar to those seen in the late 1980's. In terms of volume, the Western UP is the largest producer of pulpwood followed by the Northern LP and the Eastern UP. Pulpwood produced in the Western UP may be shipped to mills in the Upper Peninsula and it is within trucking distance to consuming mills in Wisconsin.

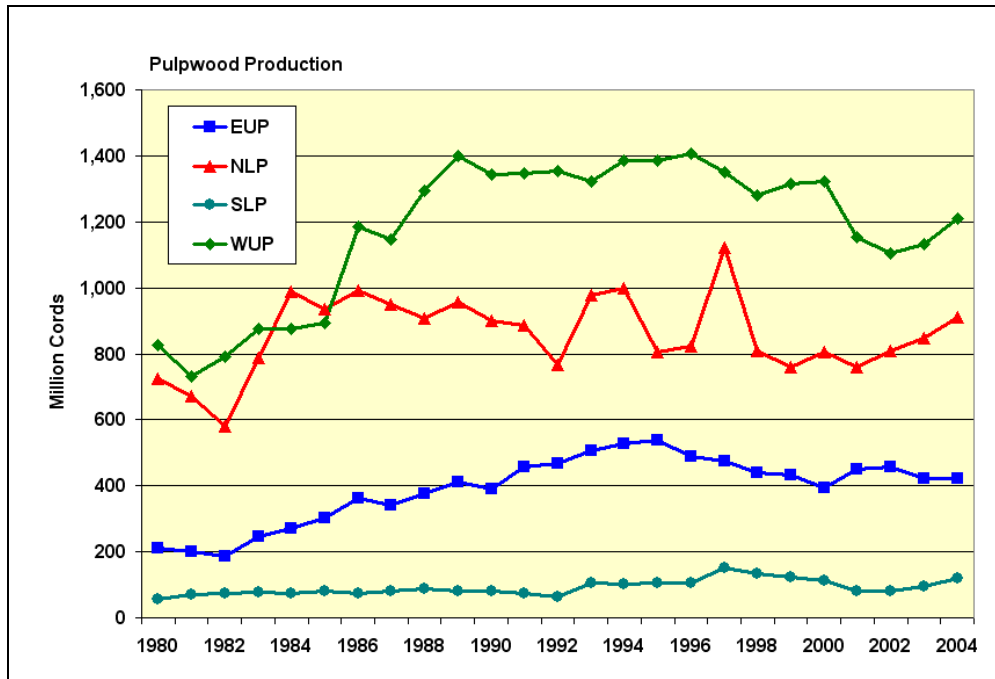


Figure 5.15. Pulpwood production (thousand cords) from all lands by ecoregion, 1980 to 2004.

Source: USDA-Forest Service, Pulpwood production and Timber Product Output reports.

Total pulpwood production in Michigan was 2.66 million cords in 2004, the most recent year for which data are available. About one-quarter of this production came from state forests. Production in the WUP was 1.2 million cords; EUP was 420 thousand cords, and the NLP was 909 thousand cords from all lands. Pulpwood production for 2004 from DNR lands was about 4% of the state total in the EUP, 12% in the NLP, and 5% in the WUP.

Figures 5.16 to 5.18 show the distribution of pulpwood production for several broad species groups in each ecoregion. Overall pulpwood production has declined since a high period of 1993 to 1997. In terms of volume, the Western UP produces more pulpwood than any other region, followed by the Northern Lower Peninsula and the Eastern UP. Production in the Western UP (Figure 5.16) is dominated by hard maple, aspen, and other mixed hardwoods with relatively little pine or softwood production. Overall production in the Western UP declined from a high in 1996 with a fairly significant drop in 2001 and an increase from 2002 to 2004. Numeric data on pulpwood production from 1980 to 2004 by ecoregion is contained in appendix Table A5.12.

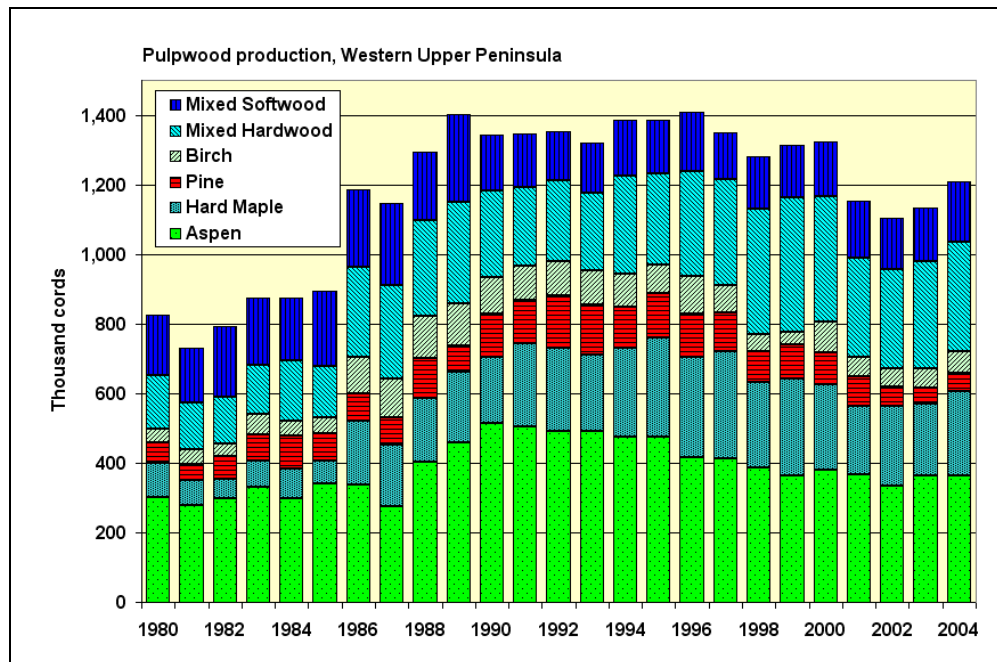


Figure 5.16. Pulpwood production from all lands, by species group, Western Upper Peninsula, 1980 – 2004.

Pulpwood production in the Eastern Upper Peninsula (Figure 5.17) has declined from a high in 1995. The 2003 production value was 78 percent of the 1995 production level, the record year for this ecoregion. Production in the Eastern UP was dominated by mixed hardwoods and hard maple followed by aspen and pine.

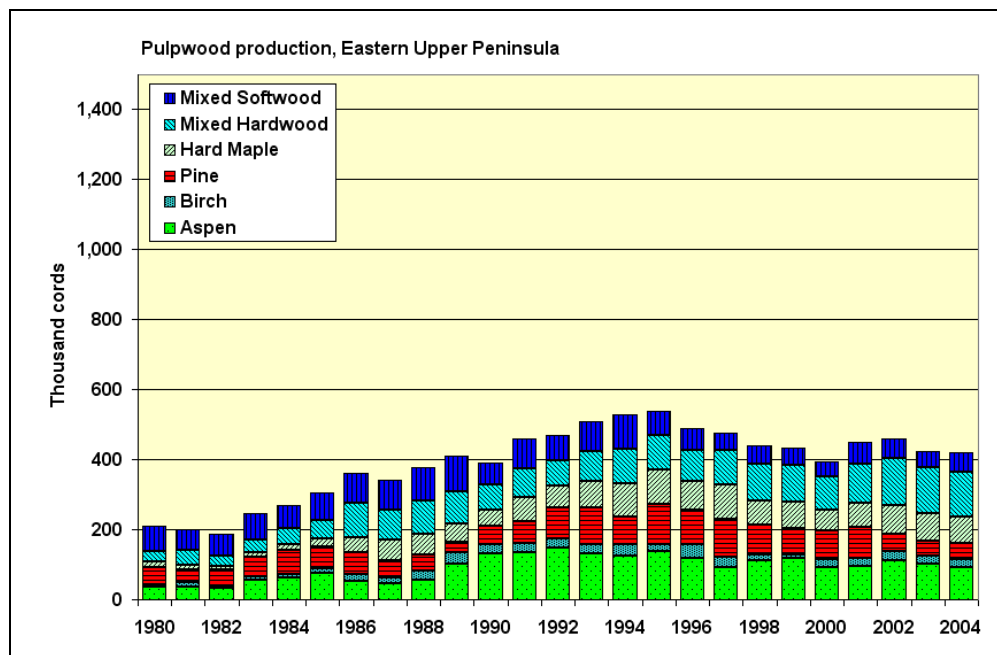


Figure 5.17. Pulpwood production from all lands, by species group, Eastern Upper Peninsula, 1980 – 2004.

Pulpwood production in the Northern Lower Peninsula (Figure 5.18) increased from 1998 to 2003. Production in the region is mostly mixed hardwoods and aspen. Aspen production in the ecoregion has declined, on average, over the past 20 years. Pine pulpwood production has also declined over time.

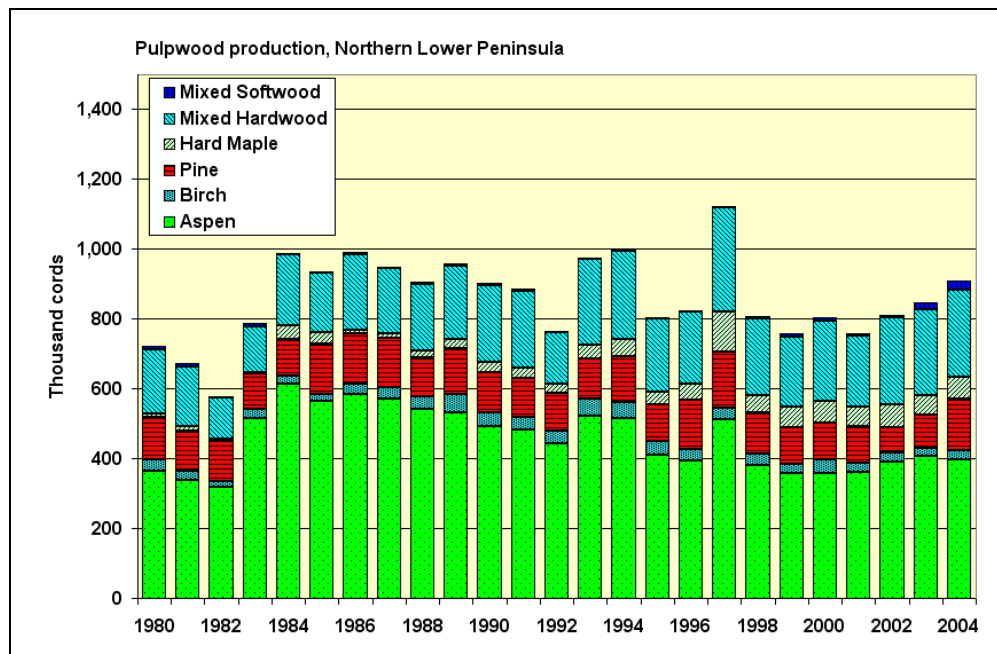


Figure 5.18. Pulpwood production from all lands, by species group, Northern Lower Peninsula, 1980 – 2003.

The distribution of statewide pulpwood production in 2004 by species and ecoregion is shown in Table 5.10. About two-thirds of the pulpwood production in the State, 64%, is composed of three species – soft maple, aspen, and hard maple. All other species comprise the remaining volume. The Western UP produced the majority of pulpwood for 17 identified species which individually account for 41% or more of the State total from the ecoregion. The Northern Lower Peninsula dominates in production of aspen, jack pine, and oak pulpwood production among the regions. Statewide pulpwood production by species and ecoregion for 2004 is shown in Figure 5.19.

Table 5.10. Distribution of pulpwood production (thousand cords) by species and ecoregion, 2004.

Species	State	Total Volume	WUP	EUP	NLP	SLP
	Percent	1,000 cords	Percent of species total			
Aspen	32%	846	40%	10%	45%	4%
Soft maple	17%	449	41%	18%	34%	7%
Hard maple	15%	388	62%	20%	17%	2%
Jack pine	7%	199	14%	15%	69%	2%
White birch	4%	110	54%	20%	24%	2%
Balsam fir	3%	79	66%	25%	9%	0%
Spruce	3%	74	72%	20%	8%	0%
Basswood	2%	63	51%	11%	36%	2%
Hemlock	2%	63	79%	20%	1%	0%

Species	State	Total Volume	WUP	EUP	NLP	SLP
	Percent	1,000 cords	Percent of species total			
Red oak	2%	60	19%	10%	47%	24%
Beech	2%	53	54%	24%	20%	2%
Red pine	2%	51	52%	29%	18%	1%
Balsam poplar	2%	48	55%	16%	26%	3%
Yellow birch	1%	37	70%	25%	4%	1%
Ash	1%	36	52%	17%	28%	3%
White oak	1%	29	0%	4%	41%	55%
Other hardwoods	1%	25	49%	19%	31%	1%
Tamarack	1%	19	59%	25%	16%	0%
White pine	0%	9	43%	24%	30%	3%
Other softwoods	0%	5	0%	0%	100%	0%
Elm	0%	5	54%	12%	29%	6%
Northern white-cedar	0%	4	69%	21%	10%	0%
Hickory	0%	3	4%	0%	79%	17%
All Species	100%	2,658	45%	16%	34%	5%

Source: USDA Forest Service, North Central Research Station. Data published in the Timber Product Output and Pulpwood Production report series.

Other species include: beech, spruce, white oak, ash, other hardwoods, white pine, tamarack, northern white cedar, elm, and hickory.

Timber Product Output data also provides information on sawlog production. Michigan produces more than one billion board feet of high-value sawlogs annually (based on 1998 FIA data). The most recent sawlog production data is for 1998. Five species – hard maple, red oak, red pine, soft maple, jack pine, and aspen - account for 80% of all sawlog production in the State. The Western UP dominates in production of jack pine, white pine, yellow birch, and white birch. The Northern Lower Peninsula dominates sawlog production for all other species except white oak which is primarily produced in the Southern Lower Peninsula. Sawlog production by ecoregion and species for 1998 is shown in Figure 5.20. According to DNR statistics, sawlog production on DNR lands is about 61 million board feet and dominated by red pine, oak, aspen, and maple.

Table 5.11. Distribution of sawlog production (MBF) by species and ecoregion, 1998.

Species	State Total	Total Volume	WUP	EUP	NLP	SLP
	Percent	MBF	Percent of species total			
Hard maple	21%	268,716	35%	9%	45%	10%
Red oak	16%	212,438	5%	1%	61%	34%
Red pine	16%	207,472	11%	10%	74%	5%
Soft maple	11%	141,606	19%	8%	45%	28%
Jack pine	8%	106,126	37%	27%	36%	0%
Aspen	8%	103,466	20%	3%	70%	7%
White oak	3%	38,528	0%	0%	36%	64%
Ash	2%	28,057	9%	15%	47%	29%

Species	State Total	Total Volume	WUP	EUP	NLP	SLP
	Percent	MBF	Percent of species total			
White pine	2%	25,248	34%	22%	33%	11%
Basswood	2%	23,995	33%	1%	52%	13%
Yellow birch	2%	23,204	80%	14%	5%	0%
White birch	2%	22,328	46%	23%	25%	6%
Other species	8%	99,487	42%	13%	21%	25%
All species	100%	1,300,671	23%	9%	50%	17%

Source: USDA Forest Service, North Central Research Station. Data published in the Timber Product Output report series.

Other species include: spruce, black cherry, balsam fir, cottonwood, beech, northern white cedar, hemlock, hickory, yellow poplar, elm, balsam poplar, walnut, sycamore, tamarack, sassafras, hackberry, butternut, red cedar, and other hardwoods

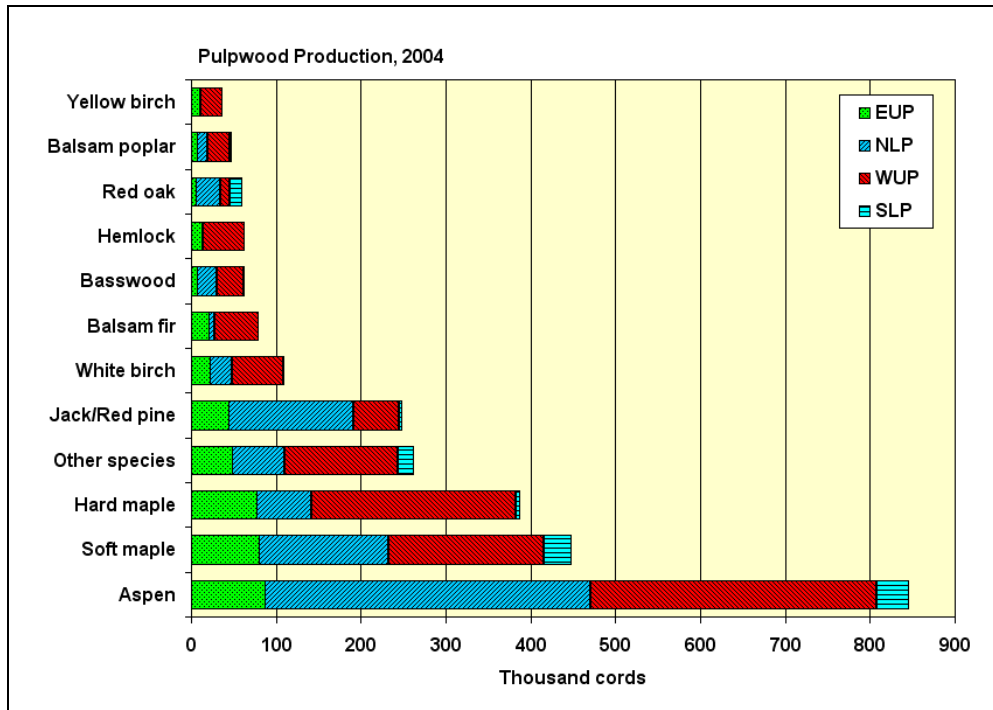


Figure 5.19. Pulpwood production (thousand cords) by species and ecoregion, 2003.

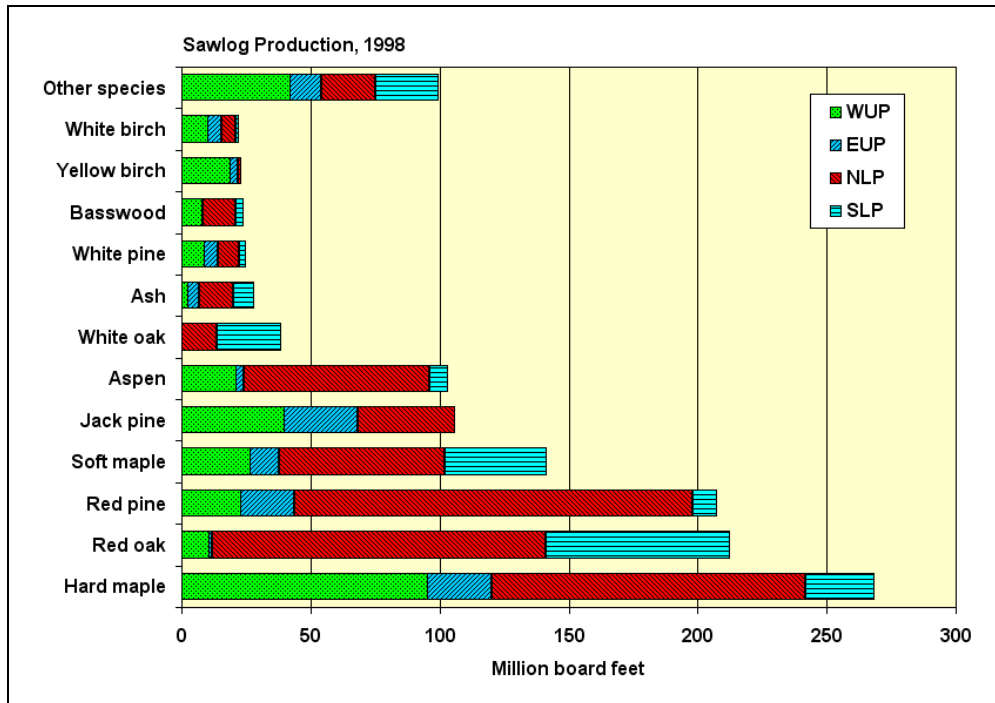
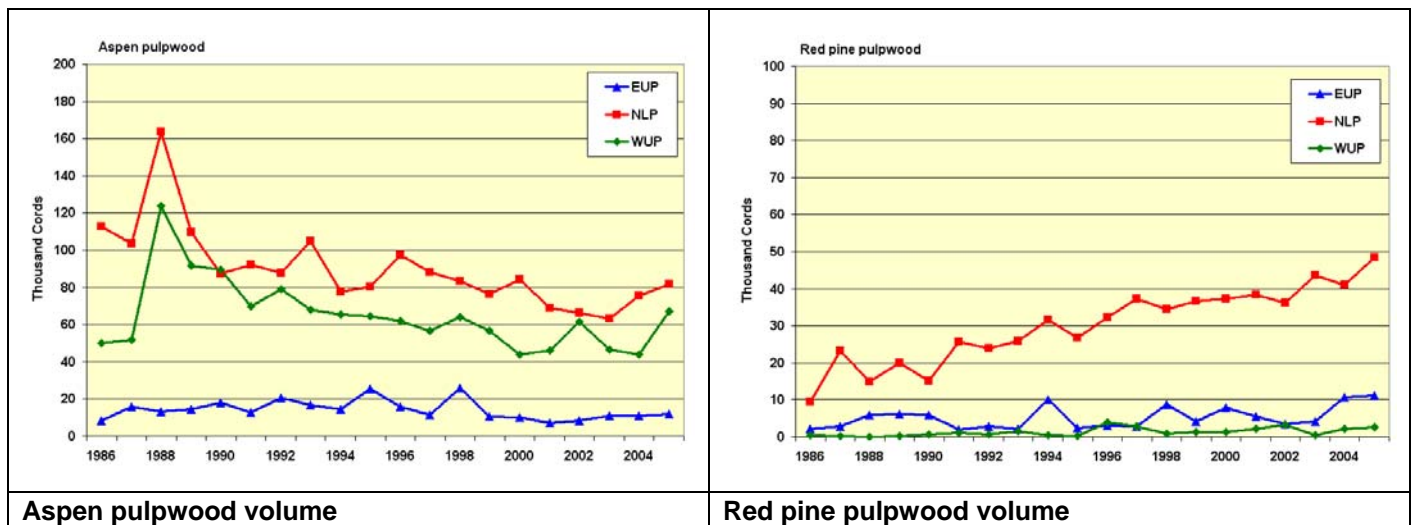


Figure 5.20. Sawlog production (MBF) by species and ecoregion, 1998.

Michigan DNR timber volume and value

DNR timber production data provides a history of sale volumes by ecoregion and species. Figure 5.21 shows production data for selected pulpwood species from 1986 to 2005. Overall, year-to-year pulpwood production data are highly erratic for specific species, especially jack pine. Pulpwood production from DNR lands are highest for aspen, red pine, jack pine and mixed hardwoods in the Northern Lower Peninsula. The data also show recent declines for all selected species group in the Northern Lower Peninsula. These data show long-term declines in production of aspen and mixed softwood sawtimber. More detailed tabular data on volume and value of timber sold from state forests are available in appendix Tables A5.13 and A5.14. An excellent recent analysis of timber harvesting on DNR lands is available in Pedersen (2005).



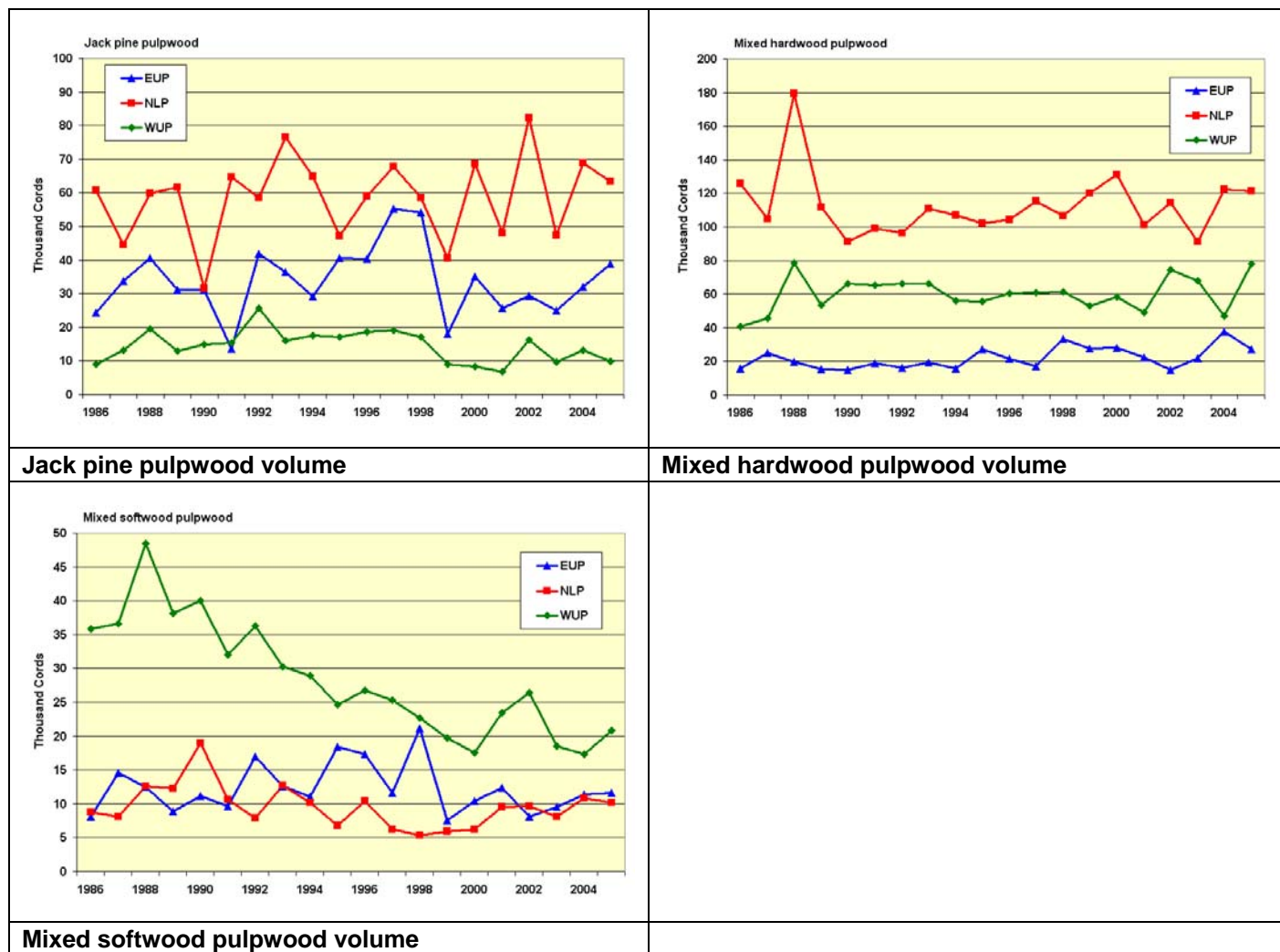


Figure 5.21. Volume of pulpwood for selected species groups sold from DNR lands by ecoregion, 1986 - 2005.

Volume of sawlogs produced from DNR lands from 1986 to 2005 are shown in Figure 5.22 for selected species by ecoregion. Again, production data show erratic year-to-year patterns. The Northern Lower Peninsula dominates production of Aspen, Jack pine, and Red pine sawlogs with relatively little of these species produced from other ecoregions.

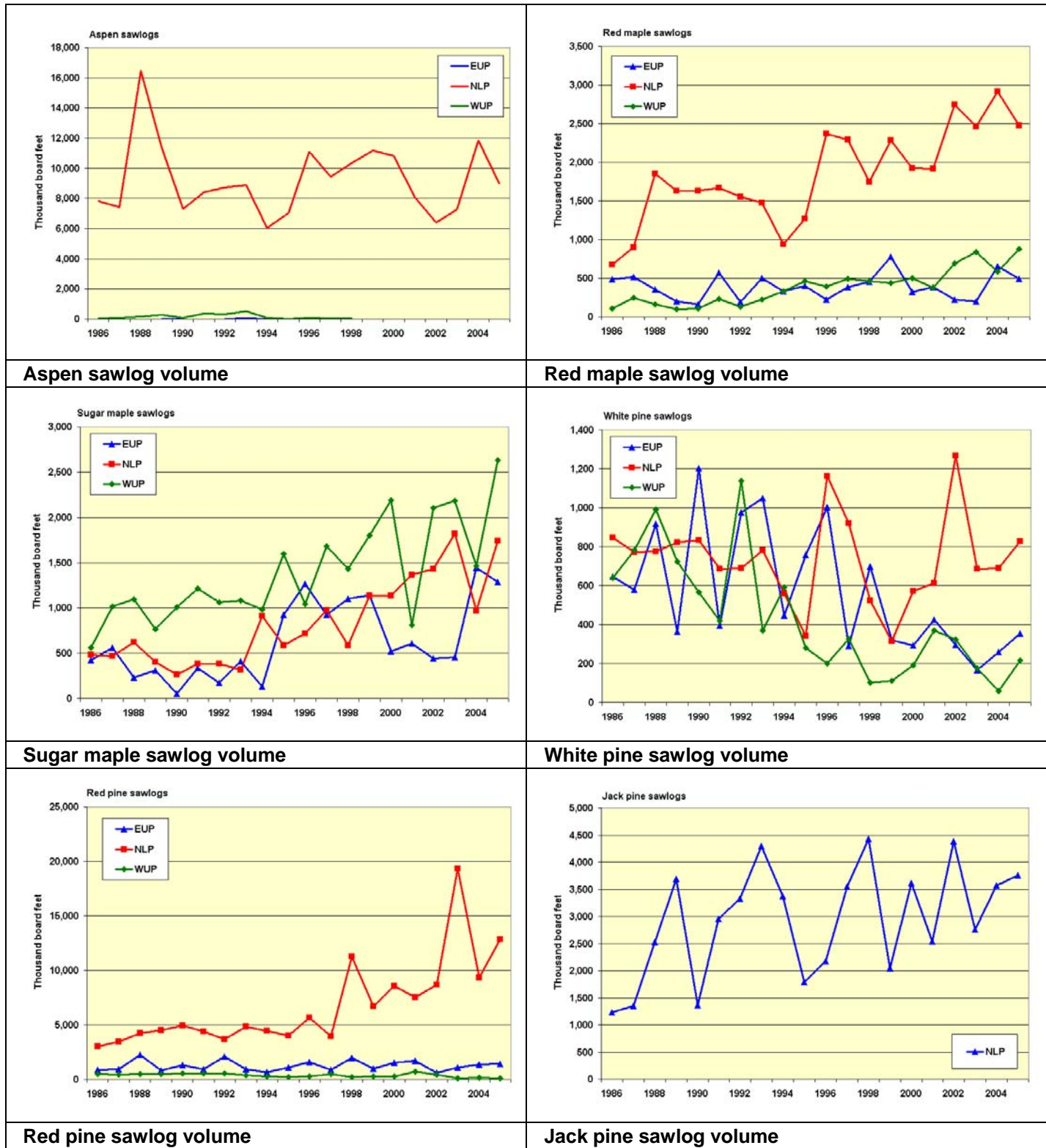


Figure 5.22. Volume of sawlogs sold from DNR lands for selected species by ecoregion, 1986 -2005.

