



Dane County Farmers' Market in Madison



Hmong Festival in West Salem

Chapter 2: The State of Wisconsin's Resources

A. Our past and current landscape

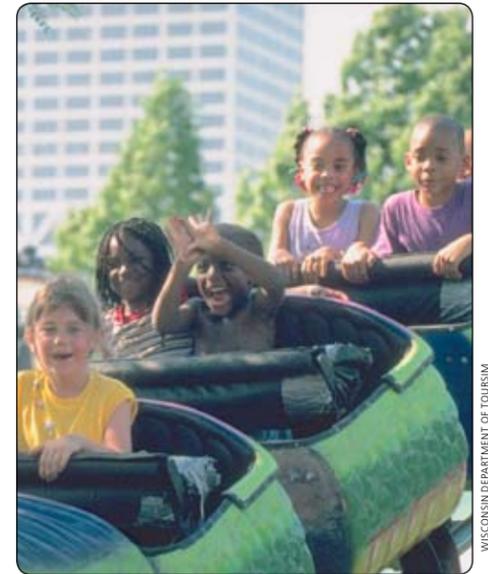
Wisconsin, along with the rest of the country, is experiencing rapid changes to the way its residents live, work, and play. What follows is a brief discussion of these changes in Wisconsin and how they may affect future efforts to protect places important to meet conservation and recreation needs.

Our People

Plants, animals, and humans colonized Wisconsin as the glaciers receded 10,000–12,000 years ago. Archaeological evidence of human presence here dates from more than 11,000 years ago. Thus, the biotic communities that took hold in Wisconsin after the glaciers receded were influenced by human activity from the beginning. The size of the human population in Wisconsin in the millennia before European contact is a subject of speculation and remains uncertain.

When Europeans landed in the New World, this picture changed dramatically. Native populations lacked immunity from such diseases as smallpox, influenza, measles, and the common cold. Disease spread along trade routes, even to tribes that had no direct contact with Europeans. Throughout North, Central, and South America, native populations declined dramatically due to disease epidemics.² When Euro-Americans arrived in what is now Wisconsin in the 17th century, they found a Native American population in flux. A number of native peoples living further east had been pushed into the area to join the tribes already present. Counteracting this surge in population was the devastating impact that foreign diseases were having on Native Americans.

Since permanent Euro-American settlement began, the population of Wisconsin has been steadily increasing. Different regions of the state have experienced surges in population as economic conditions and opportunities have changed over time. The population of the southwest corner of the state surged during the lead mining



Having fun in Milwaukee

Figure 2: Wisconsin's population, 1900 to 2025³