Timber products sold from DNR lands in recent years are dominated by pulpwood (about 85% of the total volume sold) and by hardwoods (about 65% of total volume). Total volume sold from 2000 to 2004 varied from 630 to 808 thousand cords.

State forest timber sales in 2005 hit the highest volume sold since 1988. Because prices have increased considerably, it also hit an all-time record revenues of almost \$45 million. Potential softening of markets due to several recent mill closures will affect opportunities to achieve this record sale volume and revenue in the immediate future.

Table 5.12. Volume of timber products (cords) sold from all DNR lands, by species group, 1986 to 2005.

Fiscal Year	Hardwood				Softwood				All Products
	Pulpwood	Sawlogs	Bolts	Other	Pulpwood	Sawlogs	Bolts	Other	
1986	380,402	50,487	2,183	1,679	169,927	19,570	1,375	15,372	640,995
1987	387,761	49,456	3,443	2,035	199,522	23,028	1,503	4,158	670,905
1988	620,639	79,787	4,365	1,523	237,708	30,268	1,616	3,220	979,125
1989	430,184	55,233	4,454	1,037	214,162	29,289	1,331	4,460	740,151
1990	410,554	42,361	6,494	1,536	183,949	26,010	1,092	1,178	673,173
1991	386,895	49,495	2,795	595	201,943	27,947	889	494	671,053
1992	425,598	50,039	4,577	728	244,667	29,666	1,659	1,136	758,069
1993	440,268	56,937	2,611	791	235,914	29,857	820	5,852	773,048
1994	382,811	50,769	1,026	1,050	232,792	24,943	614	6,185	700,190
1995	394,514	52,891	333	237	217,851	25,044	357	405	691,632
1996	398,388	63,971	381	731	234,805	28,734	656	525	728,192
1997	407,339	69,011	994	628	258,258	25,742	177	248	762,397
1998	427,435	65,347	888	295	264,706	44,804	210	254	803,940
1999	386,808	75,429	527	481	159,682	26,168	1,227	335	650,656
2000	406,837	74,438	1,200	195	218,348	35,516	867	236	737,637
2001	340,941	59,556	1,100	844	194,755	31,378	933	812	630,320
2002	411,534	64,476	1,291		242,434	37,102	930	256	758,022
2003	337,010	63,586	722		181,718	53,995	150		637,181
2004	377,131	79,629	460		220,900	34,461	1,149		713,730
2,005	436,054	72,669	1,204		248,309	48,615	823		807,674

Source: Dr. Larry Pedersen, Michigan DNR.

All volumes and prices are shown in \$/cord. The conversion rate is 2.0 cords per thousand board feet (MBF) for sawlog products.

The value of timber products sold has climbed steadily, largely due to increases in bid prices. Except for 2005, DNR revenues from timber sales have averaged \$20 to \$30 million as shown in Figure 5.23. Although pulpwood comprises 80% or more of the timber volume, pulpwood sales account for only 50% to 58% of the revenue stream.

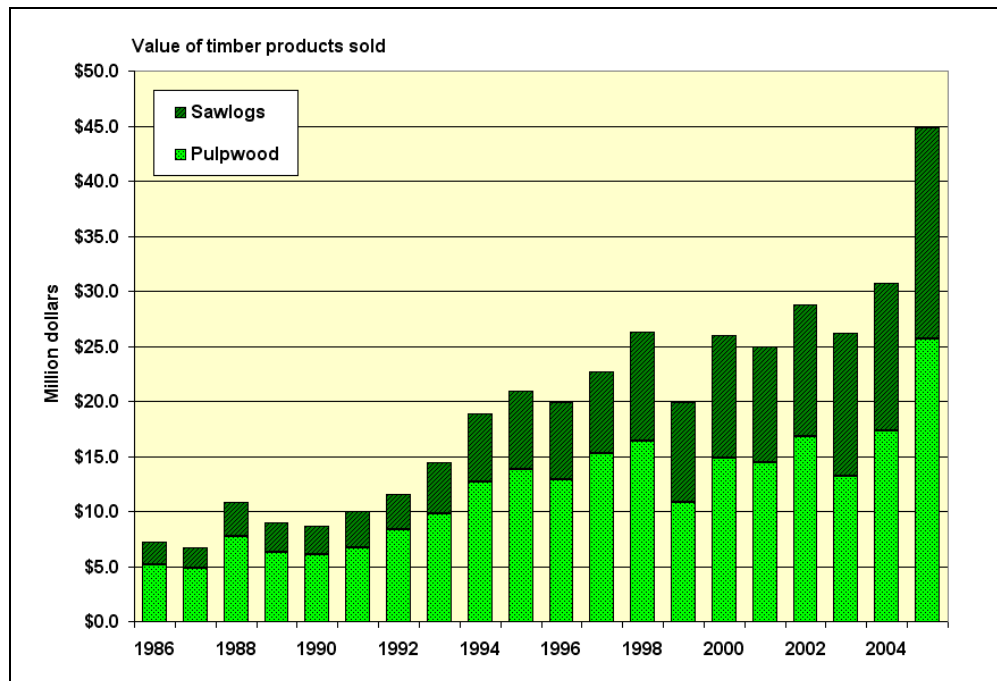


Figure 5.23. Trend in total revenue for DNR timber sales from State Forests, 1986 – 2005.

Table 5.13 provides a breakdown of statewide timber revenues by hardwood/softwood product classes. Sales of hardwood products provided 58% of the revenue from 2000 to 2005. Softwood accounted for 42% of timber sale revenue.

Table 5.13. Value of timber products (thousand dollars) sold from all DNR lands, by species group, 1986 to 2005.

Fiscal Year	Hardwood				Softwood				All Products
	Pulp-wood	Saw-logs	Bolt s	Other	Pulp-wood	Saw-logs	Bolts	Other	
1986	\$3,667	\$1,463	\$21	\$9	\$1,263	\$577	\$28	\$160	\$7,189
1987	\$3,234	\$1,203	\$33	\$17	\$1,390	\$677	\$15	\$107	\$6,674
1988	\$5,626	\$2,104	\$49	\$6	\$1,926	\$981	\$23	\$76	\$10,790
1989	\$4,046	\$1,585	\$41	\$2	\$2,035	\$1,055	\$19	\$152	\$8,934
1990	\$4,107	\$1,587	\$75	\$5	\$1,893	\$1,000	\$21	\$21	\$8,709
1991	\$4,316	\$2,029	\$35	\$4	\$2,317	\$1,232	\$14	\$4	\$9,951
1992	\$5,023	\$1,963	\$60	\$7	\$3,211	\$1,241	\$45	\$5	\$11,555
1993	\$6,233	\$3,231	\$39	\$2	\$3,490	\$1,392	\$26	\$13	\$14,426
1994	\$7,470	\$4,390	\$22	\$1	\$5,190	\$1,761	\$14	\$5	\$18,853
1995	\$7,999	\$4,989	\$8	\$0	\$5,743	\$2,178	\$7	\$29	\$20,954
1996	\$7,209	\$4,809	\$10	\$1	\$5,630	\$2,252	\$16	\$6	\$19,933
1997	\$7,625	\$5,570	\$29	\$0	\$7,601	\$1,874	\$13	\$1	\$22,713
1998	\$8,019	\$5,570	\$20	\$3	\$8,310	\$4,314	\$12	\$1	\$26,249
1999	\$6,271	\$6,611	\$13	\$4	\$4,518	\$2,397	\$51	\$8	\$19,873
2000	\$7,232	\$7,844	\$36	\$3	\$7,489	\$3,320	\$31	\$7	\$25,961

Fiscal Year	Hardwood				Softwood				All Products
	Pulp-wood	Saw-logs	Bolts	Other	Pulp-wood	Saw-logs	Bolts	Other	
2001	\$6,830	\$6,838	\$24	\$4	\$7,542	\$3,599	\$54	\$28	\$24,919
2002	\$7,696	\$8,186	\$27	\$0	\$9,011	\$3,820	\$60	\$13	\$28,813
2003	\$6,238	\$7,846	\$12	\$0	\$6,915	\$5,127	\$8	\$0	\$26,147
2004	\$7,950	\$10,290	\$12	\$0	\$9,277	\$3,162	\$54	\$0	\$30,745
2005	\$13,131	\$13,417	\$69	\$0	\$12,381	\$5,798	\$40	\$0	\$44,836

Source: Dr. Larry Pedersen, Michigan DNR.

Average bid prices have steadily increased for most timber products sold by the DNR as shown in Table 5.14. While some variation occurs from year to year, the overall trend in stumpage prices through 2005 is up for all product classes. Summaries of timber price trends by ecoregion are available in the appendix Tables A5.13 and A5.14.

Although prices for some products showed considerable variability over time, red and jack pine pulpwood, sugar and red maple and red pine sawlogs sawlogs showed very strong and sustained real price increases from 1986 to 2005.

Table 5.14. Average bid (\$/cord) for timber products sold from all DNR lands, by species group, 1986 to 2005.

Fiscal Year	Hardwood				Softwood				All Products
	Pulp-wood	Saw-logs	Bolts	Other	Pulp-wood	Saw-logs	Bolts	Other	
1986	\$9.64	\$28.98	\$9.61	\$5.22	\$7.43	\$29.49	\$20.67	\$10.40	\$11.21
1987	\$8.34	\$24.32	\$9.49	\$8.22	\$6.97	\$29.39	\$9.79	\$25.68	\$9.95
1988	\$9.06	\$26.36	\$11.22	\$4.10	\$8.10	\$32.42	\$14.19	\$23.56	\$11.02
1989	\$9.40	\$28.71	\$9.14	\$1.78	\$9.50	\$36.02	\$14.50	\$34.02	\$12.07
1990	\$10.00	\$37.47	\$11.55	\$3.04	\$10.29	\$38.45	\$18.86	\$17.87	\$12.94
1991	\$11.16	\$40.99	\$12.43	\$7.08	\$11.48	\$44.07	\$15.36	\$8.54	\$14.83
1992	\$11.80	\$39.23	\$13.10	\$9.54	\$13.13	\$41.82	\$27.17	\$4.46	\$15.24
1993	\$14.16	\$56.75	\$14.96	\$2.74	\$14.80	\$46.63	\$31.14	\$2.15	\$18.66
1994	\$19.51	\$86.46	\$21.79	\$0.73	\$22.30	\$70.58	\$23.39	\$0.74	\$26.93
1995	\$20.28	\$94.33	\$24.64	\$0.50	\$26.36	\$86.99	\$18.95	\$72.57	\$30.30
1996	\$18.09	\$75.17	\$25.91	\$1.73	\$23.98	\$78.39	\$24.79	\$11.86	\$27.37
1997	\$18.72	\$80.71	\$28.83	\$0.50	\$29.43	\$72.79	\$72.40	\$5.67	\$29.79
1998	\$18.76	\$85.23	\$22.22	\$10.95	\$31.39	\$96.28	\$58.63	\$5.58	\$32.65
1999	\$16.21	\$87.65	\$23.92	\$8.95	\$28.29	\$91.61	\$41.38	\$24.39	\$30.54
2000	\$17.78	\$105.38	\$29.65	\$17.83	\$34.30	\$93.48	\$35.20	\$28.18	\$35.19
2001	\$20.03	\$114.82	\$21.80	\$4.50	\$38.73	\$114.70	\$57.85	\$34.74	\$39.53
2002	\$18.70	\$126.96	\$21.21		\$37.17	\$102.97	\$64.44	\$50.00	\$38.01
2003	\$18.51	\$123.40	\$16.42		\$38.05	\$94.96	\$55.67		\$41.03
2004	\$21.08	\$129.23	\$27.01		\$41.99	\$91.76	\$46.70		\$43.08
2005	\$30.11	\$184.64	\$57.53		\$49.86	\$119.25	\$48.34		\$55.51

Source: Dr. Larry Pedersen, Michigan DNR.

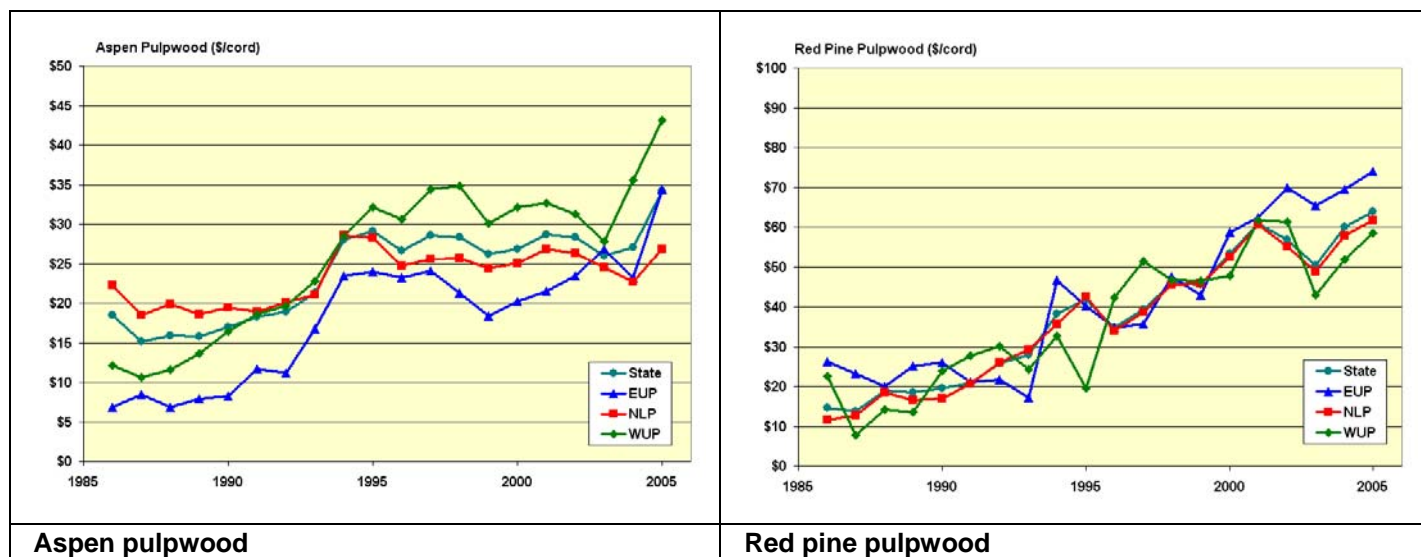
All volumes and prices are shown in cords and \$/cord. The conversion rate is 2.0 cords per thousand board feet (MBF) for sawlog products.

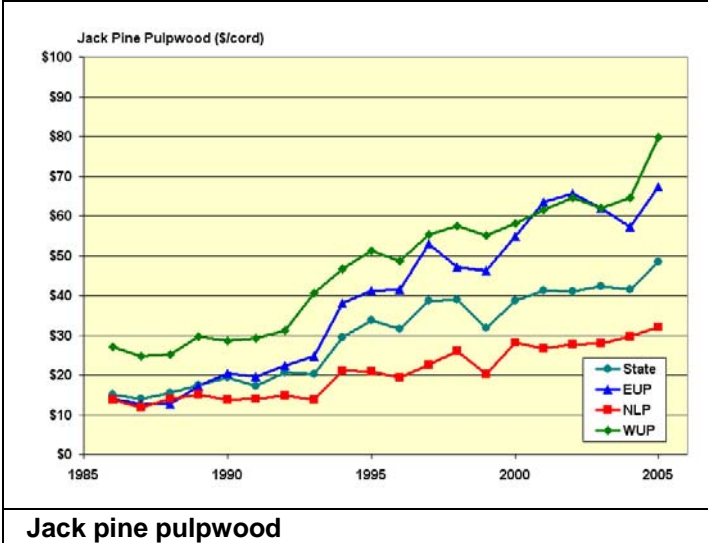
Timber sales from state forest lands in the three ecoregions generated \$30.7 million in 2004 and \$44.8 million in 2005. Sawlogs comprised about 15% of total timber volume sold in 2005, but generated 43% of total timber revenue.

Average timber prices for DNR sales have risen consistently and faster than inflation over time. Average prices for all timber products averaged \$43.08 per cord in 2004 and \$55.51 per cord in 2005. Prices varied greatly, depending on product and species. Pulpwood prices ranged from \$8 to \$55 per cord in 2005. Sawlog prices ranged from \$14 to \$852 per MBF. Jack and red pine generated the highest prices for pulpwood. Sugar maple and red pine generated the highest prices for sawlogs.

Analysis of these timber price series and adjustment for inflation shows that bid prices for most product classes have kept pace with or exceeded inflation. Figures 5.24 and 5.25 show trends in real prices for selected pulpwood and sawlog products by ecoregion. Nominal bid prices were adjusted by the Consumer Price Index for all commodities and are shown in constant 2005 dollars.

Figure 5.24 shows real price trends from 1986 to 2005 for selected pulp products – Aspen, Red pine, and Jack pine. Prices show a significant upward trend for all products and in all regions. Aspen prices show a short period, 1995 to 2003 of relatively constant real prices, but then showed an increase in 2004 and 2005. Annual fluctuations shown in prices are mostly due to local market or sale conditions. Continued price escalation depends on market factors associated with demand for wood as a raw material and aggregate supply. Factors such as mill closures could dampen market prices, especially in the short term.



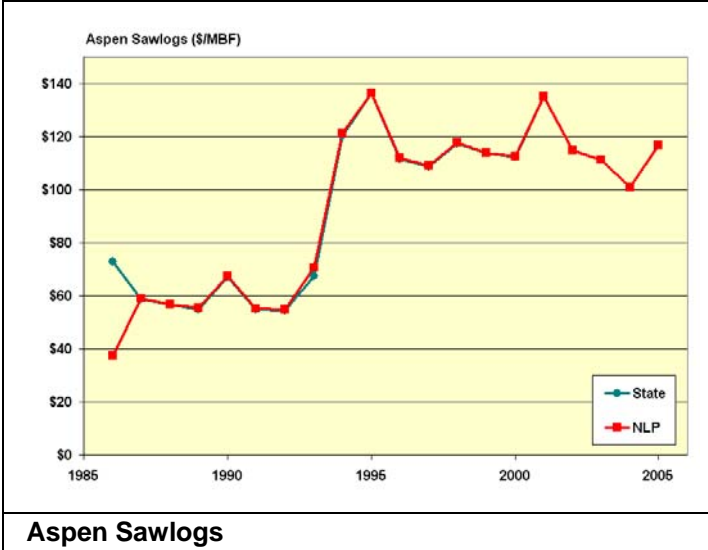


All stumpage prices are adjusted for inflation using the Consumer Price Index and shown in constant 2005 dollars.

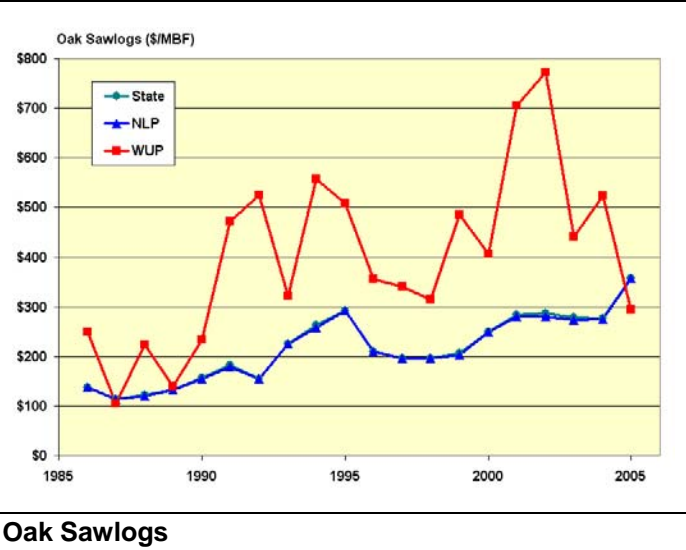
Jack pine pulpwood

Figure 5.24. Real price trends (adjusted for inflation) for selected pulpwood timber products by region, 1986 to 2005.

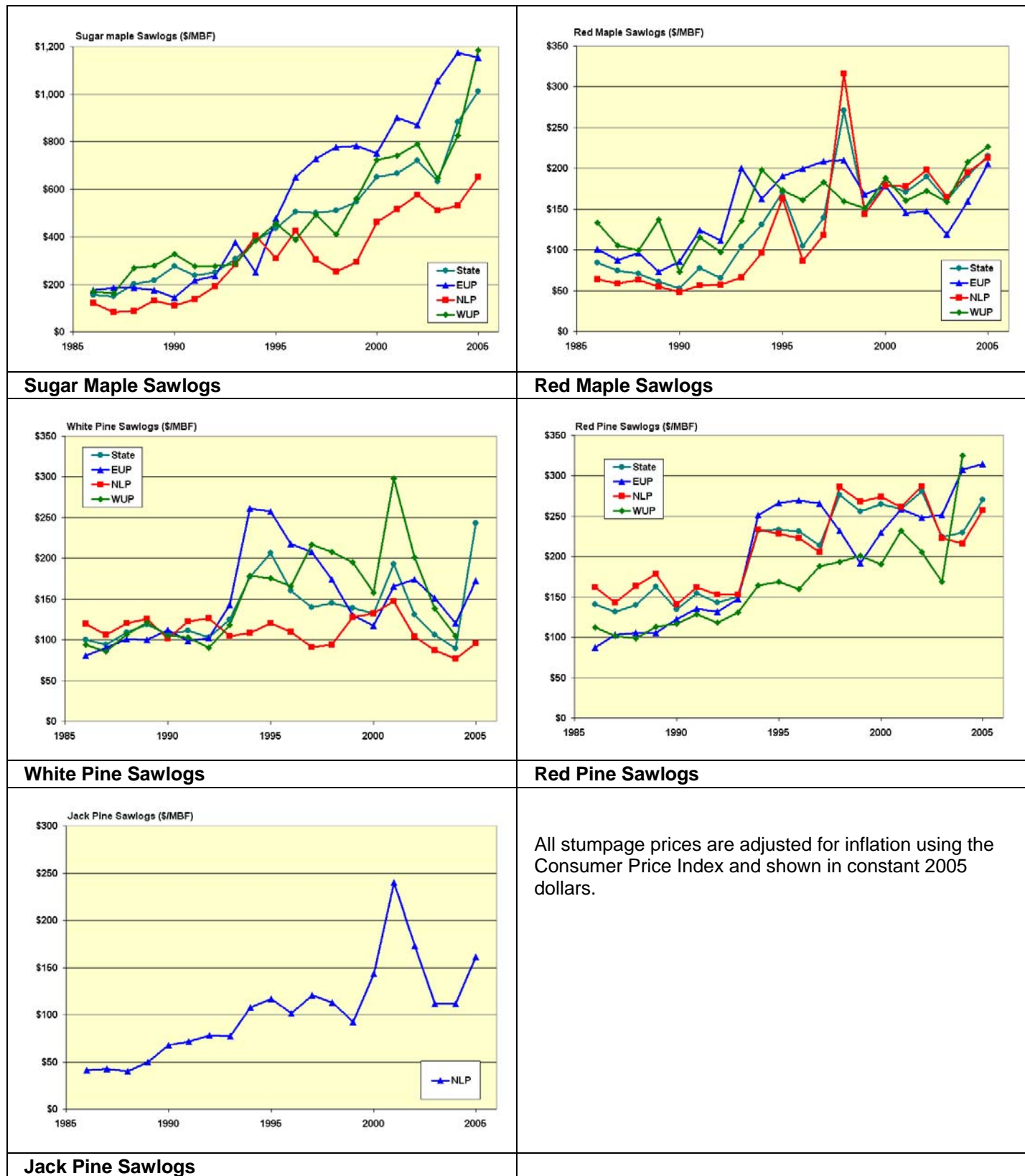
Figure 5.25 shows inflation-adjusted bid prices for sawlogs. These price series show much greater variability than pulpwood prices, but still demonstrate at least constant or upward trend in real prices over the longer term. Sawlog prices are more variable because of timber quality, sale conditions, and general market demand factors.



Aspen Sawlogs



Oak Sawlogs



All stumpage prices are adjusted for inflation using the Consumer Price Index and shown in constant 2005 dollars.

Figure 5.25. Real price trends (adjusted for inflation) for selected sawlog timber products by region, 1986 to 2005.

Mineral, oil and gas extraction

Oil and Gas

Oil and gas production is a significant land use throughout the Lower Peninsula with most well operations in the Northern Lower Peninsula. There is no oil or gas production in the Upper Peninsula. Most wells are located in major sedimentary rock formations in the Northern Lower Peninsula as shown in Figure 5.26. Red locations on the map indicate new wells drilled in 2000 to 2005 mostly in a band stretching roughly from Manistee to Alpena counties. Black indicates older wells, some of which are no longer in production.

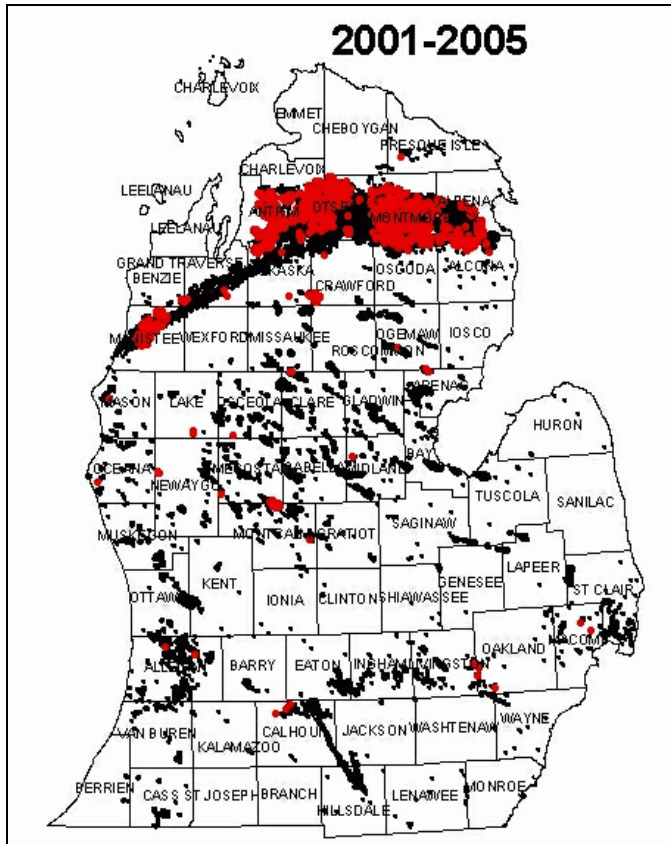


Figure 5.26. Distribution of oil and gas wells in Michigan.

The State owns mineral rights, including oil and gas, on over 6 million acres of land (Table 5.15), roughly one-sixth of the total land area of the State. About 25% of the 13,722 oil and gas wells in the State are located on state-owned land in the lower peninsula. About 31% of the oil and gas wells in the Northern Lower Peninsula are on state-owned lands. There is no oil and gas production in the upper peninsula.

Significant well development opportunities exist on these lands but also present potential conflicts with other land uses. A detailed analysis of oil and gas opportunities and issues is beyond the scope of this study. However, given recent escalation of energy prices on world markets, it is reasonable to expect that pressure for increased production from State-owned lands will develop.

Table 5.15. Area (thousand acres) of State-owned land, by ownership rights and ecoregion

EcoRegion	Surface only	Mineral and Surface	Minerals only	Mixed Ownership	Other Rights
EUP	97	996	435	25	70
NLP	146	1,860	940	70	19
SLP	63	347	68	29	4
WUP	158	780	804	27	37
State	465	3,983	2,247	150	130

The State produced about 6.9 million barrels of oil a year in 2005, down from 14.2 million barrels in 1990 as shown in Table 5.16. Eighty eight percent of the current oil production (including liquid condensates) is from wells located in the Northern Lower Peninsula ecoregion. For the production history covering the last 16 years, oil production peaked at 14.3 million barrels in 1990 and gas production peaked at 291 billion cubic feet in 1997. Except for a small increase in 1996 and 1997, oil production has generally declined over the past 15 years. Natural gas production (Table 5.17) was 191 billion cubic feet in 2005. Gas production increased from 1990 to 1997 and then steadily declined since then. Data on oil production from 1990 to 2005 in the Northern Lower Peninsula ecoregion by county is available in appendix Table A5.15. Similar data for gas production is available in appendix Table A5.16.

Table 5.16. Michigan oil production (thousand barrels, including natural gas liquids and condensate) on all lands, by ecoregion, 1990 to 2005.

Year	NLP	SLP	State
	Thousand barrels		
1990	11,328	2,964	14,292
1991	9,896	3,147	13,043
1992	10,294	2,423	12,718
1993	8,656	2,066	10,722
1994	7,461	1,775	9,236
1995	7,195	1,795	8,991
1996	6,697	1,935	8,631
1997	9,107	2,820	11,926
1998	8,024	2,312	10,336
1999	7,376	1,930	9,306
2000	7,321	1,928	9,249
2001	6,802	2,073	8,875
2002	6,217	2,083	8,300
2003	5,743	1,973	7,716
2004	5,397	1,692	7,089
2005	5,352	1,557	6,909

Source: Mi DEQ database, http://www.michigan.gov/deq/0,1607,7-135-3311_4111_4231---,00.html

Table 5.17. Michigan gas production (million cubic feet) on all lands, by ecoregion, 1990 to 2005.

Year	NLP	SLP	State
	Million Cubic Feet		
1990	143,536	16,387	159,923
1991	159,192	21,952	181,144
1992	179,257	17,632	196,889
1993	183,199	12,721	195,920
1994	182,195	13,316	195,511
1995	203,491	12,428	215,919
1996	221,834	16,363	238,197
1997	272,300	18,762	291,062
1998	272,658	14,470	287,128
1999	262,354	10,819	273,173
2000	247,346	9,797	257,144
2001	234,269	10,550	244,819
2002	220,948	8,590	229,538
2003	202,938	8,676	211,614
2004	194,076	7,409	201,485
2005	184,714	5,953	190,667

Source: Mi DEQ database, http://www.michigan.gov/deq/0,1607,7-135-3311_4111_4231---,00.html

Estimates of the distribution of wells on State lands (with mineral rights) are shown in Table 5.18. In the Northern Lower Peninsula, almost 31% of the wells (4,529) are estimated to be located on State lands. State-owned lands comprise about 20% of the land area of the NLP ecoregion. County-level data on the distribution of oil and gas wells in 2005 is available in appendix Table 5.17.

Table 5.18. Distribution of Michigan lands and oil and gas wells by ecoregion, 2005.

Ecoregion	Ecoregion Land Area	State-owned land area	State Forest Land Area	Wells on non-State Land	Wells on State land	State oil-gas wells	State land area
	Acres			Wells		Percent of Ecoregion Total	
WUP total	6,935,923	960,895	883,338	0	0	0.0%	13.9%
EUP Total	3,572,262	1,116,699	1,066,870	0	0	0.0%	31.3%
NLP Total	10,358,541	2,073,890	1,991,626	10,156	4,529	30.8%	20.0%
SLP Total	15,487,706	429,943	45,533	3,566	58	1.6%	2.8%
State	36,354,432	4,581,427	3,987,367	13,722	4,587	25.1%	12.1%

Source: Oil and gas well database maintained by the Michigan DEQ.

Minerals

Mining is a very important land use in Michigan with mineral occurrences located throughout the state. There are 850 producing mineral occurrences in the State with more than 80% of these being sand and gravel operations.

Mining operations for metallic ores, such as iron, copper and other metals are concentrated in the Western UP with numerous undeveloped mineral occurrences. There is current interest in expanding mining for metallic minerals in the Western Upper Peninsula. Many non-metallic operations, especially sand and gravel, are located in the Lower Peninsula. Table 5.19 provides a summary of the number of mineral occurrences by type in each ecoregion. These occurrences may be in any stage of development from a closed mine to a new prospect. Many current and old mines (indicated as Past Producer in Table 5.19 below) affect local environmental conditions or the suitability of nearby land uses. No information is available on specific mining operations located on State-owned lands. Campbell and Robert (2001) provide an overview of the implications of mining on land use in Michigan. Information on the distribution of mineral occurrences by ecoregion and county are shown in appendix Table A5.18. County-level State ownership rights (eg. surface and mineral rights) by ecoregion and county are shown in appendix Table A5.19.

Information on mining operations on DNR lands was limited.

Table 5.19. Mineral occurrences by commodity group, development status, and ecoregion.

Development Status	Clay	Stone	Sand And Gravel	Other Non-metallic	Iron	Copper	Gold/Silver	Other Metallic
Eastern Upper Peninsula								
Past Producer	6	6	2	1				
Producer		4	47	7				2
Prospect		2						
Northern Lower Peninsula								
Past Producer	38	14	23	7				2
Producer	1	9	156	14	1			8
Plant		1						1
Prospect	24	1		3				
Unknown			1					
Southern Lower Peninsula								
Past Producer	100	9	102	29		1		14
Producer	6	12	408	25	4			20
Plant			1					2
Prospect	17		2	1				
Unknown			4	1				
Western Upper Peninsula								
Past Producer	4	14	9	14	511	265	13	4
Producer		13	83	4	14	10	2	
Plant					8	2	1	
Occurrence					127	38	24	24
Prospect	1	1		3	662	74	42	3
Unknown			1		1			
State								
Past Producer	148	43	136	51	511	266	13	20
Producer	7	38	694	50	19	10	2	30
Plant		1	1		8	2	1	3
Occurrence					127	38	24	24
Prospect	42	4	2	7	662	74	42	3
Unknown			6	1	1			

Source: U.S. Geological Survey, 2005, Mineral Resources Data System: U.S. Geological Survey, Reston, Virginia. (<http://tin.er.usgs.gov/mrds/>)

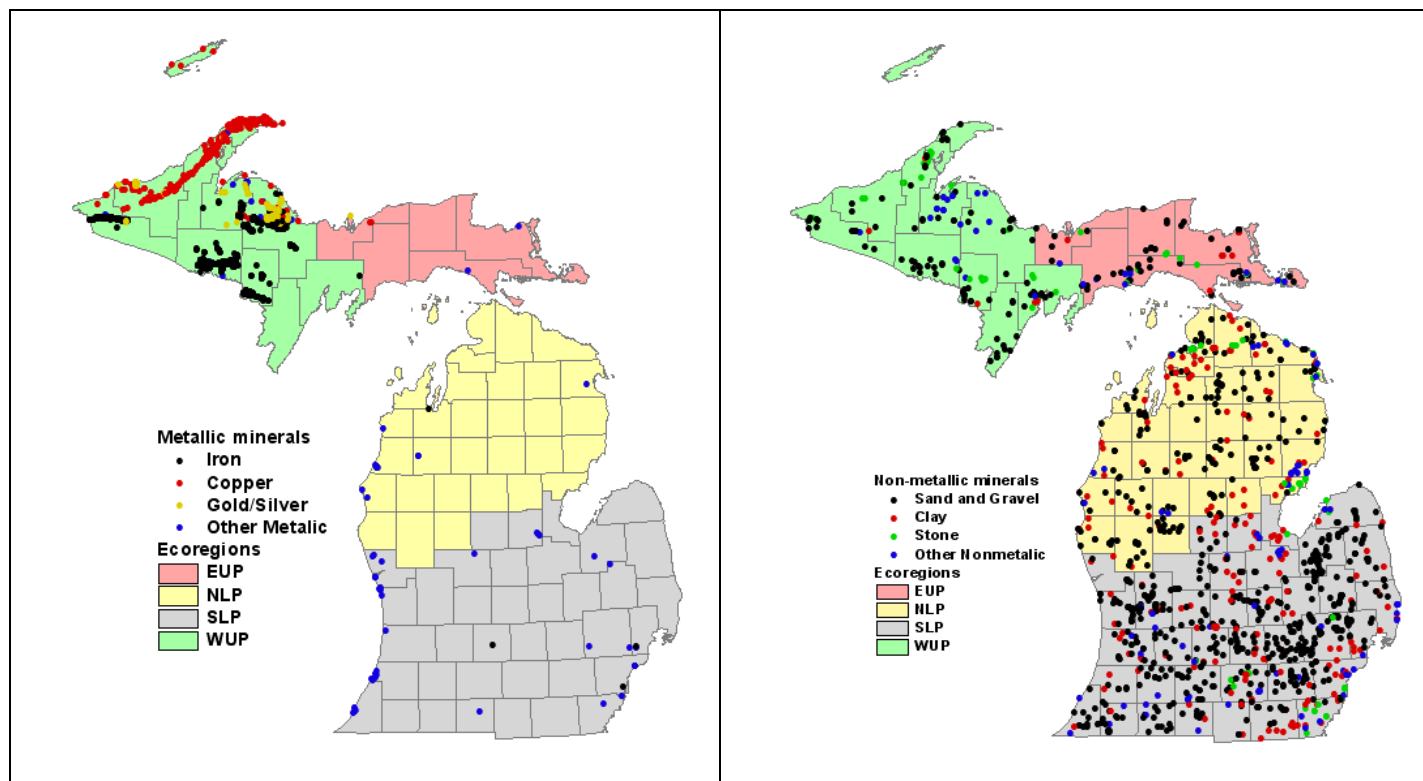


Figure 5.27. Distribution of metallic mineral occurrences in Michigan.

Figure 5.28. Distribution of nonmetallic mineral occurrences in Michigan.

Source: U.S. Geological Survey, 2005, Mineral Resources Data System: U.S. Geological Survey, Reston, Virginia. (<http://tin.er.usgs.gov/mrds/>)

Water Resources

Water resources are an essential part of the Michigan experience with the Great Lakes, natural rivers, and many inland lakes. Water resources serve many needs in Michigan – domestic water supplies, recreation and transportation, and industry.

Each of the three ecoregions in this study contains many primary watersheds and they all touch on one or more of the Great Lakes. Table 5.20 lists watersheds and the proportion of land area drained within each ecoregion. The Western Upper Peninsula has parts or all of 19 watersheds and the five largest watersheds drain almost 49% of the ecoregion. Five out of eight watersheds in the Eastern UP drain 78% of the land area of the ecoregion. The Northern Lower Peninsula has 17 watersheds and the top five watersheds drain 59% of the ecoregion. (Figure 5.29)

Table 5.20. Distribution of major watersheds and percent land area coverage by ecoregion, 2000.

Hydrologic Unit Code	Watershed	Percent of Ecoregion	Hydrologic Unit Code	Watershed	Percent of Ecoregion
Western Upper Peninsula			Northern Lower Peninsula		
4020102	Ontonagan	12.10%	4060102	Muskegon	14.20%
4020103	Keweenaw Peninsula	9.80%	4070007	Au Sable	12.00%
4030109	Cedar-Ford	9.00%	4060103	Manistee	11.60%
4030108	Menominee	8.90%	4060101	Pere Marquette-White	11.10%
4020101	Black-Presque Isle	8.70%	4060105	Boardman-Charlevoix	9.80%
4030110	Escanaba	8.40%	4070006	Thunder Bay	7.50%
4020105	Dead-Kelsey	8.30%	4080101	Au Gres-Rifle	6.10%
4030106	Brule	7.90%	4070004	Cheboygan	5.60%
4030107	Michigamme	6.60%	4080201	Tittabawassee	5.40%
4020104	Sturgeon	6.40%	4060104	Betsie-Platte	5.00%
4030111	Tacoosh-Whitefish	4.50%	4070003	Lone Lake-Ocqueoc	4.60%
4030112	Fishdam-Sturgeon	3.90%	4070005	Black	3.70%
4020300	Lake Superior	2.00%	4080202	Pine	1.20%
4020201	Betsy-Chocolay	1.60%	4060200	Lake Michigan	0.90%
4010302	Bad-Montreal	0.90%	4080102	Kawkawlin-Pine	0.80%
7070001	Upper Wisconsin	0.50%	4050006	Lower Grand	0.50%
4060106	Manistique	0.30%	4080300	Lake Huron	<0.1%
7050002	Flambeau	<0.1%			
4060200	Lake Michigan	<0.1%			
Eastern Upper Peninsula					
4060106	Manistique	24.80%			
4020201	Betsy-Chocolay	17.50%			
4020202	Tahquamenon	14.60%			
4070002	Carp-Pine	11.30%			
4060107	Brevoort-Millecoquins	10.00%			
4070001	St. Marys	7.20%			
4020203	Waiska	5.50%			
4080300	Lake Huron	4.30%			
4030112	Fishdam-Sturgeon	2.30%			
4030111	Tacoosh-Whitefish	2.30%			
4020300	Lake Superior	<0.1%			
4060200	Lake Michigan.	<0.1%			

Source: Hydrologic boundaries were intersected with county and ecoregion boundaries to derive watershed coverage. GIS layers are available from the National Atlas (<http://nationalatlas.gov>).

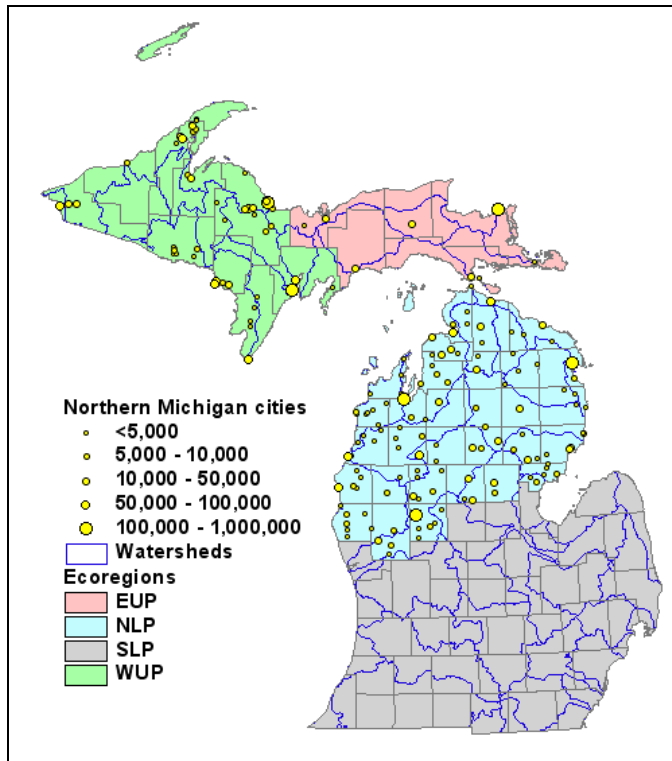
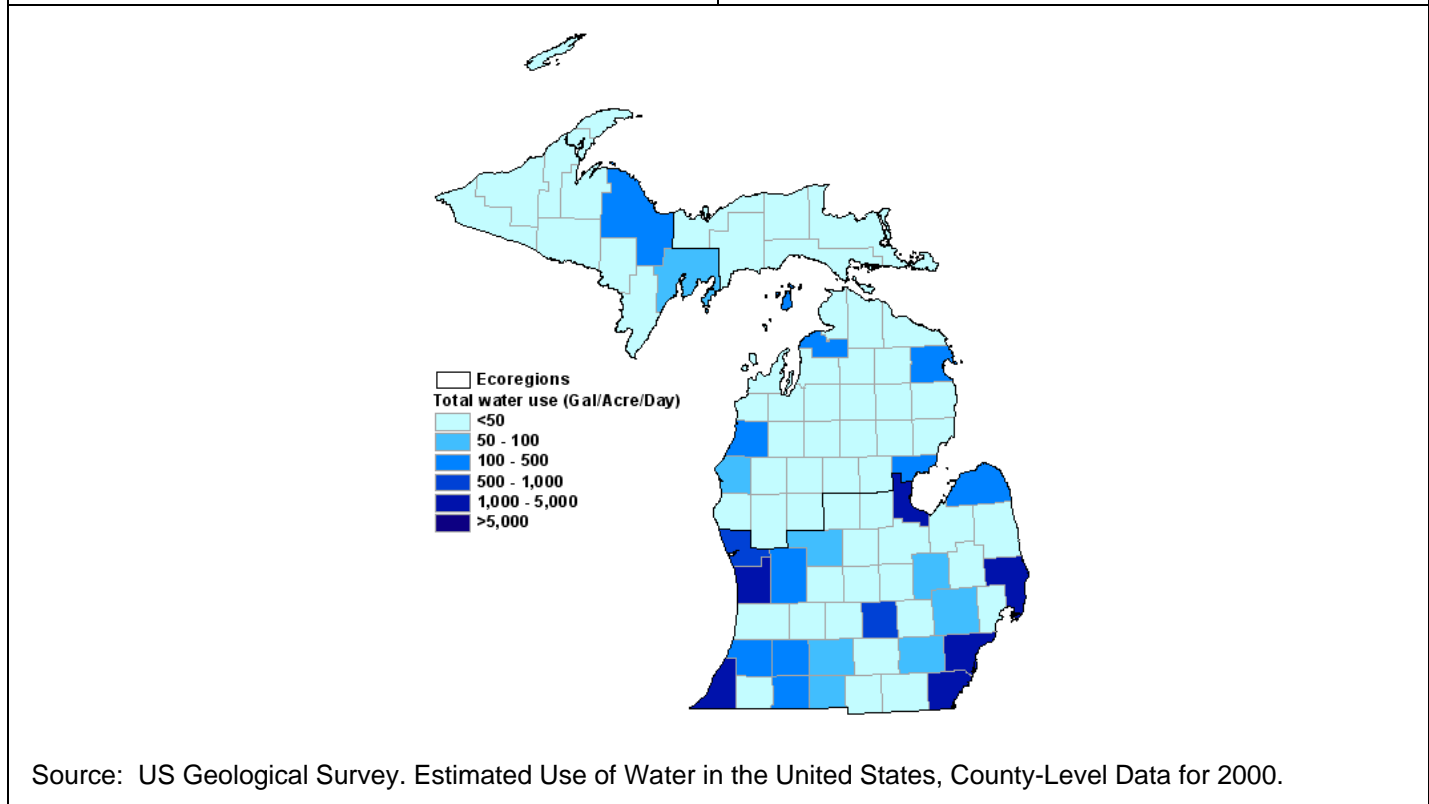
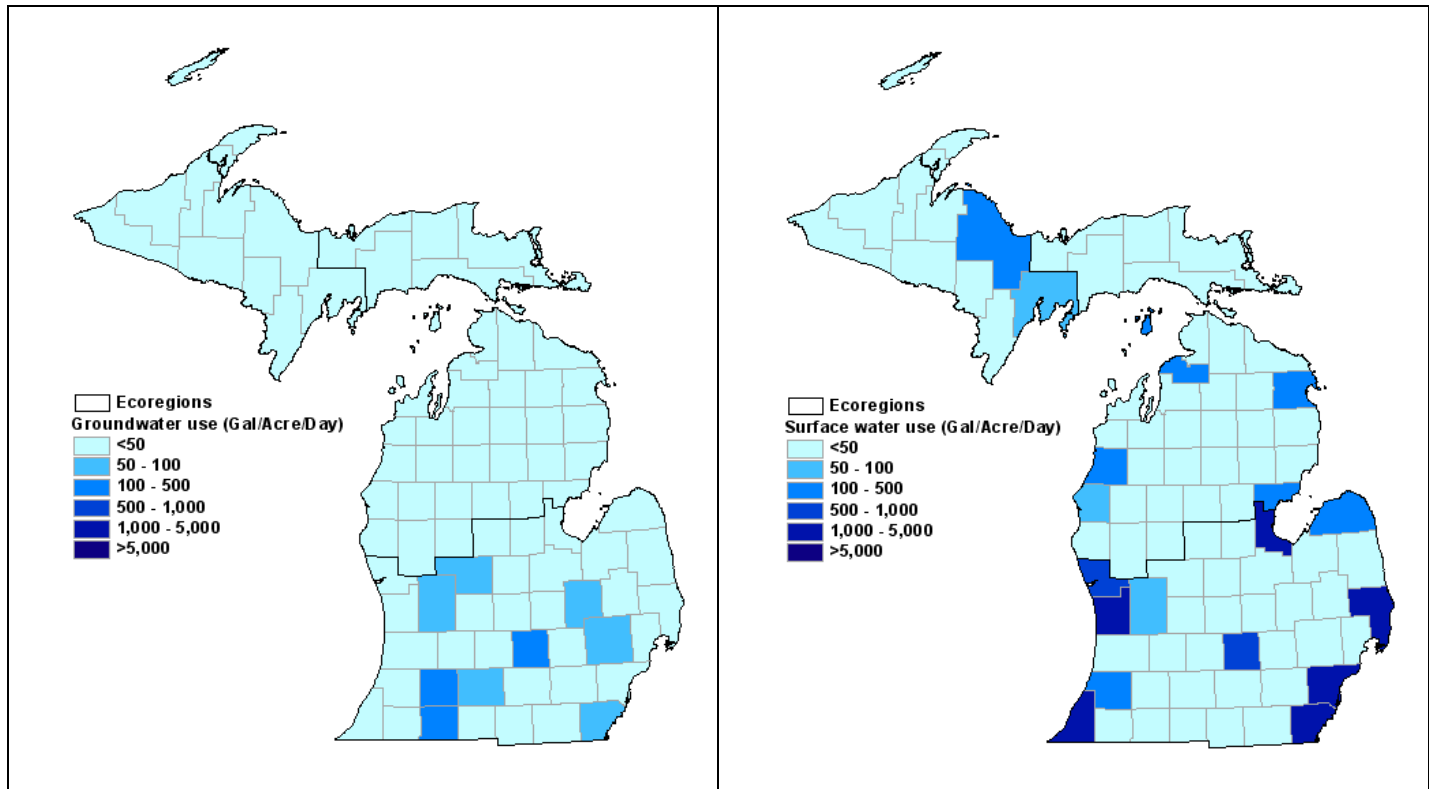


Figure 5.29. Hydrologic unit (watershed) boundaries in Michigan by ecoregion.

Water use in Michigan is about 1 billion gallons per day. About 93% of the water supply comes from surface waters (particularly the Great Lakes) and about 7% from ground water sources. Water use varies greatly throughout Michigan for both domestic and industrial use according to data maintained by the US Geological Survey. Figure 5.20 displays water consumption at the county level from surface and ground water sources. Per capita water use in the State is 1,006 gallons per day. While this may seem high, it averages all water consumption (domestic, agricultural, and industrial) per resident. Consumption values are much higher in counties with large industrial water users. Consumption rates at the low end, primarily for domestic water use range from about 100 to 150 gallons per person per day. Detailed county-level estimates of water use are available in appendix Table A5.20.

Counties adjacent to Great Lakes tend to have much higher consumption rates for surface waters, mostly to supply water-using industries or thermoelectric power generation. Per capita water consumption (Figure 5.21) is particularly high in locations with relatively low population, but high industrial water use.



Source: US Geological Survey. Estimated Use of Water in the United States, County-Level Data for 2000.

Figure 5.30. Groundwater, surface water, and total water use by county, 2000.

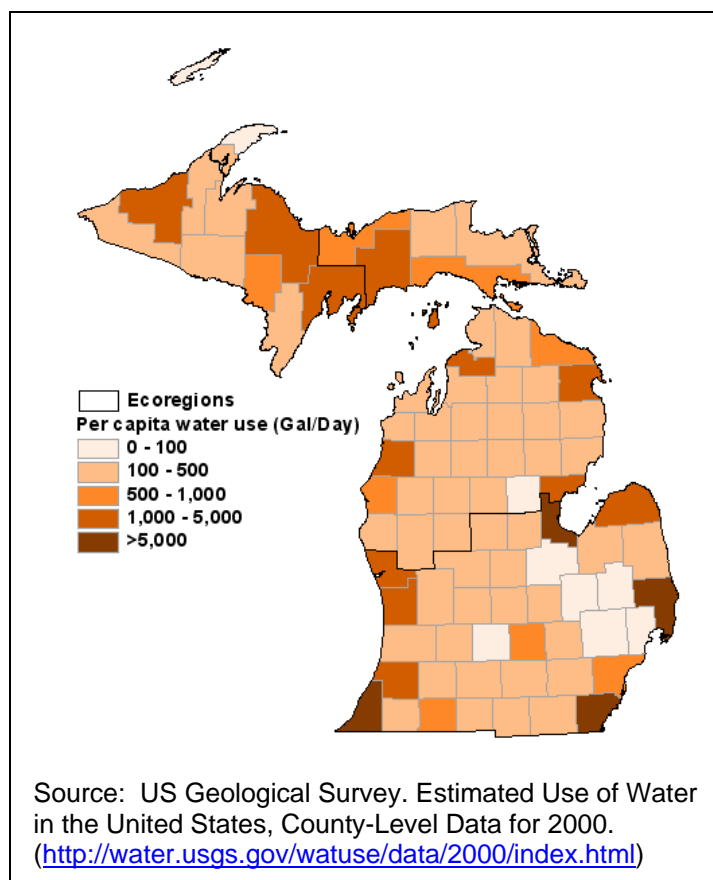


Figure 5.31. Per capita water use in Michigan, by county, 2000.

Average Michigan withdrawals was 1,006 gallons per day in 2000. This rate includes all water uses divided by the resident population and varies considerably across the state, depending on industrial uses. Per capita consumption is much higher in some counties bordering the Great Lakes, especially those with high water-use industries such as thermoelectric power generation. Water use by ecoregion is shown in Tables 5.21 and 5.22.

Average US per-capita withdrawals for all purposes was 1,432 gallons per day in 2000. Approximately 48% of total withdrawals was for thermoelectric power and 34% was for irrigation. Public water supplies accounted for only 11% of total withdrawals nationally.

Public water supplies are especially important to communities. Seventy two percent of the State's population is served by a public water utility but public water supplies reach a lower proportion of the residents in the three study ecoregions. . In the Western UP, 68% of the population are served by public water supplies. Fifty one percent of the people in the EUP have access to public water supplies and only 33% have public water in the Northern Lower Peninsula where the dispersed population relies primarily on groundwater from domestic wells.

Public land management activities can significantly affect water quality. Road construction and maintenance, silvicultural operations, mining operations, drilling and well operations, and even wildlife management strategies can affect both surface and groundwater resources. Adherence to best management practices and effective operational planning is essential to prevent or mitigate degradation.

Table 5.21. Public water supply by ecoregion from ground and surface water, 2000.

Ecoregion	Public Supply With-drawals	Population served by public supply		Public Supply from groundwater		Public Supply from Surface water	
	Million Gal/Day	Thousand persons	Percent	Million Gal/Day	Percent	Million Gal/Day	Percent
WUP	22.3	163	67.5%	15.0	5.6%	7.3	94.4%
EUP	6.4	39	50.8%	2.3	18.1%	4.0	81.9%
NLP	77.9	244	32.5%	29.1	29.2%	48.8	70.8%
SLP	1,036.8	6,720	75.8%	200.6	6.5%	836.1	93.5%
State	1,143.3	7,165	72.1%	247.0	7.3%	896.3	92.7%

Source: US Geological Survey. Estimated Use of Water in the United States, County-Level Data for 2000. (<http://water.usgs.gov/watuse/data/2000/index.html>)

Table 5.22. Per-capita water use and per-acre withdrawals from ground and surface water, by ecoregion, 2000.

Ecoregion	Total pop-ulation	Per-capita use	Land area	Total water use	Ground-water with-drawals	Ground-water with-drawals	Surface water with-drawals	Total with-drawals
	Thousand persons	Gal/Day	Thousand Acres	Gal/Acre /Day	Gal/Acre/ Day	Million Gal/Day	Million Gal/Day	Million Gal/Day
WUP	241	1,731	6,936	60.2	3.4	23.5	394.4	417.8
EUP	76	461	3,572	9.8	1.8	6.4	28.8	35.1
NLP	750	513	10,359	37.1	10.8	112.2	272.5	384.7
SLP	8,871	1,033	15,488	591.5	38.2	592.2	8,568.8	9,161.0
State	9,938	1,006	36,354	275.0	20.2	734.3	9,264.3	9,998.6

Source: US Geological Survey. Estimated Use of Water in the United States, County-Level Data for 2000. (<http://water.usgs.gov/watuse/data/2000/index.html>)

Special forest products

Information on the actual production of special forest products from state forests is limited. We could find no compilations indicating the production or harvesting of products that are typically not marketed. Gathering activities are particularly important and generate recreational activity and tourism spending for some products such as mushrooms found in state forests. Work by Emery (1998, 2001) and Davidson-Hunt, et al.(2001) provides a basis for further investigation of special products.

One related area of special interest is the captive production of deer and related species (cervids) on farms and ranches. These facilities are described below.

Captive Cervids

The number of privately-owned captive cervid facilities has increased dramatically from the late 1980's to the present (Figure 5.22). In 2004 there were 740 facilities that raise deer and elk in captivity. According to O'Brien et al. (2005), there were 740 facilities in Michigan (Table 5.23). These facilities, while on private lands, can

significantly affect the healthy of wildlife resources on nearby public lands. Captive cervid facilities are actively inspected by the Michigan Department of Agriculture to assure animal safety and protect wildlife in surrounding areas. There are a range of classes of these facilities, but more than half (399) are full registration operations. Overall, from 83 to 89% of the facilities were active in 2004 (Table 5.23).

Table 5.23. Number of captive privately-owned cervid facilities in Michigan by type of registration, 2004.

Facility Class	MDA Registration	Percent Inspected	Percent Active
Class I (Hobby)	166	21%	83%
Class II (Exhibition)	33	27%	89%
Class III (Ranch)	142	100%	88%
Full Registration	399	100%	86%
Total	740	79%	87%

Source: O'Brien et al., 2005, p 101)

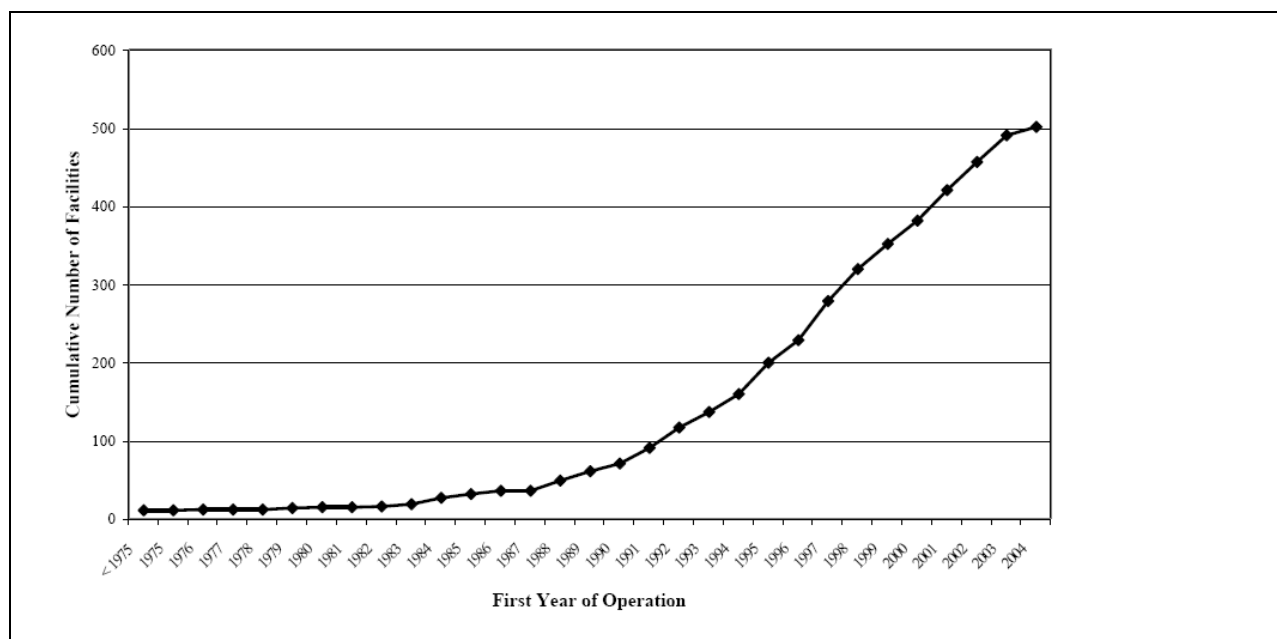


Figure 5.32. Number of active captive privately-owned cervid facilities inspected in 2004. (from O'Brien et al., 2005, p 94)

Most cervid facilities are located in the Lower Peninsula (Figure 5.33) and almost half (361) are located in the Northern Lower Peninsula (Northeastern, Northwestern, and Saginaw Bay Wildlife Management Units). The Upper Peninsula has 52 facilities. A specific breakdown of facility locations in relation to State-owned lands could not be done without further data. Current summaries and mapping show these facilities by administrative Wildlife Management Units (Table 2.24) which do not match ecoregion boundaries considered in this report.

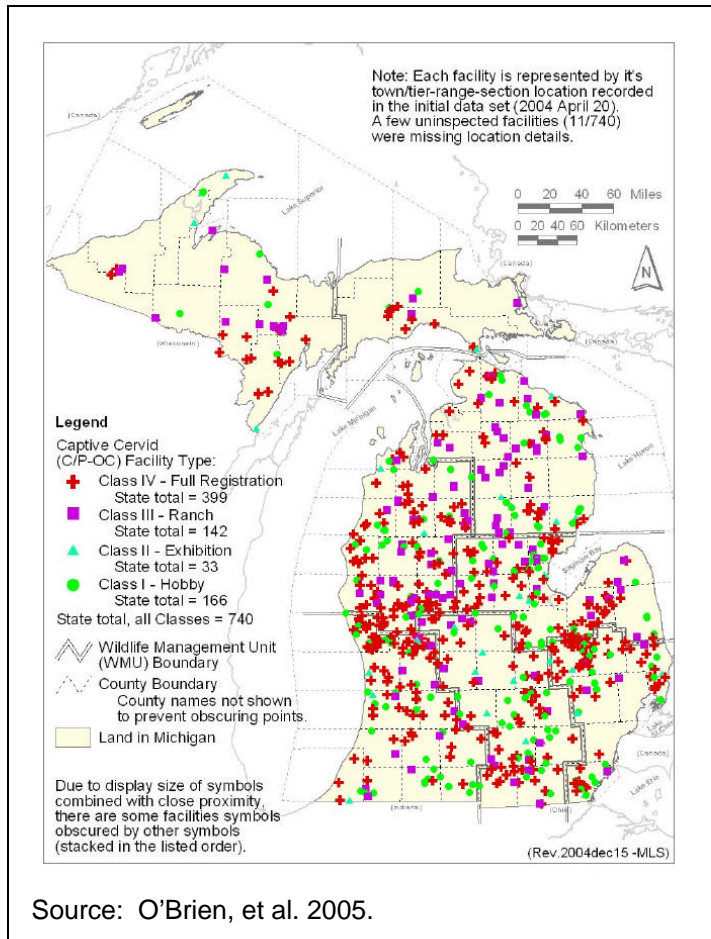


Figure 5.33 Distribution of captive privately-owned cervid facilities by Michigan DNR Wildlife Management Unit, 2004.

Table 5.24. Number of captive privately-owned cervid facilities in Michigan by Wildlife Management Unit, 2004.

Wildlife Management Unit	MDA Registration	Percent Inspected	Percent Active
Western UP	38	82%	94%
Eastern UP	14	93%	85%
Northeastern	97	78%	87%
Northwestern	145	86%	86%
Saginaw Bay	119	76%	81%
South Central	109	77%	92%
Southeastern	98	76%	91%
Southwestern	120	77%	83%
Total	740	79%	87%

Source: O'Brien, et al. 2005.

References

- Campbell, G., and Robert, M. 2001. Economic implications of projected land use patterns for the minerals industry in Michigan. In: Michigan Land Resource Project Final Report. Lansing, MI: Michigan Economic and Environmental Roundtable (MEER) and Public Sector Consultants, Inc.:67-110.
<http://www.publicsectorconsultants.com/documents/lbilu/minerals.pdf>
- Davidson-Hunt, I.; Duchesne, L. C.; and Zasada, J. C. 2001. Non-timber forest products: local livelihoods and integrated forest management. In: Davidson-Hunt, Ian; Duchesne, Luc C.; Zasada, John C. ,eds. Forest communities in the third millennium: linking research, business and policy towards a sustainable non-timber forest product sector; Proceedings of the meeting; 1999 October 1-4; Kenora, Ontario, Canada Gen. Tech. Rep. NC-217. St Paul, MN: US Department of Agriculture, Forest Service, North Central Research Station. 151p.
- Emery, M. R. 1998. Invisible livelihoods: nontimber forest products in Michigan's upper peninsula. New Brunswick, NJ: Rutgers University. Doctoral dissertation.
- Emery, M. R. 2001 Non-timber forest products and livelihoods in Michigan's Upper Peninsula. In: Forest communities in the third millennium: linking research, business and policy towards a sustainable non-timber forest product sector; Proceedings of the meeting; 1999 October 1-4; Kenora, Ontario, Canada. Ian Davidson-Hunt, Luc C Duchesne, John C. Zasada, eds. Gen. Tech. Rep. NC-217. St Paul, MN: US Department of Agriculture, Forest Service, North Central Research Station. 151p.
- Flesher, J. 2001. Military base a retiree magnet. Traverse City Record-Eagle May 27, 2001. www.record-eagle.com/2001/may/27cenwur.htm.
- Hansen, M. H. and Brand G. J. 2006. Michigan's Forest Resources in 2004 St. Paul, MN: USDA Forest Service, North Central Research Station. RB NC-255 41 p.
- Hansen, M. H.; Frieswyk, T.; Glover J. F.; Kelly, J. F. 1992. The Eastwide forest inventory data base: users manual. Gen. Tech. Rep. NC -151. St Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Research Station. 48p.
- Haugen, D. E. and Weatherspoon, A. 2003. Michigan Timber Industry—An Assessment of Timber Product Output and Use, 1998 St. Paul, MN: USDA Forest Service, North Central Research Station. RB NC-212 83 p.
- Haugen, D. E. and Pilon, J. 2002. Michigan timber industry--an assessment of timber product output and use, 1996 St. Paul, MN: USDA Forest Service, North Central Research Station. RB-NC -203 85 p.
- Leatherberry, E. C. 2002. Michigan's Forest Resources in 2000 St. Paul, MN: USDA Forest Service, North Central Research Station. RN NC-379 8 p.
- Leatherberry, E. C. 2002. Michigan's Forest Resources in 2002. Research Note NC-379. St Paul, MN: U.S .Department of Agriculture, Forest Service, North Central Research Station. 8p.
- Leatherberry, E. C.; Haugen, D. E.; and Brand G. J. 2005. Michigan's Forest Resources in 2003 St. Paul, MN: USDA Forest Service, North Central Research Station. RB NC-245 39 p.
- Leatherberry, E. C.; and Spencer, Jr, J. S. 1996. Michigan forest statistics, 1993. RB- NC-170. St. Paul, MN: USDA Forest Service, North Central Research Station.
- Leatherberry, Earl C. and Gary J. Brand
- Leatherberry, E. C.; and Brand G. J. 2003. Michigan's Forest Resources in 2001 St. Paul, MN: USDA Forest Service, North Central Research Station. RB NC - 224 23 p.
- O'Brien, D., P. Bernardi, S. Dubay, S. Mayhew, W. Moritz, and D. Purol. 2005. A Risk-based Audit of the Captive/Privatey owned Cervid Industry in Michigan. Lansing, MI. Michigan Department of Natural Resources Report Series, Issue Report No. 1. 154p.
- Pedersen, L. 2005. Michigan State Forest Timber Harvest Trends. Lansing, MI: Department of Natural Resources. Unpublished report. 76p.

- Piva, R. J. 1999. Pulpwood production in the North-Central Region, 1997 St. Paul, MN: USDA Forest Service, North Central Research Station. RB-NC-195 37 p.
- Piva, R. J. 2003. Pulpwood Production in the North-Central Region, 1999 St. Paul, MN: USDA Forest Service, North Central Research Station. RB NC-214 58 p.
- Piva, R. J. 2005. Pulpwood Production in the North-Central Region, 2003 St. Paul, MN: USDA Forest Service, North Central Research Station. RB NC-251 56 p.
- Piva, R. J. 2006. Pulpwood Production in the North-Central Region, 2004 St. Paul, MN: USDA Forest Service, North Central Research Station. RB NC-265 51 p.
- Piva, R. J. 2002. Pulpwood Production in the North-Central Region, 1998 St. Paul, MN: USDA Forest Service, North Central Research Station. RB NC-207 59 p.
- Piva, R. J. 2003. Pulpwood Production in the North-Central Region, 2000 St. Paul, MN: USDA Forest Service, North Central Research Station. RB NC-221 58 p.
- Piva, R. J. 2003. Pulpwood Production in the North-Central Region, 2001 St. Paul, MN: USDA Forest Service, North Central Research Station. RB NC-227 56 p.
- Piva, R. J. 2005. Pulpwood Production in the North-Central Region, 2002 St. Paul, MN: USDA Forest Service, North Central Research Station. RB NC-239 56 p.
- Piva, R. J. 1999. Pulpwood production in the North-Central Region, 1997. Resour. Bull. NC-195. St. Paul, MN: USDA Forest Service, North Central Research Station. 37 p.
- Potts, R.; Gustafson, E.; Stewart, S. I.; Thompson, F. R.; Bergen, K.; Brown, D. G.; Hammer, R.; Radeloff, V.; Bengston, D.; Sauer, J.; and Sturtevant, B. 2004. The Changing Midwest Assessment: land cover, natural resources, and people. Gen. Tech. Rep. NC-250. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Research Station. 87 p.
- Raile, G. K.; and Smith, W. B. 1980. Michigan Forest Statistics, 1983. Resource Bulletin NC-67. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station. 101 p.
- Schmidt, T. L.; Spencer, Jr, J. S.; and Bertsch, R. 1997. Michigan's forests, 1993: an analysis. Resour. Bull. NC-179. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station. 96p.
- Smith, W. B.; Miles, P. D.; Vissage, J. S.; and Pugh, S. A. 2003. Forest Resources of the United States, 2002. Gen. Tech. Rep. NC-241. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Research Station. 137 p.
- U.S. Geological Survey. Digital geologic map and mineral deposits of the Lake Superior region
<http://pubs.usgs.gov/of/of97-455/>

Chapter 6: Outdoor Recreation Uses and Values

Introduction

Outdoor recreation is an important component of Americans' lives (Bowker et al. 1999). There are many facets of outdoor recreation relevant to state forest management and planning. This section focuses on A) lands available for outdoor recreation, B) special areas and designations, C) recreation facilities, D) state and national trends in recreation activities, E) access to outdoor recreation, F) recreation activities and participation on state and national forests, and G) economic impacts of forest-based recreation visitors. Data and information on outdoor recreation comes from a variety of sources, including the Michigan DNR, the USDA Forest Service and Michigan State University's Travel, Tourism and Recreation Resources Center.

Settings for Outdoor Recreation

Michigan provides many opportunities for outdoor recreation, on public and private lands. The states are dominated by private land, but the principal emphasis in this section is on public lands.

Public lands in Michigan are viewed as a tremendous recreation resource. The variety and extent of public lands are well known (Figure 6.1, Table 6.1). State lands comprise 4.7 million acres of Michigan's total of 36.4 million acres, and federal lands total another 3.2 million acres. The state and federal lands account for over 21% of Michigan lands. The state of Michigan has the largest landholdings including state forests, state park and recreation areas, state wildlife refuges, and state game areas. Federal lands consist of national forests, national lakeshores, a national park, and national wildlife refuges.

State wildlife and game areas are concentrated in the southern Lower Peninsula, whereas state forests and federal lands are concentrated in the northern Lower Peninsula and Upper Peninsula. Forest, Mineral and Fire Management Division of the Michigan Department of Natural Resources manages the state forests, the largest dedicated state forest system in the United States. Several classes of Special Conservation Areas and High Conservation Value areas within the state forests are associated with recreation, notably Trout Streams and Trout Lakes, Visual Management Areas, Concentrated Recreation Areas, Wilderness or Wild Areas, and Natural Rivers. Wildlife Division manages 100 state game and wildlife areas covering nearly 340,000 acres that provide a setting for recreational activities (Nelson and Stynes 2003). In addition, there are 96 state parks and recreation areas with over 270,000 acres, managed by the MiDNR Parks and Recreation Division, throughout Michigan.

At the federal level, the USDA Forest Service manages national forests, the USDI Park Service manages national parks and lakeshores, and the USDI Fish and Wildlife Service manages national wildlife refuges. The national forests (Ottawa, Hiawatha, and Huron-Manistee) comprise the largest federal ownership category, followed by Park Service units (Isle Royale National Park, Pictured Rocks National Lakeshore, Sleeping Bear Dunes National Lakeshore, Keweenaw National Historical Park, Father Marquette National Memorial, and North Country National Scenic Trail). Seney National Wildlife Refuge, located in the central Upper Peninsula, is the largest of several Fish and Wildlife Service units.

Individual privately-owned lands provide another major setting for recreation; seasonal and permanent homeowners recreate on public and private lands in northern Michigan. Commercial forest lands, through the Commercial Forest Act, passed in 1925 (now the Commercial Forest Program, P.A. 451, part 511) provide another major setting for outdoor recreation on private lands. The act encourages retention of timber-growing land by reducing the owners' taxes and requires access to these lands by citizens for hunting and fishing. Over 2.2 million acres are covered in the program with over 1,300 landowners enrolled. The largest landowners have 1.6 million acres enrolled—all in the Upper Peninsula (Figure 6.2, Table 6.2). This area is slightly less than the acreage of national forests in the Upper Peninsula.

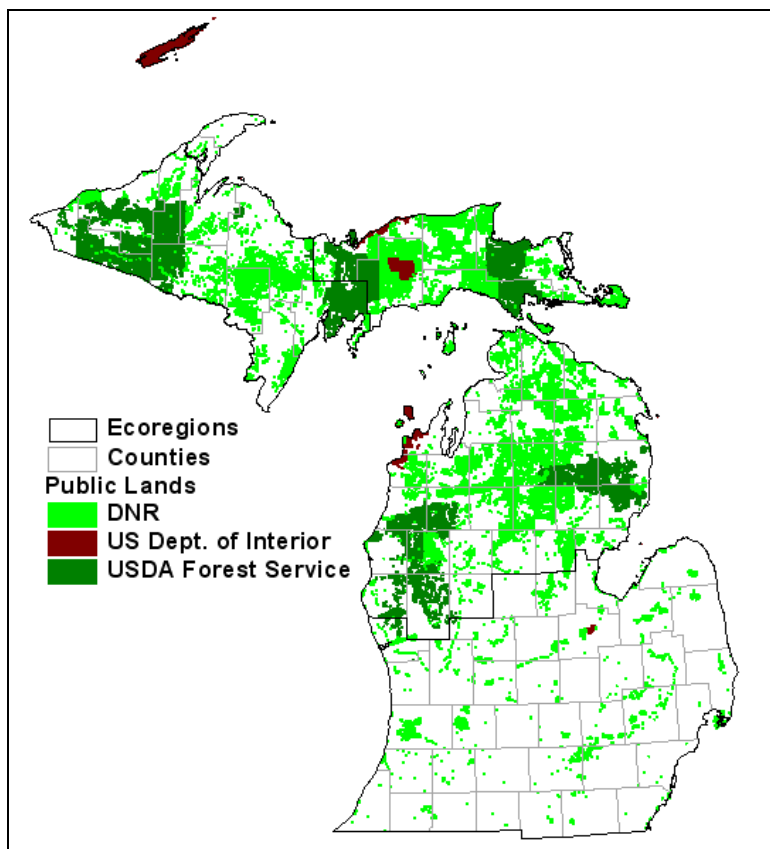


Figure 6.1. Public lands in Michigan.

Table 6.1. Public lands in Michigan^a.

Public Ownership	Upper Peninsula	Northern Lower Peninsula	Total
National Forest	1,875,119	961,400	2,836,519
National Lakeshore	30,092	62,512	92,604
National Park	141,086		141,086
National Wildlife Refuge	93,483	10,116	103,599
State Fish Hatchery	479	379	858
State Forest	1,861,398	1,928,315	3,789,713
State of Michigan	128,980	182,857	311,837
State Park	116,381	80,600	196,980
State Wildlife Area	1,418	10,478	11,897
State Wildlife Management Area	39,840		39,840
State Game Area		231,243	231,243
State Recreation Area		39,372	39,372
State Wildlife Research Area		41,989	41,989
Total Area in Acres	4,288,275	3,549,260	7,837,535

^aArea, in acres, based on spatial data available at <http://www.mcgi.state.mi.us/mgdl/>. Totals may not be identical to data published in other sources.

Table 6.2. Major forestland owners enrolled in Michigan's Commercial Forest Program.

Owner	Approximate Acres	County Location
Longyear Realty Corporation	65,000	Baraga, Gogebic, Houghton, Iron, Keweenaw, Marquette, and Ontonagon
The Nature Conservancy	23,076	Luce
Keweenaw Land Association, Ltd.	145,618	Baraga, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Marquette, Ontonagon, and Schoolcraft
Heartwood Forestland Funds II & III, LP	160,461	Iron, Baraga, Houghton, Keweenaw, and Ontonagon
Lake Superior Land Co.	190,194	Baraga, Houghton, Keweenaw, and Ontonagon
International Paper Corporation	231,693	Baraga, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Luce, Marquette, Menominee, and Ontonagon
Heartwood Forestland Fund IV LP	358,079	Alger, Baraga, Chippewa, Delta, Gogebic, Houghton, Luce, Marquette, Ontonagon, and Schoolcraft
Plum Creek	635,094	Alger, Baraga, Chippewa, Delta, Dickinson, Houghton, Iron, Mackinac, Marquette, Menominee, and Ontonagon

Source: Michigan DNR (2006) and adapted from Dickmann and Leefers (2003).

Note: International Paper lands were sold in 2006.

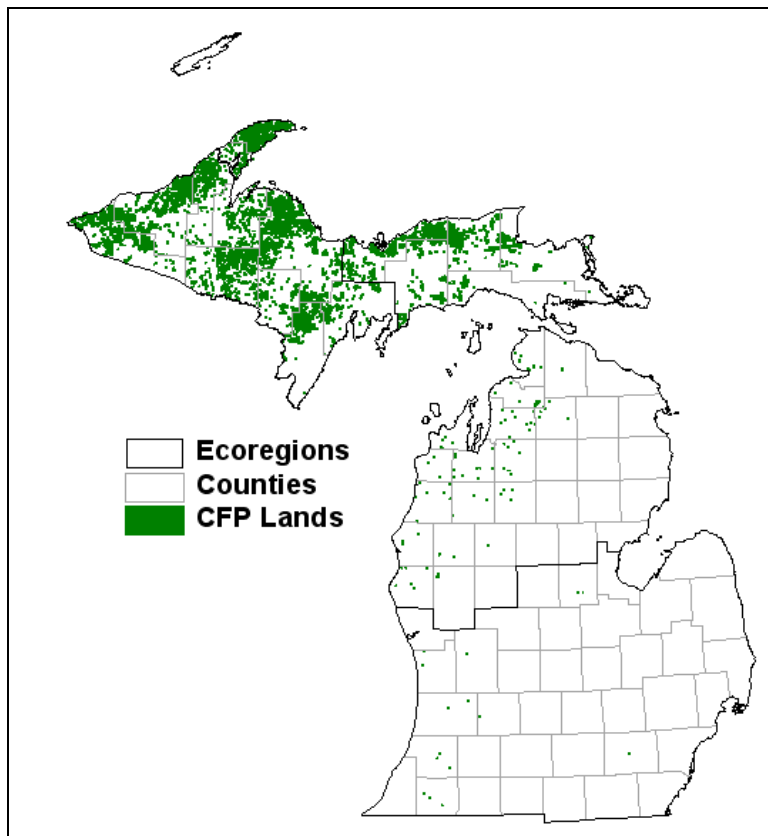


Figure 6.2. Commercial Forest Program lands in northern Michigan, 2005.

Special areas and designations

Recreation Opportunity Spectrum (ROS) areas

Opportunities for recreation experiences are affected by natural resource settings. National forests have instituted the Recreation Opportunity Spectrum (ROS) across the country to classify lands by the mixes of activities, settings and possible experience opportunities they provide (Leefers et al. 1994). Six classes, going from the most remote and natural to the least remote and natural, are recognized along a continuum: primitive, semi-primitive nonmotorized, semi-primitive motorized, roaded natural, rural, and urban (Figure 6.3, Table 6.3). Most Forest Service lands, approximately 3/4s, are in the roaded national class. These areas provide complements and substitutes for state forest based recreation. The MiDNR does not use a comparable recreation-based, forestland classification system that covers all lands.

Primitive	Area is characterized by essentially unmodified natural environment of fairly large size (5,000 acres). Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use within the area is not permitted.
Semi-Primitive Non-Motorized	Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size (2,500 acres). Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on site controls and restrictions may be present, but are subtle. Motorized use is not permitted.
Semi-Primitive Motorized	Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size (2,500 acres). Concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimum on site controls and restrictions may be present, but are subtle. Motorized use is permitted.
Roaded Natural	Area is characterized by a predominantly natural-appearing environment with moderate evidence of the sights and sounds other humans. Such evidences usually harmonize with the natural environment. Interaction between users may be low to moderate but with evidence of other users prevalent. Resource modification and utilization practices are evident but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities.
Rural	Area is characterized by substantially modified natural environment. Resource modification and utilization practices are to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for special activities. Moderate densities are provided far away from developed sites. Facilities for intensified motorized use and parking are available.
Urban	Area is characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Renewable resource modification and utilization practices are to enhance specific recreation activities. Vegetative cover is often exotic and manicured. Sights and sounds of humans on-site are predominant. Large numbers of users can be expected, both on-site and in nearby areas. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site.
Source: Ottawa National Forest Land and Resource Management Plan, Appendix B, 2006.	

Figure 6.3. Recreation Opportunity Spectrum setting and experience characterization.

Table 6.3. Recreation Opportunity Spectrum areas proposed in 2006 Michigan National Forest Plans.

ROS Objective	Ottawa NF	Hiawatha NF ^a	Huron-Manistee NF
Rural/Roaded Natural		1,085	128,483
Roaded Natural	787,600	618,161	715,409
Semi-primitive Motorized	127,750	190,879	17,149
Semi-primitive Non-motorized	74,900	64,034	62,301
Primitive			3,370
Special Management Areas		21,653	46,385

^aSummer ROS; includes Grand Island as non-motorized.

Wilderness and Wild Areas

The Wilderness and Natural Areas Act, Public Act 241 of 1972 was re-codified in 1994 as Section 35102 of Part 351, PA 451. The Porcupine Mountains Wilderness State park is the most visible part of the state's system of wilderness, wild and natural areas. The Mackinaw State Forest and Wilderness State Park, High Island Wilderness Area, and Hog Island Wilderness Area have also been designated. Additional state forest areas are the Little Presque Isle Wilderness Area, the Dog Lake Wild Area, the Grindstone Creek Wild Area, and Seiner's Point Wild Area. Many of these areas provide recreational opportunities, and are part of the High Conservation Value Areas identified in the 2006 State Forest Management Plan (Michigan Department of Natural Resources 2006). In addition, many natural areas also provide recreational settings.

The national Wilderness Act of 1964 provided the means to designate wilderness on federal lands. Criteria for designation were skewed towards the large areas of western public lands. Congress passed the Eastern Wilderness Act to in 1975, providing opportunities for federal wilderness in the eastern United States. Eventually state-by-state legislation evolved to designate additional areas—1987 was the year in which most Michigan wilderness was designated (Table 6.4).

Wilderness and natural areas provide unique opportunities for dispersed recreation and solitude. These areas have restrictive management standards and guidelines with a clear purpose of preserving natural ecological and social values.

Table 6.4. Natural areas in Michigan protected by the National Wilderness Preservation System.

Wilderness Area (Region)	Acres	Location/Description/Agency
Isle Royale (WUP)	131,880	Keweenaw County, in Lake Superior; diverse boreal forests; Isle Royale National Park
Huron Islands (WUP)	147	Eight remote islands in Lake Superior; Seney National Wildlife Refuge
McCormick (WUP)	16,532	Baraga and Marquette Counties; northern hardwood and conifer forests; Ottawa National Forest
Sturgeon River Gorge (WUP)	14,800	Baraga and Houghton Counties; rugged terrain with northern hardwoods mixed with pines and hemlocks; Ottawa National Forest and Wisconsin Energy Corporation
Sylvania (WUP)	18,327	Gogebic County; located near Watersmeet; northern hardwoods with large areas of mature hemlock; Ottawa National Forest
Seney (EUP)	25,150	Schoolcraft County; located in the heart of the Great Manistique Swamp; variety of habitats including spruce-fir forests, hardwoods, and open water; Seney National Wildlife Refuge

Wilderness Area (Region)	Acres	Location/Description/Agency
Michigan Islands (EUP)	12	Two islands in Lake Michigan and one in Lake Huron; Shiawassee National Wildlife Refuge
Big Island Lake (EUP)	5,500	Schoolcraft County, halfway between Manistique and Munising; low rolling hills with 23 small lakes—hardwoods in upland areas and hemlock, spruce, and balsam fir in the lowlands; Hiawatha National Forest
Delirium (EUP)	12,000	Chippewa County, southwest of Sault Ste. Marie; mostly swamp conifers with some aspen, and red and jack pines; Hiawatha National Forest
Horseshoe Bay (EUP)	3,949	Mackinac County near St. Ignace; Lake Huron shoreline—balsam fir and cedars grow on the ridges adjacent to swamps; Hiawatha National Forest
Mackinac (EUP)	12,388	Mackinac County north of St. Ignace; Carp River flows through area—second growth forest with northern hardwoods, aspen and birch and marshy areas; Hiawatha National Forest
Rock River Canyon (EUP)	5,000	Alger County, between Marquette and Munising; Rock River and Silver Creek canyons with swamp conifers and hardwoods, northern hardwoods in the uplands; Hiawatha National Forest
Round Island (EUP)	378	Mackinac County, between Mackinac and Bois Blanc Islands; also known as Nissawinagang; Hiawatha National Forest
Nordhouse Dunes (NLP)	3,450	Mason County; Lake Michigan shoreline and dunes with northern hardwoods, junipers and stunted jack pine; Huron-Manistee National Forests

Source: Adapted from Dickmann and Leefers (2003).

Natural Rivers and Wild and Scenic Rivers

Michigan's Natural River Act, now Part 305 of PA 451 of 1994, became law in 1970. The law authorized the DNR to develop a system of Natural Rivers for the purpose of preserving and enhancing a river's values for a variety of reasons, including; aesthetics, recreation, and boating. Over 2,000 miles on sixteen rivers or segments of rivers have been designated into Michigan's Natural River System since 1970 (Figure 6.4). Natural Rivers are classified as High Conservation Value Areas. The Fox and Two Hearted rivers are located in the Eastern Upper Peninsula. The Au Sable, Betsie, Boardman, Jordan, Pere Marquette, Pigeon River, Pine, Rifle, Upper Manistee, White rivers are located in the Northern Lower Peninsula, and the Flat, Huron, Lower Kalamazoo, and Rogue rivers are in the Southern Lower Peninsula. Currently, there are no state Natural rivers in the Western Upper Peninsula.

The federal Wild and Scenic Rivers Act of 1968 created a process to select rivers that "possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values" to be preserved "in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations." Designated rivers provide opportunities for many recreational pursuits including fishing, canoeing, hiking, and nature study. The rivers are heavily used by recreationists in many cases (Vasievich 1999).

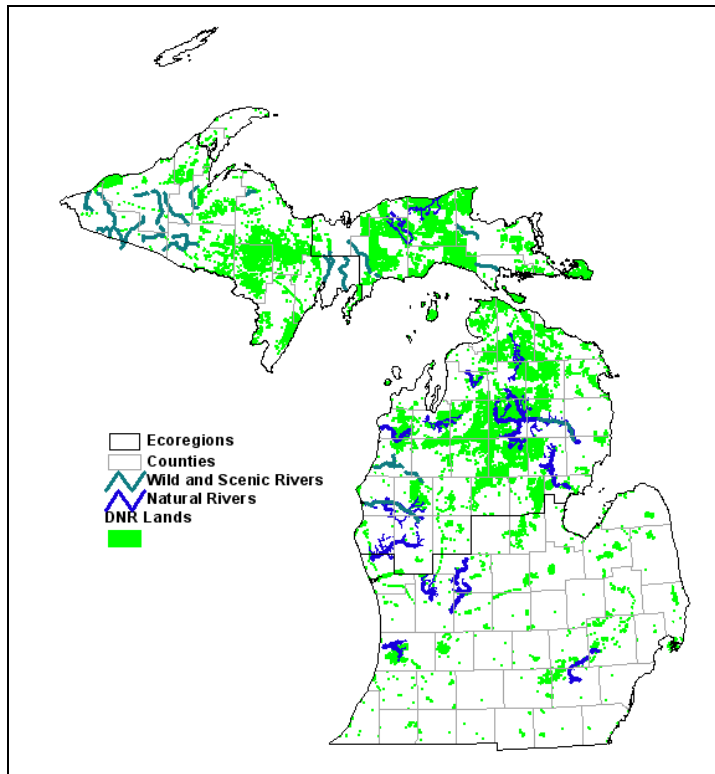


Figure 6.4. Wild and Scenic Rivers and Natural Rivers in Michigan.

Designated trails

Snowmobiling, off-road vehicle (ORV)/all-terrain vehicle (ATV) riding, hiking, cross county skiing, mountain biking, and horseback riding are common uses. Motorized trails far exceed non-motorized trail mileage—over 9,300 miles are available for snowmobiles and ATVs/ORVs. State forest trail opportunities differ by ecoregion (Table 6.5). Pathways in the Upper Peninsula are equally split between the EUP and the WUP. Most pathways are in the Northern Lower Peninsula. Trails are managed by the MiDNR and other providers (Table 6.6).

Table 6.5. Michigan state pathways by Ecoregion.

Western Upper Peninsula	Eastern Upper Peninsula	Northern Lower Peninsula	
Anderson Lake	Algonquin	Besser Bell	Ossineke
Blueberry Ridge	Big Knob / Crow Lake	Betsie River	Pickeral Lake
Cedar River	Bodi Lake	Black Mountain	Pine Baron
Days River	Canada Lake	Buttles Road	Pine Forest
Days River Natural Trail	Fox River	Cadillac	Pine Haven
Gene's Pond	Gemini Lake	Chippewa Hills	Pine Valley
Lake Mary Plains	Indian Lake	Clear Lake	Platte Springs
Little Presque Isle / Harlow Lake	Marsh Lake	High Country	Red Pine Natural Area
Meriman East	Pine Bowl	Inspiration Point	Sand Lake Quiet Area
Ninga Aki	Switchback Ridge	Jordan Valley	Sheep Ranch
West Branch	Tyoga	Lake Ann	Shingle Mill
		Lost Lake	Silver Creek
		Lost Tamarak	Sinkhole

Western Upper Peninsula	Eastern Upper Peninsula	Northern Lower Peninsula	
		Lost Twin Lakes	Spring Brook
		Mason Tract	Tisdale Traingle
		Muncie Lake	Trout Lake
		North Ridge	Vasa Trail
		Oceola	Wah- Wah- Tah- See
		Ocqueoc Falls Bicentennial	Warner Creek
		Ogemaw Hills	Wildwood Hills

Table 6.6. Miles of Trails and Pathways by Provider, 2006.

Trail/Pathway Provider	Snowmobile	ORV Trail / Route	Trailways / Rail Trails	State Forest Trails	State Forest XC Skiing Trails	State Park and Recreation Areas
Private	3,108					
Forest Service	1,554	382				
State Forests (SF)	1,554	2,325				
County/SF Road ROW		478				
Forest, Mineral and Fire Mgt. Div.			814	880	242	
Parks & Rec. Div.			198			878.8
Local Units of Govt.			163			
Total	6,216	3,183	1,145	880	242	878.8

Source: J. Radabaugh; Recreation and Trails; Forest, Mineral and Fire Management Division; MiDNR

Natural Beauty Roads and Heritage Routes

Travel to and from recreational settings has long been recognized as an important part of the recreational experience. Two Michigan programs highlight efforts to identify and preserve transportation routes associated with recreation: Natural Beauty Roads and Heritage Routes. In 2001, Michigan had over 200 miles of Natural Beauty Roads (Part 357 of PA 451; NBR_directory_23594_7[1].pdf). In the NLP, there were 52.83 miles; 18.8 miles were in the EUP, and 12.5 miles were in the WUP. The Heritage Routes Program classifies roads as scenic, historic, or recreational. Scenic routes include an 18-mile stretch of US-41 in Keweenaw County (WUP) near Copper Harbor, a 27-mile stretch of M-123 near Tahquamenon Falls State Park (EUP), a 13-mile stretch of M-119 near Cross Village (NLP), and highway M-22 in Leelanau County (NLP). A 16-mile section of US-2 in the WUP forms the Iron County Heritage Trail. And, in the NLP, US-23 from Standish to Mackinaw City is known as the Sunrise Side Coastal Highway, a recreational heritage route.

The federal government has a program similar to the Heritage Routes; it identifies National Scenic Byways. Each national forest has a National Scenic Byway: Black River Harbor (WUP), Whitefish Bay (EUP), and River Road (NLP). These roads provide unique opportunities to view forest scenery. The Black River Harbor Scenic Byway is an 11-mile stretch of Highway 513, north of Bessemer, that parallels the Black River as it flows north to Lake Superior. The Whitefish Bay National Scenic Byway is located along the southern edge of Whitefish Bay on Route 42. The byway passes by the Pt. Iroquois Lightstation and Museum. The 22-mile River Road National Scenic Byway is south of the AuSable River, from Oscoda to Loud Dam and includes many scenic vistas including those at Lumberman's Monument.

Campgrounds and other special areas and designations

Each ecoregion has an array of special areas. Special Conservation Area, High Conservation Value Areas, and Ecological Reference Areas have unique attributes that are valued by many people (MiDNR 2006). Concentrated Recreation Areas, especially state forest campgrounds, are popular areas for forest recreation (Table 6.7). State forest campgrounds are concentrated in the NLP, followed by the EUP and WUP. Michigan has a highly regarded state park system. There are 64 units of the state park system in northern Michigan (Table 6.8). These provide alternative and complementary sites for state forest recreationists. Public and private campgrounds are common throughout the northern Michigan (Figure 6.5, Table 6.9). Commercial campsites exceed all other sources and account for 46% of the campsites within northern Michigan. The second most common provider is the state park system with 18% of the total. State forests and counties each provide an additional 6% of campsites in the area. The largest concentration of campsites is in the Northern Lower Peninsula.

Table 6.7. Michigan state forest campgrounds by Ecoregion.

Western Upper Peninsula	Eastern Upper Peninsula	Northern Lower Peninsula	
Anderson Lake West	Andrus Lake	4-mile ^b	Long Lake (Wexford)
Bass Lake	Bass Lake	Ambrose Lake ^a	Long Lake (Missaukee)
Beaufort Lake	Big Knob	Arbutus No. 4 ^a	Manistee River Bridge ^a
Big Eric's Bridge	Black River	Au Sable River Canoe Camp	Maple Bay ^a
Big Lake	Blind Sucker No. 1	AveryLake ^a	McCollum Lake ^a
Carney Lake	Blind Sucker No. 2	Baxter Bridge ^a	Mio Pond ^a
Cedar River North	Bodi Lake	Beaver Island ^a	Mud Lake
Deer Lake	Canoe Lake	Big Bear Lake ^a	Muskrat Lake ^a
Emily Lake	Culhane Lake	Big Oaks ^a	Ocqueoc Falls ^a
Gene's Pond	Cusino Lake	Black Lake ^a	Old US-131 ^a
Glidden Lake	Detour	Bray Creek ^a	Ossineke ^a
King Lake	East Branch of Fox River	Burton's Landing ^a	Parmalee Bridge ^a
Little Lake	Forest Lake	Canoe Harbor ^a	Pickerel Lake ^a
North Horseshoe Lake	Fox River	Carrieville	Pigeon Bridge ^a
Pike Lake	Garnet Lake	CCC Bridge	Pigeon River ^a
Portage Bay	Headquarters Lake	Elk Hill ^b	Pine Grove
Squaw Lake	High Bridge	Ess Lake ^a	Pinney Bridge
West Branch	Hog Island Point	Forks ^a	Platte River ^a
	Holland Lake	Gary Lake ^b	Rainbow bend
	Kingston Lake	Goose Creek ^b	Reedsburg Dam
	Lake Superior	Goose Lake	Round Lake ^a
	Lime Island	Graves Crossing	Scheck's Place
	Little Brevort Lake North	Guernsey Lake ^a	Scheck's Place ^b
	Little Brevort Lake South	Haakwood ^a	Shupac Lake ^a
	Mead Creek	Healy Lake ^a	Silver Creek ^a
	Merwin Creek	Hopkins Creek ^b	Spring Lake
	Milakokia Lake	Houghton Lake ^a	Stoney Creek ^b
	Mouth Of Two Hearted River	House Lake ^a	Sunrise Lake
	Munuscong River	Jackson Lake ^a	Thunder Bay River ^a
	Natalie	Johnsons Crossing ^b	Tomahawk Lake ^a
	North Gemini Lake	Jones Lake ^a	Town Corner

Western Upper Peninsula	Eastern Upper Peninsula	Northern Lower Peninsula	
	Perch Lake	Keystone Landing ^a	Trout Lake ^a
	Pike Lake	Lake Ann ^a	Tubbs Lake
	Pretty Lake	Lake Dubbonet ^a	Twin Lakes ^a
	Reed And Green Bridge	Lake Dubbonet ^b	Upper Manistee River ^a
	Ross Lake	Lake Margrethe	Veterans Memorial ^a
	Shelldrake Dam	Lake Marjory ^a	Walsh Road ^a
	South Gemini Lake	Leverentz Lake ^a	Weber Lake ^a
	South Manistique Lake	Lincoln Bridge ^a	Wildwood Lake
		Little Wolf Lake ^a	

^aRustic Campground, ^bTrail Camp

Table 6.8. Michigan state parks by Ecoregion.

Western Upper Peninsula	Eastern Upper Peninsula	Northern Lower Peninsula	
Agate Falls ^c	Brimley	Aloha	Otsego Lake
McLain	Father Marquette Memorial ^c	Burt	P.H. Hoeft
Baraga	Fort Mackinac Historic	Charles Mears	Petoskey
Bewabic	Indian Lake	Cheboygan	Rifle River ^d
Bond Falls ^c	Laughing Whitefish Falls ^c	Clear Lake	Silver Lake
Craig Lake	Muskallonge Lake	Fisherman's Island	South Higgins Lake
Fayette ^b	Palms Book	Harrisville	Sturgeon Point ^c
Fort Wilkins ^b	Straits	Hart-Montague Trail ^a	Tawas Point
J.W. Wells	Tahquamenon Falls	Hartwick Pines	Thomson's Harbor
Lake Gogebic	Wagner Falls ^c	Interlochen	Traverse City
Porcupine Mountains Wilderness		Leelanau	White Pine Trail
Twin Lakes		Ludington	Wilderness
Van Riper		Negwegon	William Mitchell
		Newaygo	Wilson
		North Higgins Lake	Young
		Orchard Beach	

^aLinear park, ^bHistoric park, ^cScenic site, ^dRecreation area.

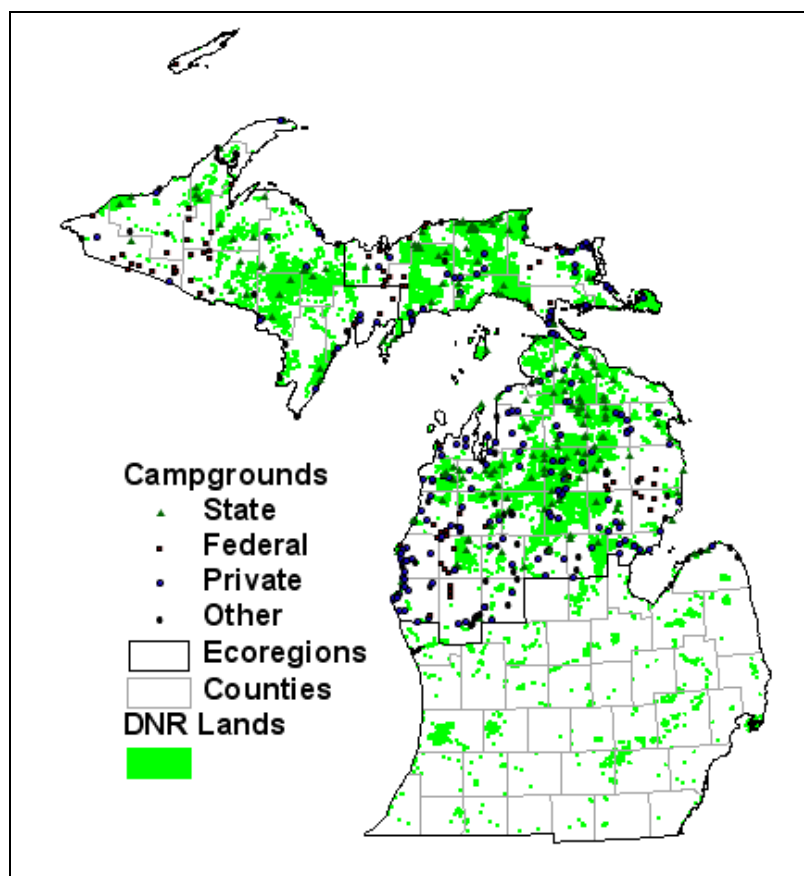


Figure 6.5. Public and private campgrounds in northern Michigan (Source: Leefers and Vasievich 2001).

Table 6.9. Campsites by ecoregion, 2000.

Provider	WUP	EUP	NLP
Commercial	1,321	2,421	19,187
County	582	30	2,307
Township	216	397	1,930
Municipal	542	227	1,224
Condominium	37	0	2,234
Fraternal	0	0	92
Recreation	0	0	461
Religious	16	21	845
Other nonprofit	16	0	685
State forest	338	770	1,935
State park	1,418	1,396	6,114
National forest	647	642	817
National park	244	151	166
Total	5,347	6,045	37,967

Source: Travel, Tourism, and Recreation Resources Center, Michigan State University.

Recreation facilities

There are many recreation facilities in Michigan. According to Michigan State University's Travel, Tourism and Recreation Resources Center, there are approximately seven million acres of public recreation land in northern Michigan (Table 6.10).

Most of Michigan's designated Natural Rivers and Wild and Scenic Rivers fall within the area (Figure 6.4). And there are approximately 620,000 acres of lakes and ponds within the three ecoregions—most available for public recreation. In 1990, over 900 public access sites were identified in the northern counties. Thousands of miles of trails and roads exist within the areas to provide a range of recreation experiences.

Table 6.10. Natural resources and recreation/travel facilities by ecoregion.

	YEAR	WUP	EUP	NLP
NATURAL RESOURCES				
Land area (acres)	1989	6,942,272	3,587,392	10,377,856
Water area (acres)	1989	192,192	229,312	361,152
Total area (acres)	1989	7,134,464	3,816,704	10,739,008
Area of public recreation land (acres)	1990	2,268,124	1,879,2153	3,027,310
Rivers and streams (miles)	N.A.	9,158	3,248	7,835
State or federal wild/scenic/natural rivers (miles)	1990	380	322	1,263
Natural or artificial lakes and ponds (acres)	1991	149,753	98,478	374,923
RECREATION AND TRAVEL FACILITIES				
Public access sites (number)	1990	245	110	546
Designated scenic highway (miles)	1990	575	389	764
State-funded snowmobile trail (miles)	1990	1,253	697	1,511
Hiking/skiing/mtn.biking trail (miles)	1994	1,314	766	2,100
Designated off-road vehicle trail (miles)	1992	217	356	1,966

Source: Various sources and years; published by the Travel, Tourism, and Recreation Resources Center, Michigan State University.

State and national trends in recreation activities

Recreation behavior is affected by demographic factors such as age, race or ethnicity, sex, wealth or income, education, and previous experience (Bowker et al. 1999). Bowker and others used these variables to project future recreation activity, nationally and regionally. They estimated 1) millions of participants age 16 years and older, 2) consumption in millions of days annually, and 3) consumption in millions of primary purpose trips (Bowker et al. 1999). We indexed the projections to 2000 (=100) as a base year. As a result, various activity projections can be compared relative to each other and relative to population growth within the region (Table 6.11). Michigan is part of the projections for the North region, but state-specific projections are not available. The individual activities can be further classified as winter, water-based, wildlife-related, dispersed land, and developed land activities. These projections rely on data from the Survey on Recreation and the Environment (NSRE) (Bowker et al. 1999, Cordell et al. 1999). Participation, days and trips are projected, but only trips are reported here because they are most closely linked with visitors' expenditures—most economic impact surveys gather data based on trips.

Table 6.11. Projections for change in the U.S. population and selected recreation visits for the region (North Region), adjusted to 2000 = 100.

Recreation Activities	2000	2010	2020	2030	2040	2050
U.S. Population—North Region	100	105	113	119	123	129
Winter Activities						
Cross-Country Skiing	100	104	111	120	130	146
Snowmobiling	100	115	134	154	175	206
Water-Based Activities						
Canoeing	100	95	92	91	91	92
Nonpool Swimming	100	101	106	111	115	122
Rafting/Floating	100	93	91	89	89	82
Wildlife-Related Activities						
Fishing	100	100	102	102	98	96
Hunting	100	103	109	115	117	121
Nonconsumptive Wildlife Activities	100	106	114	114	106	94
Dispersed Land Activities						
Backpacking	100	97	98	100	102	110
Hiking	100	99	103	104	103	102
Horseback Riding	100	108	120	130	136	144
Off-Road Driving	100	86	75	65	57	49
Primitive Camping	100	96	95	91	84	78
Developed Land Activities						
Biking	100	114	131	148	162	180
Developed Camping	100	107	117	125	129	135
Picnicking	100	79	64	53	44	33
Sightseeing	100	111	125	139	144	157
Visiting Historical Places	100	117	138	155	166	174
Walking	100	106	114	121	126	132

Source: Adapted from Bowker et al. 1999.

Population is projected to increase by 29% in the North region from 2000 to 2050. Most recreation trips are projected to increase more slowly than population. Trips for activities such as cross-country skiing, snowmobiling, horseback riding, biking, sightseeing, visiting historical places, and walking are projected to increase faster than population growth. Hunting, developed camping and nonpool swimming are projected to increase at about the same rate as population growth. Trips for many traditional activities (e.g., picnicking, off-road driving, and primitive camping) are projected to decline markedly. These shifts are based on increased income and projected changes in demographic characteristics (e.g., an aging population). Though trips may decline in some cases, the number of days may increase—that is, longer multipurpose trips may have specific recreation activities as secondary purposes. For example, fishing may become a secondary to other primary activities. Only four activities were projected to increase in terms of trips, participation, and days—horseback riding, biking, sightseeing, and visiting historical places. Recent trends in camping, hunting and other activities can be compared to these projections.

Socio-demographic shifts will affect outdoor recreation participation and trends (Chavez 2001). Ethnic and racial minorities are increasing in absolute and relative size in the U.S., and they can be expected to increase their participation in outdoor recreation activities. Overall an aging population may slow growth. Increased wealth,

however, may mitigate some effects of aging and bring more off-season travel and demands for more education-oriented facilities and activities.

Recreation participation rates also differ depending on which generation is considered (Warnick 2001). Generations include the GI Generation (born 1904-25), the Silent Generation (born 1926-43), the Baby Boom Generation (born 1944-60), the 13th Generation (1961-82), and the Millennial Generation (1983-present). A few examples of recreation activities (i.e., golf, downhill skiing, swimming, and hunting) during the 1980-96 period illustrate how participation varies by age cohort. The 13th Generation had declines in swimming, hunting, and downhill skiing as it aged, but there were increases in golf activity. The Silent Generation and the Baby Boomers had similar declines. Looking across generations at the same age cohort (e.g., comparing generations when they were 18-24 years old), golfing rates were lower for Baby Boomers compared to 13th Generation, but hunting and swimming participation were higher for Baby Boomers. Downhill skiing varied depending on age of cohorts. Overall, the 45-54 year olds had substantial changes in participation—monitoring this older group will help managers assess new niches for forest-based recreation.

Amenity migration, another phenomenon, also is affecting many rural areas—people are migrating to rural areas due to their rich natural resource amenities, and they are willing to have less income and fewer job opportunities (Stewart 2001). Basically, they are interested in a better quality of life. Researchers have found that net in-migration is significantly related to natural resource amenities; new and long-time residents value these amenities (Section 3). Economic prosperity and diversification, increasing property values, and reduced out-migration are attributed to amenity migration. Sprawl and loss of habitat may also result from amenity migration. Local infrastructure, in some cases, cannot support population influxes and must be expanded. Amenity migration may be driven by retirement (e.g., mailbox economy), technological changes (e.g., telecommuting), and second home purchases (e.g., investment), and new residents bring ideas and perceptions about how forests should be managed. Traditional management activities may or may not be acceptable to these new migrants.

Access to outdoor recreation (including transportation and traffic counts)

Forests in Michigan are widely accessible through a variety of state, county, and MiDNR roads; thirty-nine percent of timberland in Michigan is within one-quarter mile of a maintained road (Hansen and Hahn 1987). An additional 47% of timberlands are between one-quarter and three-quarters of a mile from a road.

Major routes for the WUP are U.S. Route 2 and Michigan Route 28 which run east and west, U.S. Route 51 from Wisconsin into Ironwood, U.S. Route 45 from Wisconsin into Watersmeet, and Michigan Route 95 from Wisconsin into Iron Mountain. U.S. Route 2 in the Ironwood-Bessemer-Wakefield area has an average daily traffic count of 1,700 vehicles east of Wakefield to 8,900 vehicles near the Wisconsin border in 2004 (<http://www.michigan.gov/mdot/>). Michigan Route 95 has an average daily traffic count of 6,100 vehicles near the Wisconsin border to 21,900 where it joins U.S. Route 2.

The EUP is accessed by some of the same routes as the WUP—U.S. Route 2, Michigan Route 95 from Iron Mountain, and Michigan Route 28. U.S. Route 41 from Marinette-Menominee is the other major access route in the WUP. Interstate Highway 75, in the EUP provides the north-south link with Canada and the NLP. The average daily traffic count for U.S. Route 2/41 in the Escanaba-Gladstone area ranges from 15,000 on the west side of Escanaba to 9,000 east of Gladstone. The average daily traffic count across the International Bridge in Sault Ste. Marie is 5,600. The count near 3 Mile Road on the south side of town is 8,100.

Major north-south routes that provide access to the NLP are U.S. Route 31 out of Muskegon, U.S. Route 131 out of Grand Rapids, U.S. Route 27 out of Lansing, and Interstate Highway 75 out of Detroit-Flint-Saginaw. The average daily traffic count for Route 31 north of Muskegon is 45,100 vehicles. On U.S. Route 131 north of Big Rapids, the daily count is 11,400; the count on U.S. 127 north of Mt. Pleasant is 17,700. Finally, the average daily traffic count on I-75 north of Saginaw is 58,000.

Major east-west routes in the NLP are Michigan Route 55 from Tawas City to Manistee, U.S. Route 10 from Saginaw-Midland to Ludington, and Michigan Route 115 from Clare to Cadillac. The average daily traffic count for Michigan Routes 55/115 near Lake Cadillac is 10,100. Northbound traffic on M-115 north of Lake Mitchell is 10,400, and westbound traffic on M-55 is 8,600.

Recreation activities and participation on state and national forests

The USDA Forest Service conducts a nationwide, systematic recreation survey through the National Visitor Use Monitoring (NVUM) Program that was implemented in 2000 (<http://www.fs.fed.us/recreation/programs/nvum/>). It provides statistically reliable recreation visitation on national forests, national grasslands, and designated wilderness areas (English et al. 2002). A recreation visit is defined as "...one person entering and exiting a national forest, national grassland or designated wilderness area for the purpose of recreation." Visitors may participate in multiple activities (e.g., hiking, nature study, etc.) and may visit more than one site (e.g., developed campground, hiking trail, etc.). Care is taken to prevent "double counting" or sampling a person more than once during a visit. The three national forest in Michigan have been surveyed under the NVUM Program.

Forest-specific reports provide visitation estimates, profiles or descriptions of visitors, a description of the visits, economic/spending information, and satisfaction information. Though not identical to state forests, some information gleaned in these studies may be applicable to state forests (see Kocis et al. 2002a, 2002b, 2004).

National forest visitors spent the most time at Overnight-Use Developed Sites (24.2-48.0 hours) and in Wilderness areas (17.4-48.3 hours) (Table 6.12). The least amount of time was spent at Day-Use Developed Sites (2.5-3.0 hours). The average visit was 12.0-18.1 hours.

Table 6.12. Site visit length of stay (in hours) from the National Visitor Use Monitoring (NVUM) Program, by Michigan national forest.

Site Type	Ottawa	Hiawatha	Huron-Manistee
	Hours per Visit		
Day-Use Developed Site	3.0	2.5	3.0
Overnight-Use Developed Site	24.2	48.0	39.9
Wilderness	48.3	17.4	28.0
General Forest Area	28.0	10.9	14.1
Average, All Sites	18.1	12.0	12.6

Source: Kocis et al. 2002a, 2002b, 2004.

The top five recreation activities differ by forest, but hunting is a common top-five activity on all forests (Table 6.13). Twenty-six categories of recreation use were identified in the NVUM survey. Everyone was asked to identify their primary activity. For example, 13% of visitors to the Hiawatha National Forest fished, but only 6% identified this as their primary activity. Downhill skiing and snowmobiling were the highest uses tallied on the Upper Peninsula national forests (Kocis et al. 2002a, 2002b, 2004). The samples in the northern Lower Peninsula did not capture any snowmobile travel. Aside from these concerns, the NVUM data provide the most consistent recreation use data available for the national forests.

Table 6.13. Top five primary recreation activities (and percent) from the National Visitor Use Monitoring (NVUM) Program, by national forest.

Ottawa	Hiawatha	Huron-Manistee
Downhill skiing (22%)	Snowmobile travel (30%)	General/Other Recreation (19%)
Hunting (17%)	General/Other Recreation (19%)	Viewing natural features such as scenery and flowers (17%)
Snowmobiling (17%)	Viewing wildlife, birds, and fish (18%)	Off-highway vehicle travel (10%)
Viewing Natural Features (8%)	Fishing – all types (11%)	Hunting – all types (9%)
Fishing (6%)	Hunting – all types (10%)	Hiking or walking (8%)

Source: Kocis et al. 2002a, 2002b, 2004.

The 2006 State Forest Management Plan provides standards and guidelines for water access; recreational trails; state forest campgrounds; and hunting, fishing, trapping, and other dispersed recreation; managed hunting areas; and scenery management. Data availability related to recreational use for these settings is mixed. Detailed data are available from state forest campgrounds around the state, but other data are available in the form of licenses, from past studies or not at all. Studies and data associated with water access; recreational trails; state forest campgrounds; and hunting, fishing, trapping, and other dispersed recreation are presented in this subsection.

Water access

Michigan's extensive water resources make access an important element of natural resource management. There are hundreds of boat launches from public lands in Michigan: 116 at state forests, 100 at state parks, and 485 undeveloped water access sites on state forests (Nelson and Stynes 2003).

Based on NVUM statistics, 3% of Ottawa National Forest visitors, 3% of Hiawatha National Forest visitors and 4.1% of Huron-Manistee National Forests visitors have nonmotorized water travel (canoe, raft, etc.) as the primary activity—fewer people use motorized water travel on national forests. Several studies have focused on river-based recreation in the northern Lower Peninsula for the AuSable, Pere Marquette, and Upper Manistee rivers (Johnson and Nelson 1996, Nelson and Johnson 1998, Nelson, Johnson, and Stynes 1998, and Nelson, Valentine, and Lynch 2002).

Though studies of river recreation were completed prior to the 1990s, most recent efforts relate to natural resource planning and management. The 1994 study of watercraft use on the AuSable River provides one example (Johnson and Nelson 1996). Natural River and Wild and Scenic River status is associated with the AuSable. The authors estimated watercraft use for the 101-day summer season for livery canoes, non-livery canoes, tubes and rafts, and boats. Estimates were compared to results of a 1984 survey that used similar methods. Watercraft use declined somewhat in three of four river segments studied, but weekend/holiday use increased considerably. A shift toward use of tubes and rafts was noted. The first river segment (near Mio) had approximately 11,000 watercraft during the 101-day survey, but use dropped off farther downriver—the last segment had just over 1,000 watercraft. Total use declined 15% in 1994 relative to 1984. Total use declined approximately 15% from 1984 to 1994. Newer use estimates are not available.

Another study in the NLP was completed in 1996 and 1997. Recreation use associated with selected access sites and originating from private riparian owners within the Pere Marquette Wild and Scenic River corridor was assessed (Nelson and Johnson 1998, and Nelson et al. 1998). Five of 18 public access sites along the surveyed river stretch are under MiDNR jurisdiction, and the remaining sites are Forest Service sites. Two canoe liveries were also surveyed. From fall 1996 through summer 1997, over 67,000 vehicles were parked at access sites, accounting for 163,000 visits. Approximately 22% of sampled vehicles were parked at MiDNR access sites. Shore fishing and wading was the most popular activity in each season for riparian owners and their guests and by users of access sites; rental canoeing was popular in the summer. Hiking was the second most popular activity in all seasons. Almost 180,000 hours of recreation use was estimated for riparian owners—access site visitors accounted for an additional 760,000 hours of use. Approximately 20% of corridor recreation use was due to riparian owners and their guests. Economic impacts associated with access site users were estimated: \$7 million in sales, \$4 million in income and 229 jobs were attributed to these recreation activities.

Nelson and others (2002) completed a similar study of the Upper Manistee River in 2001. They estimated about 1.3 million hours of recreation use, with the same portion attributed to riparian owners. \$3.5 million in local spending was associated with public access users.

Recreational trails

The state forest system and other owners provide opportunities for motorized and non-motorized trail use. Several studies shed insights regarding these activities. For snowmobiles and ORVs, the MiDNR has license sales to track the level of interest in these activities (Figure 6.6). The Michigan Snowmobile Association also sells snowmobile licenses; those sales are not reflected in Figure 6.6 (Note: Point-of-sale licenses for snowmobiles were not made in 2004.). Overall, there is an upward trend in MiDNR-sold ORV and snowmobile licenses.

Forest visitors often mention off-road vehicle (ORV) use as an important recreation activity. Recent studies provide additional insights regarding this activity (Nelson et al. 2000, Nelson and Lynch 2001a, and Nelson and Lynch 2001b). In Michigan Public Act 71 of 1990

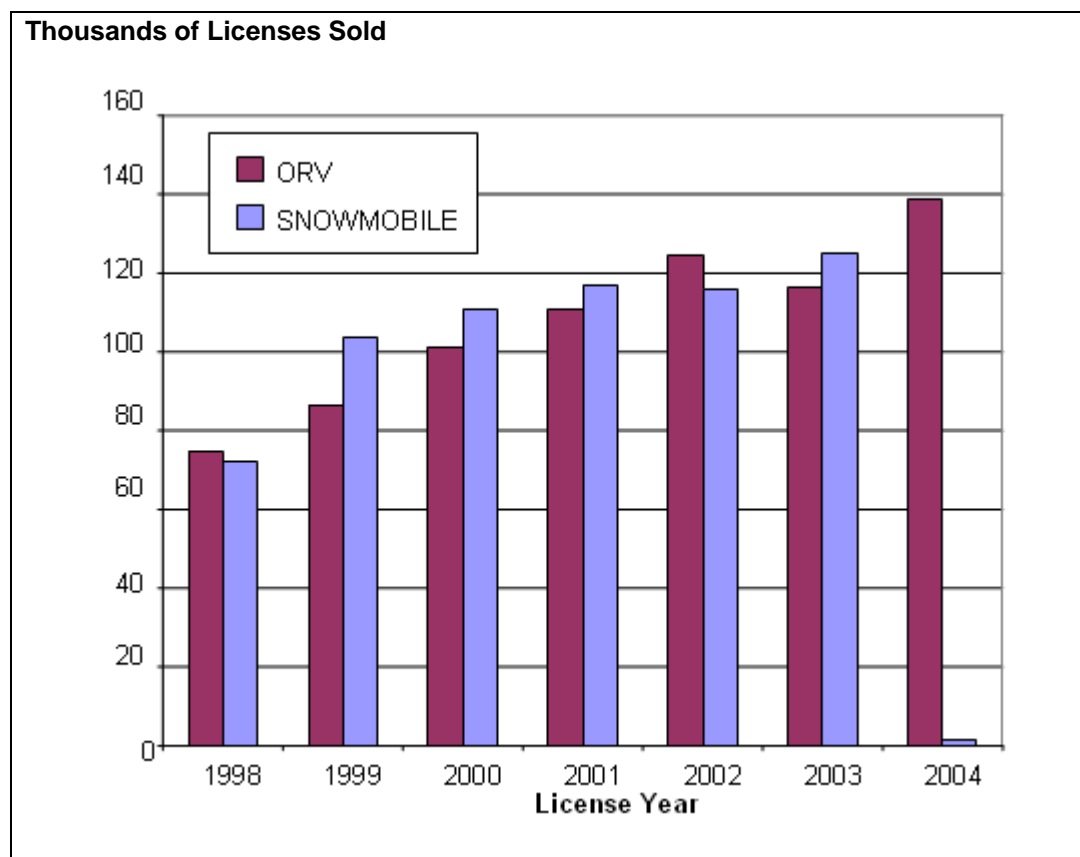


Figure 6.6. MiDNR snowmobile and ORV license sales (in thousands), 1998-2004.

implemented a “closed unless posted open” system for ORV use on public lands in the Lower Peninsula (Nelson, Stynes, and Lynch 2000). ORV use in the Upper Peninsula is allowed on unposted state forest roads as well as on the designated system. The Forest Service’s national policy, instituted in 2005, is to allow ORV use on posted areas, trails and roads only.

In 1999, the designated ORV system had 3,107 miles of ORV trails and five major scramble areas where vehicles climb hills of varying terrain in concentrated areas. Over 2,400 ORV users (out of approximately 5,000 surveyed) answered questions regarding their recreation activities (Nelson et al. 2000). There were 124,723 Michigan DNR licensed ORVs for the 1998-99 license year. Seven ORV ownership segments were identified: motorcycle only, all-terrain vehicle (ATV) only, sports utility vehicle (SUV) only, cycle/ATV, ATV/SUV, cycle/SUV, and cycle/ATV/SUV. The “ATV only” segment was the largest (53%). ORV use of public forest roads, designated ORV trails/routes, and scramble areas (excluding fishing and hunting use) in the Upper Peninsula and the northern Lower Peninsula was estimated at nearly 1.2 million days. The most popular scramble areas were Bull Gap, Silver Lake State Park, St. Helens Motorsport Area, The Mounds, and Black Mountain Motorsport Area. ORV use varies by region and type of use. Off-road All Terrain Vehicles (ATVs) have the highest use, followed by off-road motorcycles and SUVs (Nelson et al. 2000). ATV use is highest on private lands in the UP and NLP. Off-road motorcycle use and off-road SUV use are highest on public lands in the NLP. Twenty percent of ATV use and 27% of SUV use is related to hunting.

Snowmobiling is another popular recreational activity in Michigan. Snowmobilers find ample opportunities to recreate on the extensive system of groomed public trails and on the shoulders of county roads in northern Michigan. In some cases, communities are linked to allow riders to enjoy lodging, restaurants and other amenities (Nelson et al. 1998). For the 1995-96 trail permit season, over 212,000 permits were sold. In 1996-97, snowmobile users participated in over 2.1 million snowmobile days. The relationship of this use was not related to public lands, or more specifically to MiDNR lands. Snowmobile spending creates a significant economic impact in

northern Michigan; people coming into northern Michigan in 1996-97 spent approximately \$86 million at their destinations (Stynes et al.1998). The northwest Lower Peninsula was the most popular destination, followed by the Western Upper Peninsula.

In 1995-96, an assessment of state forest non-motorized pathways was completed (Lynch and Nelson 1996). The study concluded that the pathway system was sizable, was in good condition, was comprised of multiple-use trails, had challenges regarding mountain biking and equestrian uses, focused expenditures on personnel, and was under-funded relative to needs.

State forest campgrounds

Camper days, a measure of recreation use, at state forest campgrounds has been relatively stable in the past four years (Figure 6.7). Most camper days are associated with the NLP. Senior citizens are an important segment of the camping population.

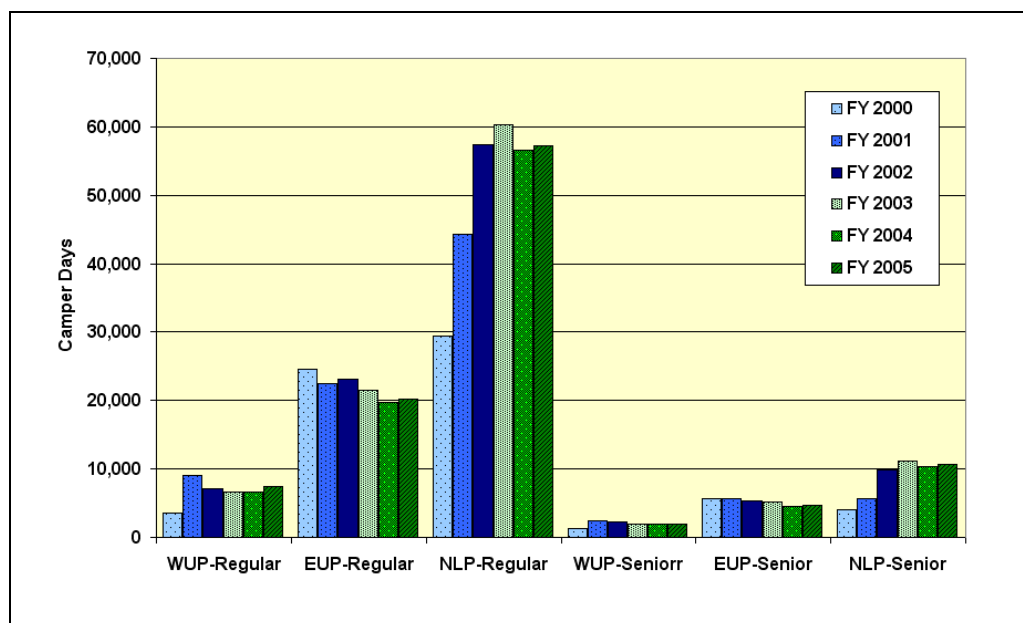


Figure 6.7. Camper days at state forest campgrounds by ecoregion for regular and senior campers, FY 2000-05.

Other camping opportunities at state forests come in the form of cabins and group camping (Table 6.14). Cabin camping was relatively unchanged from 2002-05; most occurred in the WUP. Group camping, heavily concentrated in the NLP, increased substantially in 2005.

Table 6.14. Camper days in cabins and group areas by ecoregion, FY 2002-05.

Rate type	Fiscal Year	WUP	EUP	NLP	Total
Cabin	2002	739	137		876
Cabin	2003	728	147		875
Cabin	2004	683	145		828
Cabin	2005	678	188		866
Group	2002		1	1047	1048
Group	2003			948	948
Group	2004			1036	1036

Rate type	Fiscal Year	WUP	EUP	NLP	Total
Group	2005	1		2378	2379

State forest provide some of the lowest fee camping experiences in Michigan (Figures 6.8 and 6.9). Private sites (PVT) provide the most camping opportunities, and they charge more for amenities not offered at most public campgrounds (Leefers and Vasievich 2001). National forest (NF) campgrounds charge similar fees to state forest (SF) campgrounds; state parks (SP) charge more.

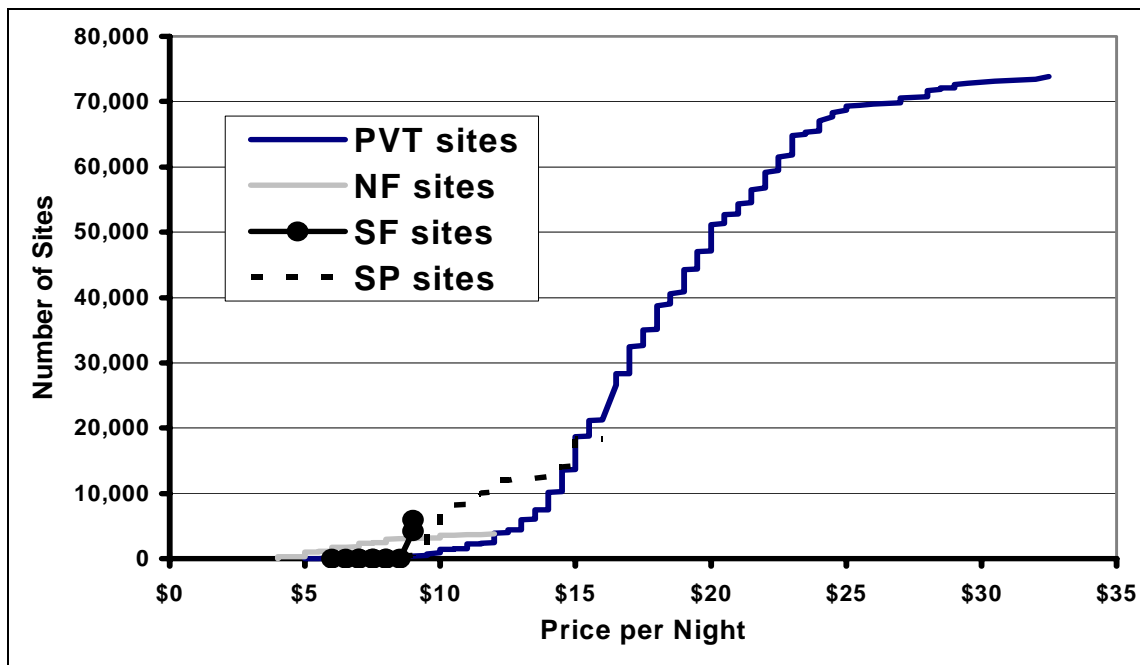


Figure 6.8. Fee structure at private and public campgrounds, ca. 2000 (Source: Leefers and Vasievich 2001).

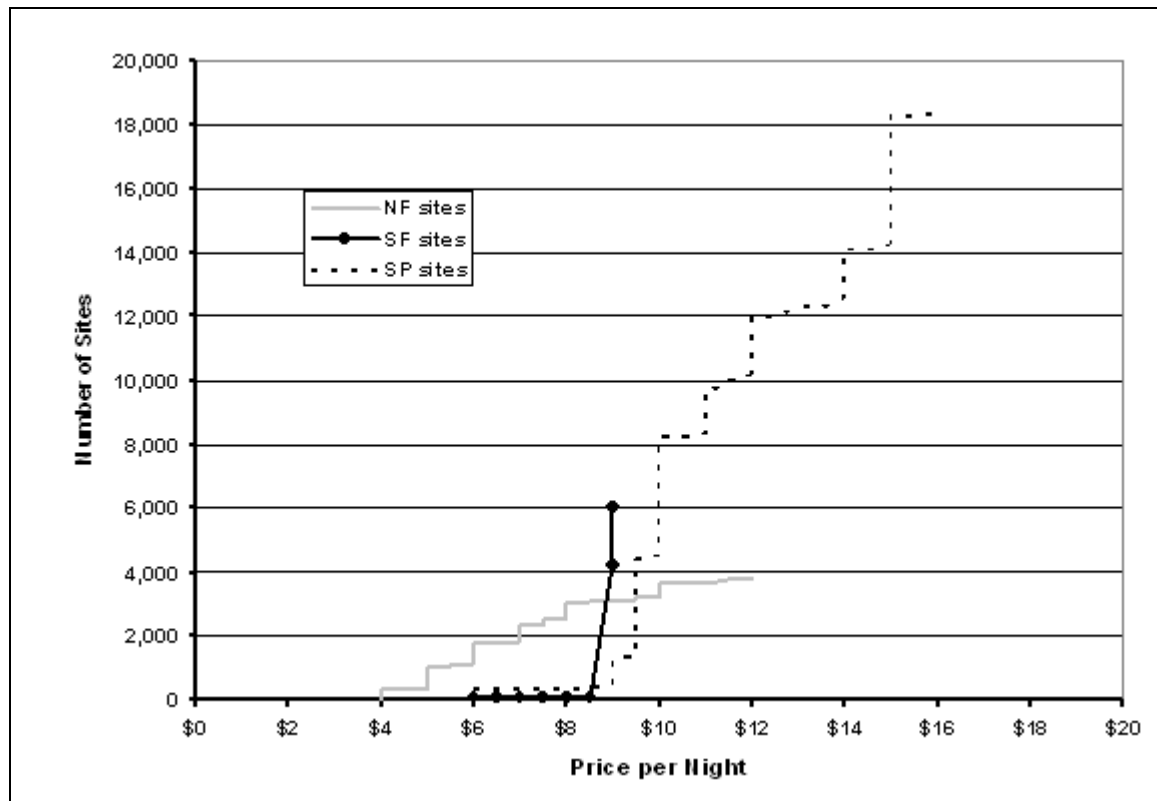


Figure 6.9. Fee structure at public campgrounds, ca. 2000 (Source: Leefers and Vasievich 2001).

Hunting, fishing, trapping, and other dispersed recreation

The U.S. Fish and Wildlife Service, in conjunction with the Bureau of Census, conducts a national survey of fishing, hunting, and wildlife-related recreation. For the 1996 and 2001 surveys, Michigan-specific reports were developed (U.S.D.I. Fish and Wildlife Service, and U.S.D.C. Bureau of the Census 1998, 2003). The surveys compile various types of data on participation, hunter and angler characteristics, and expenditures. In 2001, Michigan ranked seventh nationally in total wildlife-related participants where activities took place (3.5 million participants 16 years old and older) and in expenditures for wildlife-related recreation (\$2.8 billion). Wildlife-related recreation includes hunting, fishing, and wildlife watching. Over 1.7 million residents and non-residents fished or hunted. Participation in fishing, hunting, and wildlife watching by Michigan residents declined from 1996 to 2001.

MiDNR's Wildlife Division surveys hunters regarding their effort and success. Overall, though hunter numbers are substantial, the number of paid hunting license holders has declined in recent years (Frawley 2004, Figure 6.10). This downward trend is reflected in the number of active firearm deer, small game and waterfowl hunters (Figure 6.11). The number of turkey hunters and bear hunters has increased significantly in recent years, and the number of furtakers has increased as well (Figures 6.12 and 6.13). Unpublished hunting-related data based on counties will be available in late 2006 (B.J. Frawley, MiDNR, pers. com. 2006).

More recent MiDNR studies are available for deer turkey, and small game hunting and bobcat trapping (Frawley 2005a, 2005b, 2005c, 2005d and 2006). The number of people hunting deer in Michigan has been on the decline since the late 1990s (Frawley 2006). Approximately 1.8 million harvest tags were purchased in 2003 compared with 1.6 million in 2005. Statewide, there were 670 thousand deer hunters who harvested 417,000 deer in 2005. Over half of the 10-million day hunting effort was in the SLP, followed by 5.5-million days in the NLP, 0.8-million days in the WUP, and 0.3-million days in the EUP. Eighty-seven percent of deer harvested statewide came from private lands. Turkey hunting in Fall 2004 and Spring 2006 involved 16,200 and 90,300 hunters, respectively (Frawley 2005b, 2005c). Over 45% of the Spring hunters hunted on public lands; only 8% of Fall hunters did so. Small game hunting seasons are set for ring-necked pheasants, northern bobwhites, ruffed grouse, American woodcock, cottontail rabbits, snowshoe hare, squirrels, and American crows (Frawley 2005d). The number of hunters has declined in recent years, but there were over 210,000 hunters in 2004. The greatest hunting effort

(days afield) is associated with ruffed grouse and cottontail rabbits. Ruffed grouse hunting is concentrated in the UP and NLP, whereas cottontail rabbit hunting is concentrated in the SLP and NLP.

License sales provide additional insights into contemporary hunting and trapping. Hunting and trapping are activities related to public and private forestlands. Bear hunting license sales have been increasing in recent years (Table 6.15). Elk hunting uses a lottery, and the number of applications has vacillated in recent years—applications decline when fewer elk are targeted for harvest. Fur trapping licenses have increased for several years. In addition to the licenses reported in Table 6.15, 7,550 bobcat licenses were issued in 2004.

Table 6.15. License sales for selected hunting and trapping species, 1997-2004.

License Year	Bear	Elk		Fur
		Applications	License	
1997	27,495	34,799	353	14,235
1998	44,288	40,376	355	18,520
1999	46,896	39,725	188	17,169
2000	58,467	48,652	366	17,873
2001	63,447	46,933	247	19,293
2002	62,771	37,939	142	19,911
2003	64,138	38,777	97	21,024
2004	66,357	40,595	123	22,006

Source: Customer Systems, MiDNR.

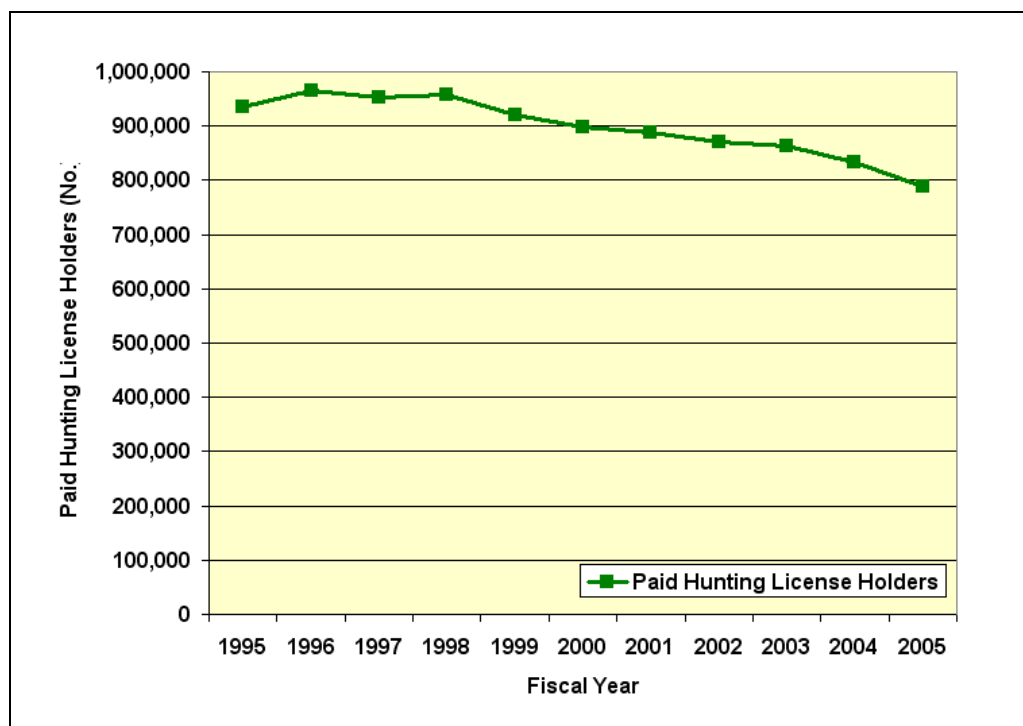


Figure 6.10. Number of paid hunting license holders in Michigan, 1995-2005 (Source: Frawley 2004 and MiDNR unpublished data).

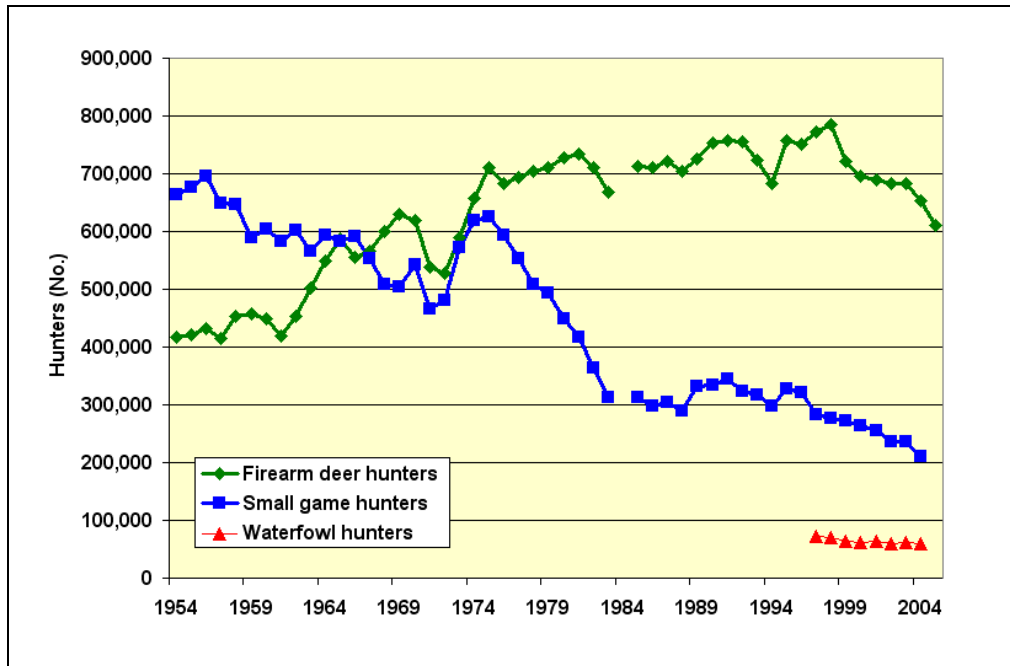


Figure 6.11. Number of active firearm deer, small game, and waterfowl hunters (went afield) in Michigan, 1954-2005 (Source: Frawley 2004 and MiDNR unpublished data). Note: All available annual data presented.

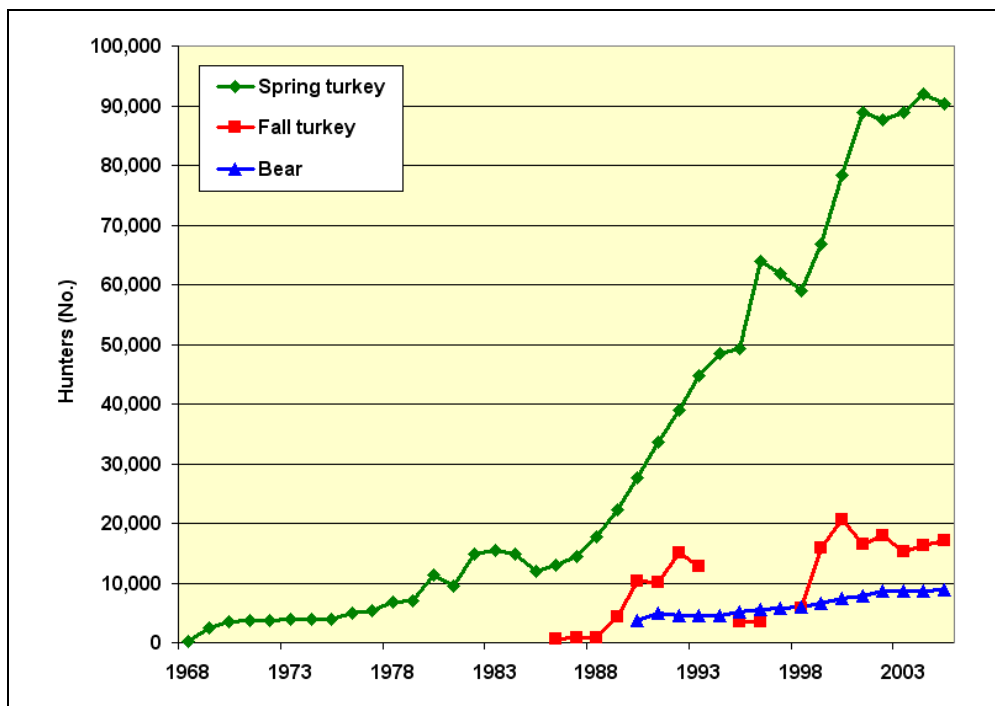


Figure 6.12. Number of active spring turkey, fall turkey, and bear hunters (went afield) in Michigan, 1968-2005 (Source: Frawley 2004 and MiDNR unpublished data).

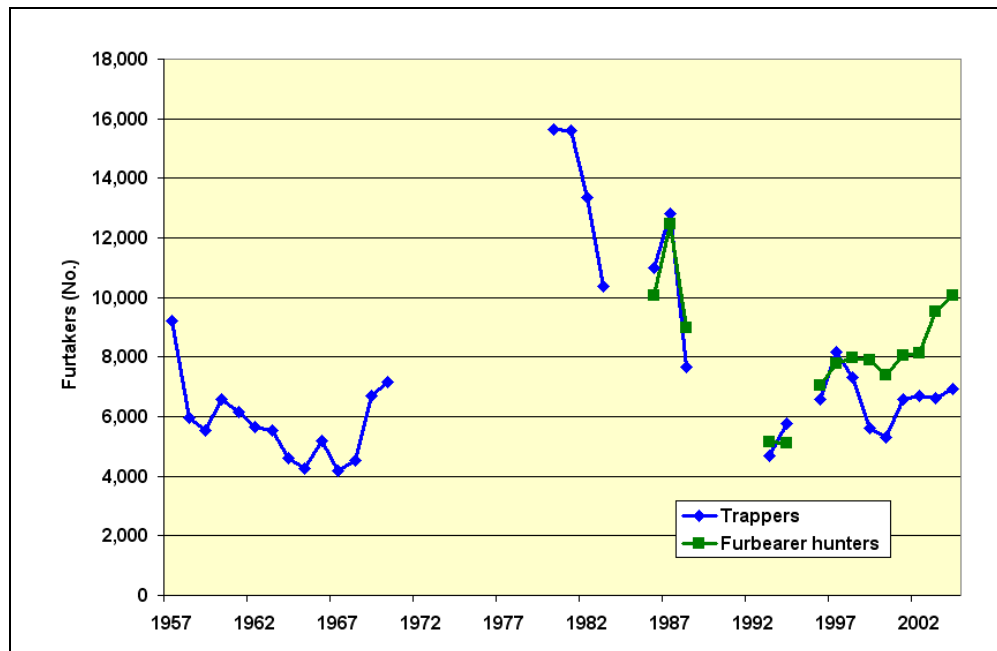


Figure 6.13. Number of active furtakers (went afield) that trapped or hunted furbearers in Michigan, 1957-2004 (Source: Frawley 2004 and MiDNR unpublished data).

Several studies have been directed at developed and dispersed recreation use on state and national forests in Michigan (Nelson 1993, Nelson and Claesson 1994, Nelson and Lynch 1994, and Nelson and Lynch 1995). Poor signage makes it difficult to differentiate state forest and national forest lands and the lands are often intermingled. The Michigan Department of Natural Resources and Huron-Manistee National Forests jointly funded a project to estimate dispersed recreation in 1992. NVUM sampling protocols for general forest areas (GFA) used trailheads or Forest Service roads where users exit the national forest. The sampling approach used by Nelson (1993) was to identify selected forest compartments that were not associated developed sites, trailheads or other access points—so this collection of users are likely a subset of GFA visitors who represent dispersed recreation uses. Mail-back postcards were placed on vehicles rather than using NVUM-like personal interviews to collect limited data on recreation use. Neither approach captures recreation use by adjacent landowners who can walk onto the forests. Also, this dispersed recreation study did not include any use during January – March, a low visitor-use time, but a previous study on the nearby Pigeon River Country State Forest indicated that 96% of use occurred during the April - December period.

Dispersed recreation visits by people who drove to the forest to recreate (tourists) were estimated at over 823,000 for 1992 using this method (Nelson 1993). Out-of-state vehicles accounted for 6.6% of the total. The main reasons for the visit were: 1) deer hunting, including scouting, blind building and baiting, 2) ORV riding, 3) grouse/ woodcock hunting, 4) fishing, and 5) nature observation. Many visitors were involved in multiple activities (e.g., nature observation and hunting). Results from the AuSable State Forest yielded similar levels of dispersed recreation use and preferences as the Huron-Manistee National Forests. The number of visits was not estimated for adjacent landowners and their guests,. Instead, recreation visitor hours were calculated: 3.6 million visitor hours by tourists and 4.4 million visitor hours by adjacent landowners and their guests (Nelson and Lynch 1994). Thus, over 55% of the recreation activity originated from people who did not drive to the forest. The top five recreation activities for this group were deer hunting, hiking/walking, nature observation fishing, and ORV riding.

During 1992, selected stakeholders were asked to assess their preferences for semi-primitive areas on the Huron-Manistee National Forests (Nelson and Claesson 1994). Three sample groups were surveyed—users of semi-primitive areas, other dispersed recreation users (not in semi-primitive or wilderness areas), and landowners within the designated national forest proclamation boundaries. Two hundred users in each group were contacted and asked questions regarding their use of the forest, types of forest attributes they desired, organizational linkages (e.g., Sierra Club, Michigan Association of Timbermen, etc.), and knowledge of semi-primitive recreation concepts. The majority of respondents favored designation of more areas for semi-primitive recreation. At the

time, 10% of the Huron-Manistee National Forests was designated as semi-primitive (see Table 6.3). The groups preferred 23-35%, with the users of semi-primitive areas desiring the most area. Regardless of preferences, semi-primitive designation depends upon lands that meet the criteria for inclusion. Roads and private landholdings in the NLP limit opportunities for semi-primitive areas.

In 1993-94, a study was undertaken similar to the one on the Huron-Manistee National Forests and AuSable River State Forest in the NLP. The focus was on the Hiawatha National Forest and Lake Superior State Forest in the EUP (Nelson and Lynch 1995). This study also included use of selected designated motorized and non-motorized trails and use of designated day-use areas at campgrounds, picnic areas, and water-access sites. The sample included visitors who drove to the forests and those who lived adjacent to the forests and accessed the forests without automobiles. Selected developed sites and 10% of forest compartments were sampled. Sampling was not done from January through April; low recreation use via roads and low levels of dispersed use found during that period in previous studies justified the sampling period. Adjacent landowners and their guests spent more time than vehicle-based visitors recreating on the Hiawatha National Forests (503,700 vs. 640,100 recreation hours). Therefore, counting only vehicle-based visitors would greatly underestimate recreation use on the forest. Picking berries/mushrooms, fishing, deer hunting, grouse/woodcock hunting, and other hunting were the top five activities for vehicle-based visitors. The most important activities for adjacent landowners were deer hunting, hiking/walking, snowmobiling, fishing, and nature observation. Lodging use differed by type of recreation visitor; for example, 55% of vehicle-based visitors to dispersed areas stayed in their principal residence on the night prior to being sampled, 20% camped, and 14% stayed in a second home. Forty-three percent of non-motorized trail users stayed in their principal home, 28% camped, and 14% stayed in second homes.

University researchers have conducted several studies that focus on recreation in or near national forests. One Huron-Manistee National Forests' study focused on Nordhouse Dunes Wilderness Area; it is adjacent to Lake Michigan north of Ludington (McDonough et al. 1996, Wiita 1998). The focus was on information for managers interested in limits of acceptable change in the wilderness area. Some data addressed visitation, description of visitors and recreation activities. A total of 506 visitors were interviewed over an 11-month period in 1993-94 at various times and locations over the study period. Total use for the area was estimated at 3,575 recreation visits for the year (Note: This compares to 12,000 visits from NVUM based on a much smaller sample of 73 visitors across 24 sample days.). Viewing scenery and hiking were the most commonly noted activities. Two-thirds of the visitors were day users, and over 40% were within 60 miles of the area or from the Muskegon-Grand Rapids area.

Outdoor recreation is one important dimension of life in the EUP and in northern Wisconsin. In the EUP, households were asked to identify their three favorite outdoor activities in which they or some member of the household participated during 1996 (Table 6.16). Most households participated in more passive outdoor activities such as wildlife viewing (85%), flower gardening (67%), wild berry picking (64%) and wildlife feeding (60%). Most respondents participated in other outdoor recreation activities: fishing (71%), swimming (66%), boating (65%), hunting (57%) and camping (48%). Skating/sledding (42%), snowmobiling (40%), cross-country skiing (32%) and downhill skiing (14%) were popular winter activities. Seasonal residents reported higher rates of participation in fishing, swimming, boating, wildlife viewing and cutting firewood while permanent residents were more likely to engage in gardening activities, snowmobiling and ORV use. Both seasonal and permanent residents listed fishing, hunting and walking/hiking as their top three (favorite) activities. Northern Wisconsin households identified many of the same activities—fishing, hunting and walking and hiking were listed as most frequent activity (Clendenning and Field 2003). Based on focus group discussions in the WUP., the most common recreation activities noted by participants were hunting, hiking and fishing (Spence and McDonough 2000).

Table 6.16. Participation in outdoor activities by segment in the eastern Upper Peninsula and northern Wisconsin.

Activity	Eastern U.P.			Northern Wisconsin		
	All households	Seasonal residents	Permanent residents	All households	Seasonal residents	Permanent residents
Wildlife watching	85%	93%	82%	66%	63%	69%
Fishing	71%	82%	67%	77%	80%	74%
Flower gardening	67%	46%	74%	NA	NA	NA

Activity	Eastern U.P.			Northern Wisconsin		
	All households	Seasonal residents	Permanent residents	All households	Seasonal residents	Permanent residents
Swimming	66%	75%	63%	65%	55%	76%
Boating (incl. jet skiing)	65%	81%	59%	67%	57%	79%
Wild berry picking	64%	66%	64%	49%	53%	45%
Wildlife feeding	60%	58%	61%	NA	NA	NA
Hunting	57%	53%	59%	46%	56%	35%
Cutting firewood	50%	62%	46%	46%	47%	45%
Camping	49%	40%	51%	19%	25%	14%
Vegetable gardening	48%	18%	51%	NA	NA	NA
Skate, sled, snowshoe	42%	31%	46%	NA	NA	NA
Biking	42%	42%	51%	30%	28%	32%
Off-road vehicles	41%	35%	44%	28%	27%	28%
Planting trees	41%	36%	43%	NA	NA	NA
Snowmobiling	40%	31%	43%	25%	25%	24%
Other gathering activities	38%	34%	40%	NA	NA	NA
Mushroom picking	35%	32%	36%	NA	NA	NA
Cross-country skiing	32%	30%	32%	NA	NA	NA
Downhill skiing	14%	10%	15%	NA	NA	NA
Snow skiing	NA	NA	NA	15%	16%	14%
Tapping for maple syrup	7%	3%	9%	NA	NA	NA
Walking/hiking	NA	NA	NA	78%	77%	76%
Canoeing	NA	NA	NA	41%	48%	35%

Source: Stynes and Kakoyannis 1999, and Clendenning and Field 2003

Spending Profiles for Forest-Based Recreation Visitors

Expenditures by recreation visitors are used to assess economic impacts (e.g., jobs, income, etc.) associated with various recreational activities. Some economists estimate the economic role of recreation and tourism in local or regional economies. Others focus on economic impacts based on new money coming into a region. Expenditures by non-local forest visitors are normally counted as new money for the region, whereas local recreation users would spend money for food, lodging and other items regardless of whether they were recreating or not. The local recreation users do not contribute new economic activity. Economic impact models, such as the Forest Service's IMPLAN model, provide a quantified representation of economic activity and linkages between various economic sectors (e.g., hotels and lodging places, eating & drinking, gasoline & oil, etc.). Recreation expenditures are often in categories that do not perfectly align with IMPLAN-type industrial sectors. As a result, "bridge tables" are used to link common recreation spending categories with IMPLAN sectors.

Several recreation studies include expenditure profiles for various types of recreation users. Estimates of money spent for various goods and services are tabulated and used as a basis for calculating economic impacts. For the Hiawatha National Forest, visitors estimated the amount of money spent they spent within a 50 mile radius of the recreation site at which they were interviewed during their recreation trip to the area (Kocis et al. 2002a). Trips may include multiple national forest visits and visits to other forests or parks. Average per person spending was estimated in ten categories on the Hiawatha National Forest (Table 6.17). Similar data for the Huron-Manistee and Ottawa national forests were not published, but are available for planning analysis (Kocis et al. 2002b, 2004).

National level data are available from the Forest Service to calculate activity-based spending profiles (e.g., camping, fishing, etc.).

Table 6.17. Average per person national forest trip expenditures within 50 miles of recreation site, Hiawatha National Forest.

Expenditure Category	Average expenditure =\$100.67
Government owned lodging	1.06
Privately owned lodging	24.48
Food/drink at restaurants and bars	26.29
Other food and beverages	14.16
Gasoline and oil	25.70
Other transportation (plane, bus, etc.)	.49
Activities (including guide fees and equipment rental)	.63
Entry, parking, or recreation use fees	1.07
Souvenirs/ clothing	2.47
Any other expenses	4.32

Source: Kocis et al. 2002a, 2002b.

Several other studies include economic expenditure profiles and economic impact estimates. Spending profiles are available for Michigan ORV users (Nelson et al. 2000). They spent \$264 per trip in 1998-99. Michigan snowmobiling participants spent \$80 per trip for day trips (>100 miles) and \$551 per trip for overnight trips in 1996-97 (Nelson et al. 1998). Mean spending per tourist visitor party on the Pere Marquette River was over \$120 in 1996-97 and about \$100 per visitor per day on the Upper Manistee River in 2001 (Nelson et al. 1998b, Nelson et al. 2002).

Wildlife-associated expenditure profiles are also available (U.S.D.I. Fish and Wildlife Service, and U.S.D.C. Bureau of the Census 1998, 2003). These studies provide average expenditures per person for fishing and hunting for the entire year—expenditures are listed for food and lodging, transportation, equipment and other categories. These data can be used to estimate economic impacts of fishing, hunting and wildlife viewing on forest lands (Maharaj and Carpenter 1999).

Economic Impacts of Forest-Based Recreation Visitors

Recreation use and spending profile data are often combined to provide estimates of economic impacts. Often, these estimates are based on a single recreation activity. For example, Stynes and others (1998) estimated that households with snowmobile permits spent \$160 million on their snowmobile trips in 1996-97, and an additional \$400 million on equipment-related items. The total impacts of this activity, using economic impact multipliers, was \$321 million in sales, \$187 million in income, and support for over 6,000 jobs.

The U.S.D.I. Fish and Wildlife Service (1998, 2003) periodically conducts a national survey of fishing, hunting and wildlife-associated recreation (bird feeding, etc.). The survey compiles data on expenditures related to expenditures related to trips and equipment/other for Michigan residents and other participants 16 years and older. For 2001, the total expenditures were \$839 million for fishing, \$490 million for hunting, and \$693 million for wildlife watching. The role of these expenditures in the Michigan economy could be assessed using spending profiles and economic impact models. Even without further analysis, it is clear that \$2 billion is a significant contribution to Michigan's economy, and many of these expenditures are made in northern Michigan.

National forests in Michigan published their revised forest plans and associated final environmental impact statements in 2006. As part of their planning effort, they assessed the economic impacts (sales, income and jobs) of proposed management of national forest lands and programs (see for example, <http://www.fs.fed.us/r9/hmnp/pages/planning.htm>). The broadest assessment of this sort in Michigan was

completed in the 1990s. Pedersen and Chappelle (1997) estimated that in 1990 there were \$39 billion in sales associated with wood products industries (including multiplier effects) and \$5.9 billion in expenditures associated with recreationists in forested areas. When combined, there were an estimated 527,000 jobs associated with these industries and \$7.6 billion in wages and salaries in 1990. From an ecoregional planning perspective, there are no current ecoregional or state forest-related impact studies.

References

- Bowker, J.M., D.B.K. English, and H.K. Cordell. 1999. Projections of outdoor recreation participation to 2050. In: Cordell, H.K., C. Betz, J.M. Bowker, and others. *Outdoor recreation in American life: a national assessment of demand and supply trends*. Champaign, IL: Sagamore Publishing: 323-351.
- Chavez, D.J. 2001. Changes in demographics: changes in recreation patterns. In *Trends 2000: Shaping the Future, The 5th Outdoor Recreation & Tourism Symposium*. East Lansing, MI: Department Park, Recreation and Tourism Resources, Michigan State University. pp. 363-368.
- Clendenning, G., and D.R. Field. 2003. Seasonal and permanent landowners' adaptation to community change in an amenity rich rural region. Madison: University of Wisconsin. Unpublished data.
- Cordell, H.K., McDonald, B.L., Teasley, R. Jeff; Bergstrom, John C.; Martin, Jack; Bason, Jim; Leeworthy, Vernon R. 1999. Outdoor recreation participation trends. In: Cordell, H.K., C. Betz, J.M. Bowker, and others. *Outdoor recreation in American life: a national assessment of demand and supply trends*. Champaign, IL: Sagamore Publishing: 219-321.
- Dickmann, D.I., and L.A. Leefers. 2003 (forthcoming). *The forests of Michigan*. Ann Arbor: The University of Michigan Press.
- English, D.B.K., S.M. Kocis, S.J. Zarnoch, and R.J. Arnold. 2002. Forest Service National Visitor Use Monitoring process: research method documentation. Res. Pap. SRS-54. Asheville, NC: U.S.D.A. Forest Service, Southern forest Research Station. 14 p.
- Frawley, B.J. 2004. Demographics, recruitment. And retention of Michigan hunters. Wildlife Division Report No. 3426. Lansing, MI: Michigan Department of Natural Resources. 42 p.
- Frawley, B.J. 2005a. Bobcat survey, 2004-2005. Wildlife Division Report No. 3445. Lansing, MI: Michigan Department of Natural Resources. 5 p.
- Frawley, B.J. 2005b. 2004 Michigan fall turkey hunter survey. Wildlife Division Report No. 3449. Lansing, MI: Michigan Department of Natural Resources. 25 p.
- Frawley, B.J. 2005c. 2005 Michigan spring turkey hunter survey. Wildlife Division Report No. 3450. Lansing, MI: Michigan Department of Natural Resources. 33 p.
- Frawley, B.J. 2005d. Small game harvest and characteristics of small game hunters in Michigan, 2004. Wildlife Division Report No. 3449. Lansing, MI: Michigan Department of Natural Resources. 25 p.
- Frawley, B.J. 2006. Michigan deer hunter survey report 2005 seasons. Wildlife Division Report No. 3434. Lansing, MI: Michigan Department of Natural Resources. 37 p.
- Hansen, M.H., and J.T. Hahn. 1987. Operability and location of Michigan's timber resource. Gen. Tec. Report NC-116. St. Paul, MN: North Central Forest Experiment Station. 41 p.
- Johnson, P. and C. Nelson. 1996. Estimated Summer 1994 Watercraft use on the AuSable River from the Mio access site to the upper end of Alcona Pond. East Lansing, MI: Department of Park, Recreation and Tourism Resources, Michigan State University. 17 p.
- Kocis, S.M., D.B.K. English, S.J. Zarnoch, R. Arnold, and L. Warren. 2002a. National Visitor Use Monitoring results, U.S.D.A. Forest Service Region 9, Hiawatha National Forest, February 2002. Athens, GA: U.S.D.A. Forest Service Southern Research Station. 23 p.
- Kocis, S.M., D.B.K. English, S.J. Zarnoch, R. Arnold, and L. Warren. 2002b. National Visitor Use Monitoring results, U.S.D.A. Forest Service Region 9, Huron-Manistee National Forests, August 2002. Athens, GA: U.S.D.A. Forest Service Southern Research Station. 23 p.
- Kocis, S.M., D.B.K. English, S.J. Zarnoch, R. Arnold, L. Warren, and C. Ruka. 2004. National Visitor Use Monitoring results, U.S.D.A. Forest Service Region 9, Ottawa National Forest, June 2004. Athens, GA: U.S.D.A. Forest Service Southern Research Station. 23 p.

- Leefers, L.A., and J.M. Vasievich. 2001. Analysis of campground resources in the Lake States. In Trends 2000: Shaping the Future, The 5th Outdoor Recreation & Tourism Symposium. East Lansing, MI: Department Park, Recreation and Tourism Resources, Michigan State University. pp. 176-183.
- Leefers, L.A., M. McDonough, and D.K. Smith. 1994. Allocating our national forests for recreation opportunities. The Fifth International Symposium on Society and Resource Management, Ft. Collins, CO, June 7-10. Abstract.
- Lynch, J.A., and C.M. Nelson. 1996. Michigan state forest non-motorized pathway assessment: manager's perspectives. East Lansing, MI: Department of Park, Recreation and Tourism Resources, Michigan State University. 32 p.
- Marjaraj, V., and J. Carpenter. 1999. The economic impacts of fishing, hunting and wildlife viewing on national forest lands. Washington, DC: USDA Forest Service, Wildlife, Fish and Rare Plants. 41 p.
- McDonough, M., D.B. Propst, and A.L. Wiita. 1996. Nordhouse Dunes Wilderness user study, 1995. East Lansing, MI: Departments of Forestry and Park, Recreation and Tourism Resources, Michigan State University. 139 p.
- Michigan Department of Natural Resources. 2006. 2006 State Forest Mangement Plan. Draft Rev. 3/27/2006. Lansing, MI: Michigan Department of Natural Resources. 230 p.
- Nelson, C., and D. Stynes. 2003. 2003-2007 Michigan Comprehensive Outdoor Recreation Plan. Lansing, MI: Michigan Department of Natural Resources. 28 p.
- Nelson, C., and G. Claesson. 1994. Opinions of selected stakeholders concerning semi-primitive area designation in the Huron-Manistee National Forests. East Lansing, MI: Department of Park, Recreation and Tourism Resources, Michigan State University. 23 p.
- Nelson, C., and J. Lynch. 1994. Estimating dispersed recreation use Michigan's state and national forests. East Lansing, MI: Forest Service Gen. Tech. Rpt. NE-198: 13-16.
- Nelson, C., and J. Lynch. 1995. Dispersed and developed recreation on the Hiawatha National and Lake Superior State Forests. East Lansing, MI: Department of Park, Recreation and Tourism Resources, Michigan State University. 56 p.
- Nelson, C., and J. Lynch. 2001a. AuSable pilot off-road vehicle project evaluation. East Lansing, MI: Department of Park, Recreation and Tourism Resources, Michigan State University. 63 p.
- Nelson, C., and P. Johnson. 1998. Estimated fall 1996 and spring and summer 1994 recreation use of the Pere Marquette Wild and Scenic River corridor originating from private riparian lands within the corridor. East Lansing, MI: Department of Park, Recreation and Tourism Resources, Michigan State University. 14 p.
- Nelson, C., B. Valentine, and J. Lynch. 2002. Upper Manistee River recreation use and access site assessment. East Lansing, MI: Department of Park, Recreation and Tourism Resources, Michigan State University. 38 p.
- Nelson, C., J. Lynch and D. Stynes. 1998. An assessment of snowmobiling in Michigan by snowmobilers with Michigan trail permits. East Lansing, MI: Department of Park, Recreation and Tourism Resources, Michigan State University. 98 p.
- Nelson, C., J. Lynch, and D. Stynes. 2000. Michigan licensed off-road vehicle use and users: 1998-99. East Lansing, MI: Department of Park, Recreation and Tourism Resources, Michigan State University. 45 p.
- Nelson, C., P. Johnson and D. Stynes. 1998. Estimated fall 1996 and spring and summer 1997 recreation use of the Pere Marquette Wild and Scenic River Corridor from selected public access sites. East Lansing, MI: Department of Park, Recreation and Tourism Resources, Michigan State University. 26 p.
- Nelson, C.M. 1993. Estimated tourist dispersed recreational use of the Huron-Manistee National Forests and the AuSable State Forest during April – December 1992. East Lansing, MI: Department of Park, Recreation and Tourism Resources, Michigan State University. 23 p.
- Nelson, C.M., and J.A. Lynch. 2001b. Trends in off-highway vehicle (OHV) use, users, regulations, and trails in Michigan: 1975-2000. In Trends 2000: Shaping the Future, The 5th Outdoor Recreation & Tourism

- Symposium. East Lansing, MI: Department Park, Recreation and Tourism Resources, Michigan State University. pp. 23-29.
- Pedersen, L.D., and D.E. Chappelle. 1997. Updated estimates of jobs and payrolls in tourism and forest products industries in the Lake States. In J.M. Vasievich and H.H. Webster (Tech. Coords.) Lake States Regional Forest Resources Assessment: Technical Papers. Gen. Tech. Report NC-189. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station. pp. 179-181.
- Spence, L.A., and M. McDonough. 2000. Social indicators for sustainable forestry in Gogebic County, Michigan. East Lansing, MI: Report submitted to Gogebic County. 45p.
- Stewart, S.I. 2001. Amenity migration. In Trends 2000: Shaping the Future, The 5th Outdoor Recreation & Tourism Symposium. East Lansing, MI: Department Park, Recreation and Tourism Resources, Michigan State University. pp. 369-378.
- Stynes, D., and C. Kakoyannis. 1999. Outdoor activities. Pp. 53-66 IN McDonough, et.al. The role of natural resources in community and regional economic stability in the eastern Upper Peninsula. Michigan Agricultural Experiment Station Research Report 568.
- Stynes, D., C. Nelson and J. Lynch. 1998. State and regional economic impacts of snowmobiling in Michigan. East Lansing, MI: Department of Park, Recreation and Tourism Resources, Michigan State University. 31 p.
- U.S.D.I. Fish and Wildlife Service, and U.S.D.C. Bureau of the Census. 1998. 1996 national survey of fishing, hunting, and wildlife-associated recreation, Michigan. Report FHW/96-MI. Washington, D.C. 79 p.
- U.S.D.I. Fish and Wildlife Service, and U.S.D.C. Bureau of the Census. 2003. 2001 national survey of fishing, hunting, and wildlife-associated recreation, Michigan. Washington, D.C. 86 p.
- Vasievich, M. 1999. Here comes the neighborhood! A gold rush and eleven other trends affecting the Midwest. St. Paul, MN: USDA Forest Service, North Central Research Station. NC News (August/September): 1-3.
- Warnick, R.B. 2001. Recreation participation trends: generational patterns and change. In Trends 2000: Shaping the Future, The 5th Outdoor Recreation & Tourism Symposium. East Lansing, MI: Department Park, Recreation and Tourism Resources, Michigan State University. pp. 379-391.
- Wiita, A.L. 1998. Evaluation of managers' and visitors' perceptions of wilderness conditions at Nordhouse Dunes Wilderness Area. Master's thesis. East Lansing, MI: Department of Forestry, Michigan State University. 179 p.

Chapter 7. Other Forest Uses and Values

Introduction

Historically, social and economic assessments have had a strong emphasis on resources such as timber and outdoor recreation because structured information and data were available. There are many other forest uses and values that are important “products” of our state forests, even if they are not easily quantified. These other forest uses and values also influence planning and management of state forests. In many cases these values are reflected in areas that have special designations such as historic sites, natural areas, ecological reference sites, and so on. Today, the importance of these uses and values is more widely recognized under forest certification programs as well as by the MiDNR’s publics.

The MiDNR and USDA-Forest Service held a series of 53 focus group sessions beginning in 1996 to gather information on people’s views of Northern Lower Michigan and their visions and concerns regarding public land management (www.michigan.gov/dnr/0,1607,7-153-10366_11865_28193-83078--,00.html). Participants identified a number of important characteristics that reflect the multitude of values and uses of the region

- Low population, less traffic, and absence of urban characteristics
- Slower, friendlier lifestyle
- Small town environment
- Beauty and solitude of lakes, rivers, and the natural environment
- Nearness to public lands
- Clean air, open spaces, the four seasons, and the pristine environment
- Hunting, fishing, viewing wildlife and other recreational activities
- Raw materials for manufacturing and good transportation networks

This chapter examines diverse uses and values by discussing cultural resources including historical, archaeological, sacred and special sites, benefits associated with gathering special forest products, and passive use values. This chapter draws on Leefers and others (2003) for its structure and part of its content. Other social and economic assessments (see for example, Arizona National Forests Socioeconomic Assessment Team 2005) rely mostly on agency records to identify designated areas and special places.

Existing historic buildings and archaeological sites

The State Historic Preservation Office (SHPO) and the Office of the State Archaeologist (OSA) work to identify, record, investigate, interpret and protect historic and archaeological sites. In many cases, site location is sensitive information due to concerns related to private property and possible damage to sites.

There are a variety of historic sites and buildings and archaeological sites on Michigan’s state forests; some are open to visitors (www.mcgi.state.mi.us/hso/). Historic buildings include bridges, historic districts, lighthouses, fire lookout towers, charcoal kilns, cabins and lodges. For some sites, only small remnants of the buildings remain. Archaeological sites include historic sites containing artifacts from past human activities such as Civilian Conservation Corps camps, mining sites, town sites and logging camps as well as prehistoric or pre-European contact sites including resource processing sites and camps or villages (Table 7.1). Counties with the largest number of archaeological sites are located in the SLP, and the highest number is 1,286 sites in Saginaw County (Appendix Table A 7.1). The highest number of sites by ecoregion are: Delta County in the WUP (559 sites), Alger County in the EUP (482 sites), and Newaygo County in the NLP (340 sites).

Table 7.1. Number of existing historic buildings and archaeological sites by ecoregion

	WUP	EUP	NLP	Michigan
Historic sites				
State Register Listed Historic Sites				2,730
National Historic Landmarks				36
National Register Listed				1,514
Archaeological sites	2,561	1,609	3,655	19,510

Source: State Historic Preservation Office and the Office of the State Archaeologist.

Native American cultural sites

Traditional cultural properties (TCPs) are places that are important to the beliefs, practices, history, and culture of living communities (Leefers et al. 2003). The National Historic Preservation Act (NHPA) requires consultation with Tribes and others to identify and manage traditional cultural properties. The act required that each state establish a SHPO and that the governor of each state appoint an officer to oversee the preservation activities. OSA deals with archaeological sites in Michigan under the NHPA. Examples of possible TCP's include places such as traditional vision quest sites, traditional gathering areas, and mourning and condolence sites. Currently, there is not a compiled list of TCPs associated with the state forests.

Special sites

The concept of special places has existed in social science literature for decades; these are areas that have been given meaning by people who have an emotional attachment to them (Arizona National Forests Socioeconomic Assessment Team 2005). Special recreation sites are places that have special meaning for people because they have used them for traditional family and community activities. Many designated sites in northern Michigan are identified in Chapter 6, and for many people, these are special recreation sites. It is more difficult to identify the undesignated sites for which inventories have not been kept. Limited research provides examples of these types of sites (Schroeder 2002). People can identify the sites as well as the values they associate with them such as naturalness, beauty, remoteness, refuge and escape, social ties, family history, and heritage (Schroeder 2002). These values help explain why people are very attached to these places. Inadvertent alteration of these sites by land management agencies can create significant controversy and consequences.

Schroeder (2002) studied “special places” in the Upper Peninsula—his work offers some insight for the state forests in the UP (Table 7.2). First, he identified sites in the Upper Peninsula’s Black River area. Then, he held a workshop with forest industry woodland managers. Their identification of these places ranged from the very broad (e.g. Menominee County) to the very specific (e.g. Gorge Falls). There was an emphasis on water features including rivers, lakes and waterfalls; these are traditional gathering places. No formal studies were found identifying locations of specific sites used for traditional family and community activities in the NLP. But there are many “known” special places used for hunting, fishing, gathering and dispersed recreation.

Table 7.2. Special places near the Black River and in the Upper Peninsula (Schroeder 2002).

Black River	Upper Peninsula
Area between harbor and campground	Bald Mountain
Black River between harbor and waterfalls (east side)	Copper Country
Black River Harbor Village	Delta County
Campground	Fence River
Conglomerate Falls	Hiawatha National Forest
Copper Peak	Huron Bay
Gorge Falls	Huron Mountain Club
Harbor/Breakwater/docks	Iron/Baraga County Line
Lakeshore/beach	Little Huron Mountains

Black River	Upper Peninsula
Lower reaches of Black River	Menominee County
Picnic area/park	Misery River
Potawatami Falls	Mosquito River
Rainbow Falls	Muskellunge State Park
Sandstone Falls	Pictured Rocks
The Narrows	Silver River
	Stonington Peninsula
	Tahquamenon Falls
	Van Riper Lake
	Whitefish River

Note: Adapted from Leefers and others (2003).

Benefits associated with gathering special forest products

Forests play a significant role in providing non-timber forest products that enhance the livelihoods of many families (Emery 2001). From an assessment perspective, we recognize that government agencies and forest land owners do not monitor a myriad of forest-based products used for food, medicine, crafts, and cultural/ceremonial purposes. Wild berries, maple syrup, bark, roots, mushrooms and other materials are gathered for social and economic purposes. People gather and harvest these special forest products and use them for personal consumption, barter and gifts. They may also be an income source from sales of raw or processed materials. Subsistence and commercial use are economic dimensions associated with gathering (Jones and Lynch 2002). Collected materials can be used for household consumption and/or for trading, gift giving or sharing. Also, the materials may be sold or traded for other goods and services (Jones and Lynch 2002).

Gathering is used by families to bridge gaps in earnings and to supplement household income in times of economic need, such as seasonal unemployment. Gathering diversifies household economies in the UP, an area with a long history of “boom and bust” economic activity (Emery 1988). Other reasons for harvesting and gathering include:

- Recreational activities that provide pleasure or exercise (Jones and Lynch 2002)
- Social ties, including family outings, that develop between people due to gathering and harvesting activities (Stynes and Kakoyannis 1999, Emery 1988)
- Fulfilling or reinforcing values such as a strong work ethic, self-sufficiency and independence (Stynes and Kakoyannis 1999)
- Developing and enhancing a relationship with the natural environment (Stynes and Kakoyannis 1999, Emery 1988, Lynch 2002).

Passive use values

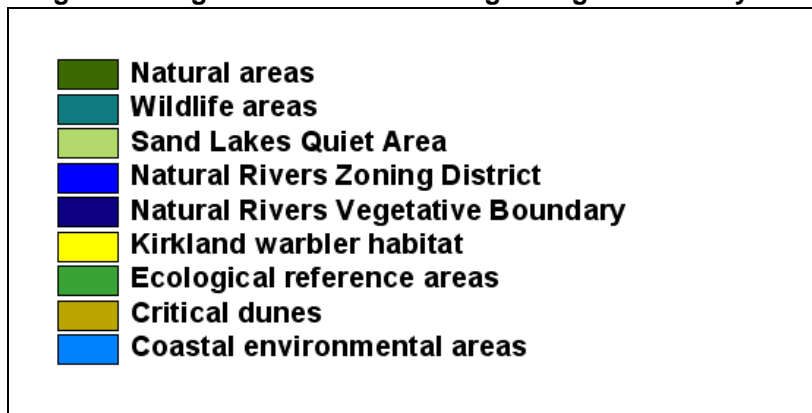
Use values such as forest products, recreation, and water are of interest to many people. But non-use or passive values are also central to people’s relationship to forests. Economists classify these non-use values as existence values, option values and bequest values (Freeman 1993). Existence value is simply the value people place on a resource or location for simply existing—use is not a concern. For example, people may place value on the mere existence of Isle Royale, even though they have no intention of ever seeing it. Option value is the value associated with maintaining future resource options. So people may not be ready to hike on state forest trails at this time, but they value the trails thinking that they may someday choose to use them. Finally, bequest value is the value people place on the knowledge that a resource will be available for future generations; we want our children and grandchildren to be able to fish on the AuSable River at some point in the future. Hence, people value a resource because it is or will be there (Freeman 1993).

Americans love forests. They have valued nature in their lives as evidenced by law, literature and art. For example, “wilderness” is highly valued by Americans (Wellman and Propst 2003). For over 100 years, conflicts between use values and nonuse values relative to forest resources have circulated around views of nature on the North American continent as a “terrible” versus nature as a source of wealth and economic opportunity. Loomis and Richardson (2001) estimated that existence and bequest values held by U.S. citizens in the lower 48 states totaled \$306 million; eastern wilderness values were estimated to be \$19 million.

Over 75% of Americans considered themselves to be environmentalists and support values and behavior associated with this view (Dunlap and Scarce 1991). While this does not necessarily transfer into environmental behavior, it is an indicator of the importance Americans place on nature. Many environmental beliefs and values are widely shared among Americans, and most of the values that characterize American environmentalism are nonutilitarian (i.e., non-use).

Land and resource allocations reflect many of the values held by Michigan’s people. Examples of areas of interest to citizens are: natural areas, wildlife areas, the Sand Lake Quiet, Kirtland warbler habitat areas, natural rivers, ecological reference areas, critical dunes, and coastal environmental areas (Figures 7.1 – 7.3). Economists may be able to estimate non-use values for these areas, but the American political process has already placed a value on them by designating and protecting them.

Legend for Figures 7.1 to 7.3 showing biological diversity areas.



(note that maps are shown as panels to increase resolution in this report)

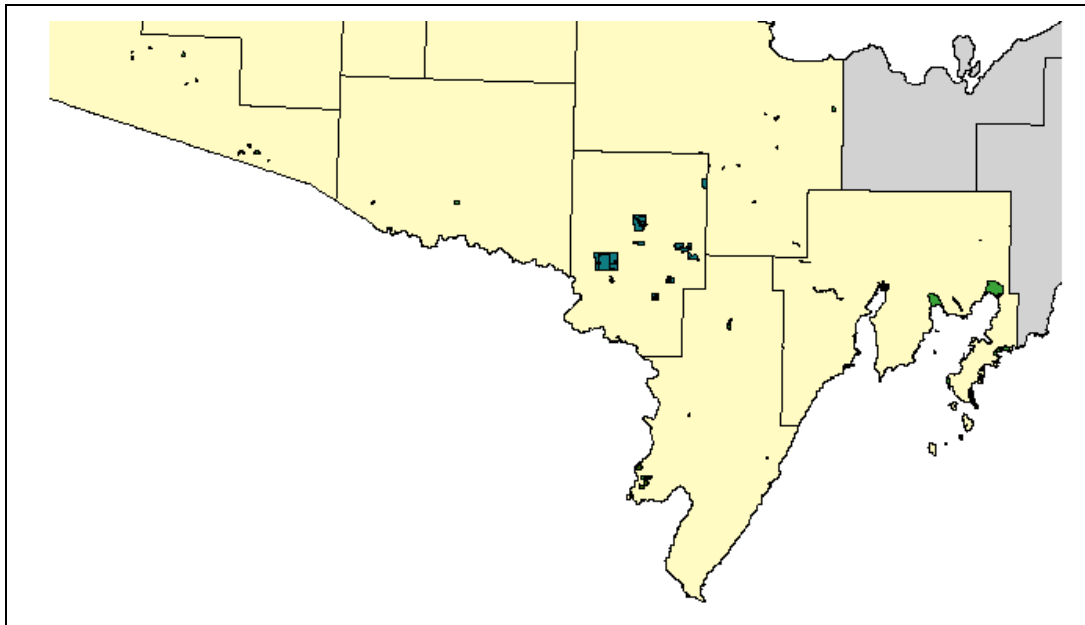
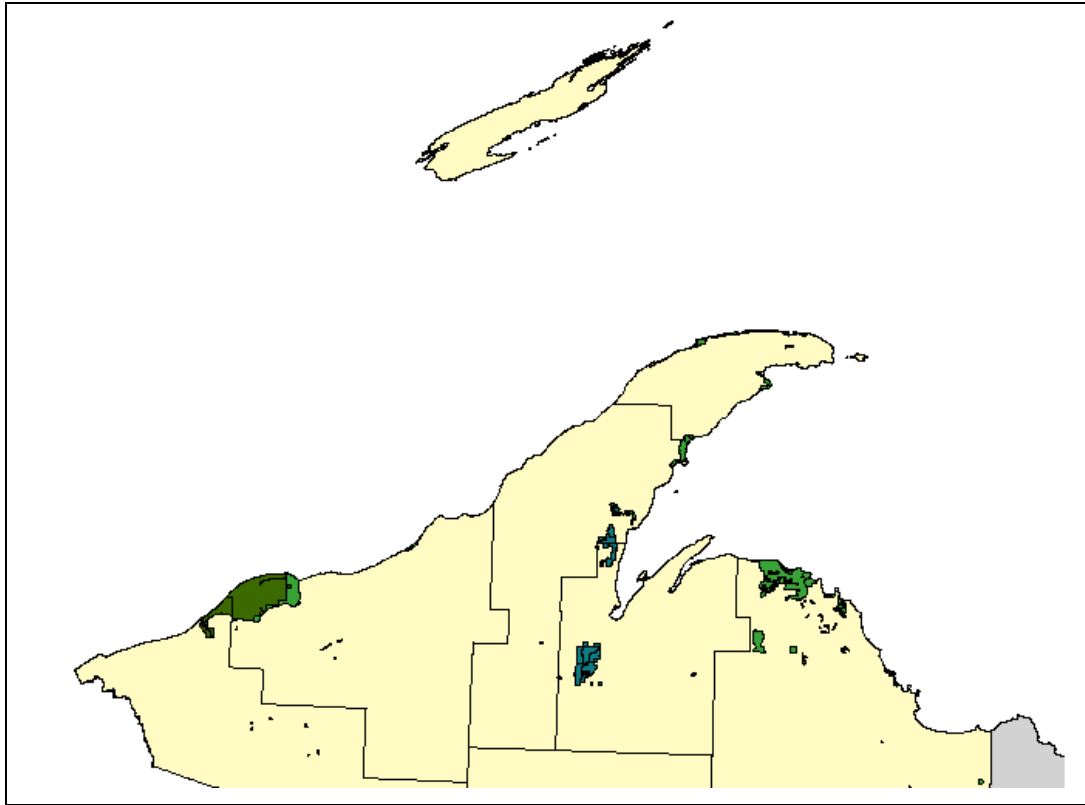


Figure 7.1. Biological diversity areas in the Western Upper Peninsula

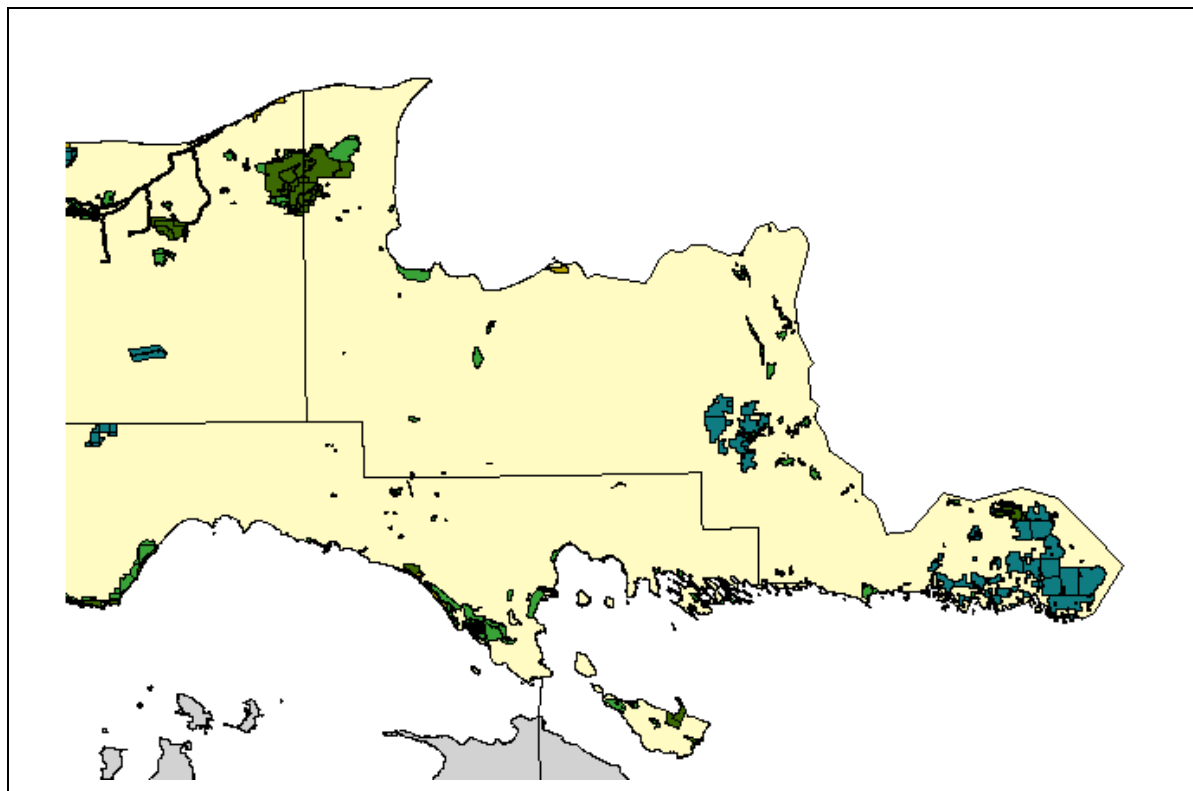
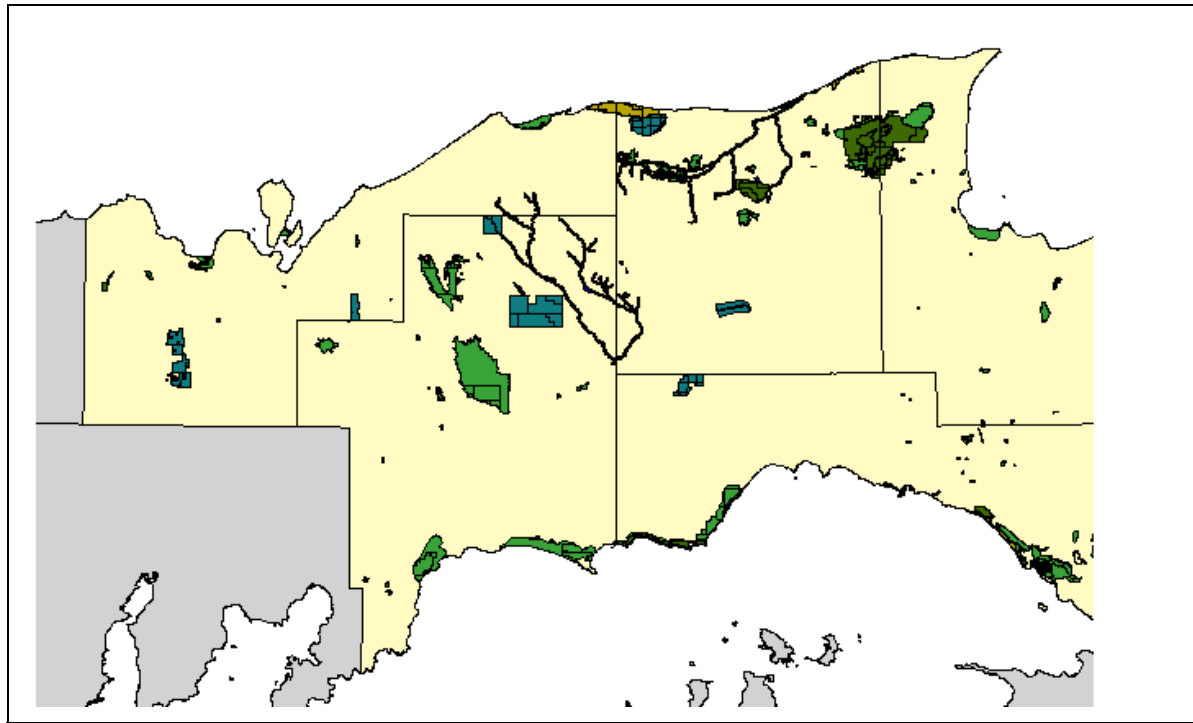


Figure 7.2. Biological diversity areas in the Eastern Upper Peninsula

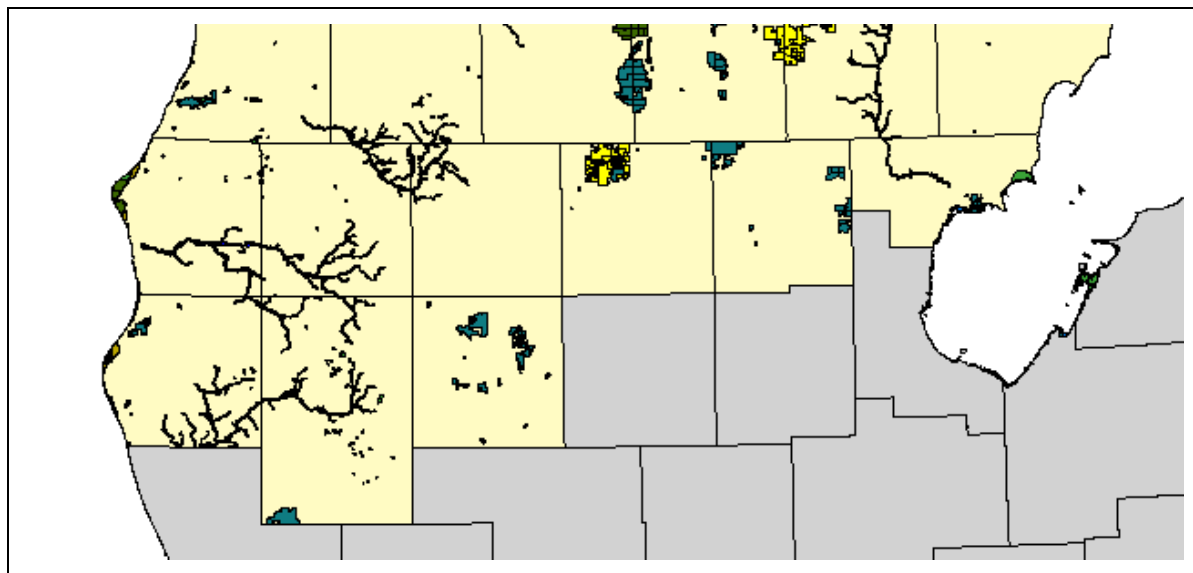
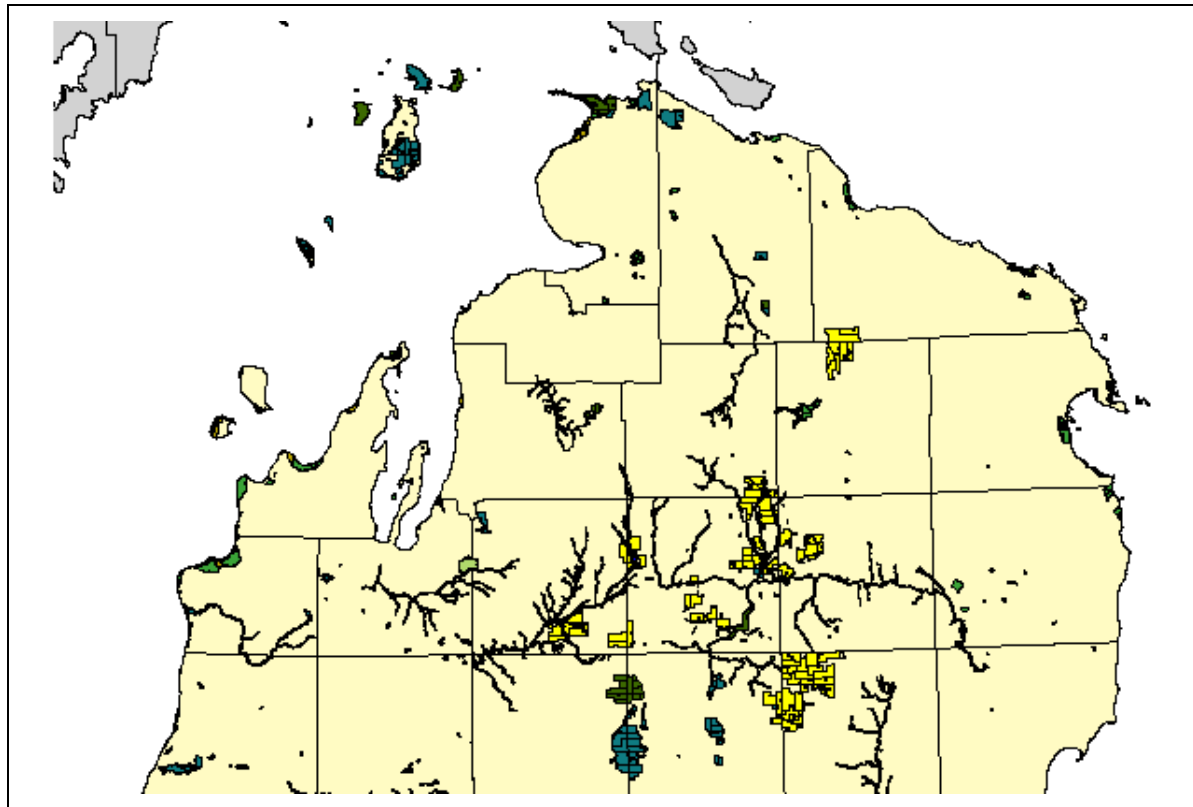


Figure 7.3. Biological diversity areas in the Northern Lower Peninsula

References

- Arizona National Forests Socioeconomic Assessment Team. 2005. Socio-economic assessment for the Coconino National Forest. Phoenix: The University of Arizona, School of Natural Resources. 140 p.
- Dunlap, R.E., and R. Scarce. 1991. The polls-poll trends: environmental problems and protection. *Public Opinion Quarterly*. 55: 713-734.
- Emery, M.R. 2001. Non-Timber Forest Products and Livelihoods in Michigan's Upper Peninsula. In *Forest Communities in the Third Millennium: Linking Research, Business and Policy towards a Sustainable Non-Timber Forest Product Sector*, edited by J. Zasada. GTR-NC-217. St. Paul, MN:USDA Forest Service, North Central Research Station.
- Emery, M.R. 1998. Invisible livelihoods: nontimber forest products in Michigan's upper peninsula. New Brunswick, NJ: Rutgers University. Doctoral dissertation.
- Freeman, A.M. 1993. The measurement of environmental and resource values. Washington, DC: Resources for the Future. 516 p.
- Jones, E., and K. Lynch. 2002. The relevance of sociocultural variables to nontimber forest product research, policy and management. In: Jones, E.T.; McClain, R.J.; Weigland, J. eds. *Nontimber forest products in the U.S.* Lawrence, KS: University Press of Kansas: 26-51
- Leefers, L., K. Potter-Witter, and M. McDonough. 2003. Social and economic assessment for the Michigan national forests. 244 p. Report submitted to Robert Brenner, James DiMaio, David Maercklein, and Fred P. Clark on July 25, 2003.
- Loomis, J.B., and R. Richardson. 2001. Economic values of the U.S. wilderness system. *International Journal of Wilderness*. 7(1): 31-34.
- Schroeder, H.. 2002. Experiencing nature in special places: surveys in the North-Central region. *Journal of Forestry*. 100 (5): 10-14.
- Stynes, D., and C. Kakoyannis. 1999. Outdoor activities. In: McDonough, Maureen H. ed.. *The role of natural resources in community and regional economic stability in the eastern Upper Peninsula*. East Lansing, MI: Michigan Agricultural Experiment Station Research Report 568:53.66.
- Wellman, D., and D. Propst. 2004. *Wildland Recreation Policy*, 2nd Edition. Malabar, FL: Krieger.

Chapter 8. Assessment Summary

Chapter 1. Introduction

- The Michigan DNR is preparing a statewide forest management plan, and management plans for sub-state ecoregions, starting with the Western Upper Peninsula (WUP), Eastern Upper Peninsula (EUP), and Northern Lower Peninsula (NLP). This report information on social and economic conditions and trends is intended to support development of future management directions for these plans.
- The geographic scope of this report includes three ecoregions. Because most social and economic data are available by political subdivisions, ecoregions are defined as groups of counties for the purpose of this report. Actual ecoregional boundaries do not follow county boundaries and in some cases, MiDNR Forest Management Units also cut across county boundaries.
- Michigan state forests comprise almost 4 million acres and cover 12.5 percent of the land area of the State. State forests represent almost 87 percent of all land in DNR ownership with parks and game areas making up the rest. State forests make up 13.5 percent of the Western UP, 30.9 percent of the Eastern UP, and 19.9 percent of the NLP.
- This report provides information in the following major areas:
 - Demographic patterns and trends (Chapter 2)
 - Relationships with communities (Chapter 3)
 - Economic vitality and dependence (Chapter 4)
 - Natural resources production and economic contributions (Chapter 5)
 - Outdoor recreation (Chapter 6)
 - Other forest uses and values (Chapter 7)

Chapter 2. Demographic Patterns and Trends in Michigan

- The three northern Michigan ecoregions account for 12.2 percent of the State population according to the 2000 Census.
- In recent decades, population growth has occurred in the NLP, but the Eastern UP and Western UP have been relatively stagnant in terms of population growth.
- The Western UP lost population slightly from 1990 to 2000. All counties in the Eastern UP grew in population from 1990 to 2000, increasing a total of 8 thousand people. The NLP grew by 129 thousand people in that period. Double-digit percentage population growth was most notable in the NLP.
- Population density is low in the study area and ranged from 14 to 46 persons per square mile in the three northern Michigan ecoregions in 2000. Statewide, the population density averaged 175 per square mile.
- Analysis of population within 120 miles of the centroid of state forests in 2000 shows that there were 967 thousand people for Western UP state forests, 574 thousand for Eastern UP forests, and 2.94 million for NLP state forests.
- Most northern Michigan counties are classified as “recreation counties”, which is related partially to net migration into the area.
- Natural change (births – deaths) was negative in the WUP during the 1990 to 1999 period. This contributed to the overall WUP population decline.
- The NLP had significant growth during the 1990’s due to positive natural change and immigration.
- The percentage of males and females in Michigan and the ecoregions is approximately equal. The exception is higher percentages of males in the EUP in recent decades; this is partially attributable to correctional facilities located there.

- The counties in the NLP generally have lower percentages of minorities than those counties in other regions. American Indians are concentrated in the UP and Black – African Americans are concentrated in the Southern Lower Peninsula (SLP).
- For most educational metrics, northern Michigan ecoregions and counties fall below average performance for the state. Counties with strong links to universities fare better than others.
- Seasonal homes are concentrated in northern Michigan, in comparison with the more densely populated southern region of the State.

Chapter 3. MI DNR Relationships with Communities

- The MiDNR and other natural resource agencies interact with communities to understand issues of mutual interest and to implement programs for management of natural resources. The interactions of natural resource agencies and communities is a widespread phenomenon (McDonough et al. 1999, Leefers et al. 2003).
- Communities of interest can be classified as place-based or affiliation-based, and they may be statewide and/or specific to certain ecoregions. (Leefers et al. 2003).
- Statewide communities include international organizations, federal agencies, Tribes, multi-state organizations, other state agencies, universities, statewide recreation and other user groups, conservation and environmental groups, and non-governmental organizations.
- Local communities specific to ecoregions include counties, local units of government, local chambers of commerce and regional/local groups similar to those existing at the state level. In addition, there are local permanent residents and seasonal residents.
- Natural resource features affect why people live in an area and visit it. People enjoy the peace, quiet and tranquility of northern Michigan, the opportunity to be close to nature, and scenic beauty (Kakoyannis et al. 1999).
- In the WUP, researchers found that there was widespread recognition of the contributions public forests made to the quality of life in their communities (Carr and Halvorsen 2001).
- Relationships that the MiDNR has with other organizations and people in communities near state forests are important for sharing agency and publics' concerns regarding forest management, creating public support for the forest management, and providing resources for forest management activities.
- The U.S. and Michigan governments have unique legal and political relationships with Indian tribes. Tribes are independent sovereign nations, and there are 12 federally recognized Tribes in Michigan. State forests collaborate with Tribes in the management of state forest lands.
- Public participation occurs at three primary administrative levels: at the State or Division level, at the Ecoregional or District Level, and at the Forest Management Unit Level (Forest Certification Work Instruction 1.5, 2005). In addition, there is substantial public participation in a wide variety of MiDNR programmatic and project work. Michigan's state forests have extensive relationships with diverse partners across the state.
- State forests exist in a political and social environment of national, state and local land use policies. Some of these policies do not directly influence state forest management, but they drive management decisions on adjacent and nearby lands.
- Historically, Michigan had numerous statutes related to natural resource management. In 1994, these disparate statutes were combined into the Natural Resources and Environmental Protection Act (P.A. 451)

Chapter 4. Economic Vitality and Natural Resource Dependence

- Approximately 12% of all industrial establishments in Michigan were in the WUP, EUP and NLP in 2005.
- Over \$1.2 billion in wages were paid by the Forestry and Logging, Wood Products Manufacturing, and Paper Manufacturing sectors in 2005.

- The Local Government sector was the largest employer in the WUP, EUP and NLP in 2005.
- Seasonality is a distinct unemployment feature of northern Michigan. Relatively high unemployment rates in the winter and spring are followed by relatively low rates during the summer and early fall.
- Forest-related economic activities of primary interest include timber harvesting, wood products manufacturing, recreation and tourism, and minerals extraction.
- Most forest products employees are in the SLP, and are associated with secondary manufacturing. Logging operations are concentrated in northern Michigan where wood raw materials dominate the landscape.
- Grand Traverse, Mackinac and Emmet counties had the highest tourism-related spending in northern Michigan in 2000.
- Mining establishments are largely concentrated in the SLP and NLP, but there is a proposal for a large new nickel and copper mine in the UP near Marquette.
- The number of MiDNR employees declined over the 1995-2005 period.
- The largest loss of MiDNR employees was in the NLP, especially in Roscommon and Crawford counties.
- There has also been a significant switch from full-time to part-time or seasonal employees.
- Median household income in 2000 was lowest in the WUP and highest in the SLP. Most of the lowest income counties were located in northern Michigan.

Chapter 5. Natural Resources Production

- Michigan timberland increased from 17.4 million acres in 1980 to 18.7 million acres in 2004. Michigan ranks sixth in the nation in the amount of timberland.
- The State as a whole is 53 percent forested. The Western UP is 87% forest; the Eastern UP is 83% forest, and the NLP is 67% forest according to the most recent forest inventory (FIA) conducted by the USDA-Forest Service.
- The WUP has 898 thousand acres of state-owned forest land; the EUP has 998 thousand acres of forest land; and the NLP has 1.93 million acres of forest land. Collectively, state ownership makes up 24% of all forest land in the three northern ecoregions.
- Statewide, the most common softwood forest types on MiDNR timberland are northern cedar, jack pine, and red pine. Maple-beech-birch, aspen, and oak-hickory are the most common hardwood forest types on MiDNR timberland.
- The state forests contain about 19% of Michigan's total growing stock timber volume with 5.1 billion cubic feet on MiDNR timberlands. Sixty-two percent of the volume on MiDNR timberlands is in four forest types – maple-beech-birch (29.6%), aspen (11.6%), oak-hickory (11.3%), and red pine (10.1%)
- Net annual timber growth on DNR lands is 163.5 million cubic feet, more than 2 million cords annually, based on USDA-FS inventory data for the 2000 to 2004 measurement period. Average annual removals from MiDNR timberlands are estimated by FIA at 58.4 million cubic feet, roughly 730,000 cords.
- Total pulpwood production in Michigan was 2.66 million cords in 2004, the most recent year for which data are available. About one-quarter of this production came from state forests. Production in the WUP was 1.2 million cords; the EUP was 420 thousand cords, and the NLP was 909 thousand cords from all lands. Pulpwood production for 2004 from MiDNR lands was about 5% of the state total in the WUP, 4% in the EUP, and 12% in the NLP.
- Michigan produces more than one billion board feet of high-value sawlogs annually (based on 1998 FIA data). Two-thirds of all sawlog production comes from four species groups: hard and soft maple, red oak, and red pine. Sawlog production on DNR lands is about 61 million board feet and dominated by red pine, oak, aspen, and maple.
- Timber sales from state forest lands in the three ecoregions generated \$30.7 million in 2004 and \$44.8 million in 2005. Sawlogs comprised about 15% of total timber volume sold in 2005, but generated 43% of total timber revenue.

- Average timber prices for DNR sales have risen consistently and faster than inflation over time. Average prices for all timber products averaged \$43.08 per cord in 2004 and \$55.51 per cord in 2005. Prices varied greatly, depending on product and species. Pulpwood prices ranged from \$8 to \$55 per cord in 2005. Sawlog prices ranged from \$14 to \$852 per MBF. Jack and red pine generated the highest prices for pulpwood. Sugar maple and red pine generated the highest prices for sawlogs.
- Although prices for some products showed considerable variability over time, red and jack pine pulpwood, sugar and red maple and red pine sawlogs showed very strong and sustained real price increases from 1986 to 2005.
- The State owns mineral rights, including oil and gas, on over 6 million acres of land, some of which is on state forests. About 25% of the 13,722 oil and gas wells in the State are located on state-owned land in the Lower Peninsula. About 31% of the oil and gas wells in the NLP are on state-owned lands. There is no oil and gas production in the Upper Peninsula.
- About 6.9 million barrels of oil are produced annually in the State, and 191 billion cubic feet of natural gas were produced in Michigan from all land ownerships in 2005. Production for both oil and gas has declined over time. For the production history covering the last 16 years, oil production peaked at 14.3 million barrels in 1990 and gas production peaked at 291 billion cubic feet in 1997.
- Mining is a very important land use in Michigan with mineral occurrences located throughout the state. There are 850 producing mineral occurrences in the State with more than 80% of these being sand and gravel operations. Mining operations for metallic minerals such as iron, copper and other metals are primarily concentrated in the Western UP with numerous undeveloped mineral occurrences. Information on mining operations on MiDNR lands was limited.
- Michigan has abundant water resources and each of the three ecoregions is drained by many watersheds. The WUP contains parts or all of 19 watersheds; the EUP has 12 watersheds; and the NLP has 17 watersheds. The top five watersheds drain 48% of the WUP, 78% of the EUP, and 59% of the NLP ecoregion.
- Water use in Michigan is about 1 billion gallons per day. About 93% of the water supply comes from surface waters (particularly the Great Lakes) and about 7% from ground water sources.
- Public water supplies serve 72% of the State's population but public water supplies reach a lower proportion of the residents in the three northern Michigan ecoregions. In the Western UP, 68% of the population are served by public water supplies. Fifty-one percent of the people in the EUP have access to public water supplies and only 33% have public water in the NLP.
- Average water consumption was slightly more than 1,000 gallons per day in Michigan. This rate includes all water uses divided by the resident population and varies considerably across the state, depending on industrial uses. Per capita consumption is much higher in some counties bordering the Great Lakes, especially those with high water-use industries such as thermoelectric power generation.
- The number of captive privately-owned cervid farms has increased dramatically from the late 1980s to the present. In 2004 there were 740 facilities that raise deer and elk in captivity. Eighty-seven percent of these were active operations. These facilities are actively inspected by the Michigan Department of Agriculture to assure animal safety and protect wildlife in surrounding areas.

Chapter 6. Outdoor Recreation Uses and Values

- The State and federal lands account for over 21% of Michigan lands. The State of Michigan has the largest landholdings including state forests, state park and recreation areas, state wildlife refuges, and state game areas. Federal lands consist of national forests, national lakeshores, a national park, and national wildlife refuges.
- Forest, Mineral and Fire Management and Wildlife Divisions of the Michigan Department of Natural Resources manage the state forests, the largest dedicated state forest system in the United States.
- At the federal level, the USDA Forest Service manages national forests, the USDI Park Service manages national parks and lakeshores, and the USDI Fish and Wildlife Service manages national wildlife refuges.
- Commercial forest lands covering over 2.2 million acres allow access for fishing and hunting.

- Wilderness and natural areas provide unique opportunities for dispersed recreation and solitude. These areas have restrictive management standards and guidelines with a clear purpose of preserving natural ecological and social values.
- Over 2,000 miles on sixteen rivers or segments of rivers have been designated into Michigan's Natural River System since 1970.
- Motorized trails far exceed non-motorized trail mileage—over 9,300 miles are available for snowmobiles and ATVs/ORVs.
- In 1999, the designated ORV system had 3,107 miles of ORV trails and five major scramble areas where vehicles can use varying terrain in concentrated areas.
- Commercial campsites exceed public sources and account for 46% of the campsites within northern Michigan.
- Camper days, a measure of recreation use, at state forest campgrounds has been relatively stable in the past four years.
- Participation in fishing, hunting, and wildlife watching by Michigan residents declined from 1996 to 2001.
- Overall, though hunter numbers are substantial, the number of paid hunting license holders has declined in recent years. This downward trend is reflected in the number of active firearm deer, small game and waterfowl hunters. The number of turkey hunters and bear hunters has increased significantly in recent years, and the number of furtakers has increased as well.

Chapter 7. Other forest uses and values

- The MiDNR and USDA-Forest Service held a series of 53 focus group sessions beginning in 1996 to gather information on people's views of Northern Lower Michigan and their visions and concerns regarding public land management. Participants identified the following important characteristics that reflect the multitude of values and uses of the region:
 - Low population, less traffic, and absence of urban characteristics
 - Slower, friendlier lifestyle
 - Small town environment
 - Beauty and solitude of lakes, rivers, and the natural environment
 - Nearness to public lands
 - Clean air, open spaces, the four seasons, and the pristine environment
 - Hunting, fishing, viewing wildlife and other recreational activities
 - Raw materials for manufacturing and good transportation networks
- The State Historic Preservation Office (SHPO) and the Office of the State Archaeologist (OSA) work to identify, record, investigate, interpret and protect historic and archaeological sites.
- The National Historic Preservation Act (NHPA) requires consultation with Tribes and others to identify and manage traditional cultural properties.
- Forests play a significant role in providing non-timber forest products that enhance the livelihoods of many families (Emery 2001).
- Gathering is used by families to bridge gaps in earnings and to supplement household income in times of economic need, such as seasonal unemployment.
- Land and resource allocations for parks, natural rivers, and other purposes reflect many of the values held by Michigan's people.

Data gaps and limitations

- This assessment covered a broad set of information describing the conditions and trends on Michigan's state forests. In some instances, the scope of the analysis was limited by the time and resources available. However, we also encountered several situations where data limitations affected our analysis.

- Changes in the protocols used for the USDA-Forest Service forest inventory between the 1993 periodic inventory and the annualized inventory (2000 to 2004) limit comparability of these inventory data. In particular, aggregated classification of private ownerships eliminates the ability to separate out these owner groups. Also, shifts in field classification of growing stock trees suggests that the definition of this category of live trees has drifted over time.
- Data on property values and land transactions near state forests was not easily nor consistently accessible. Information on land markets and parcelization is difficult to obtain, but essential for understanding the dynamics of forest and land use change near the public lands. Better information on land subdivision, development trends near public lands and implications for management would be an important socioeconomic information gap to fill.
- Available data on oil and gas revenues from DNR lands were limited. More production and revenue information on this important activity would improve this analysis.
- This study did not analyze wildlife population trends, uses, and values in as much depth as would be possible with more detailed data. We recognize that both game and non-game wildlife reflect important social values for the people of Michigan. Further analysis of values and contributions of wildlife to people and the specific implications for management is needed.
- The state forests are a source of non-market products and services; however, specific data on the extent of these benefits from DNR lands were limited, especially when viewed in comparison with data available on commodities. Also, more in-depth data on the extent and characteristics of recreation activities and users of the state forests is needed. The MiDNR does not systematically collect recreation use and user information across all programs.
- We also found limitations on the extent of sites with historic importance. Although some information is available from the State Historic Preservation Office (SHPO) specific information on the extent of sites on MiDNR lands does not appear to be available.
- Overall, this report presents demographic, natural resource use and other data for MiDNR planning purposes. The implications of conditions and trends for state forest management were beyond the scope of this study and warrant further consideration.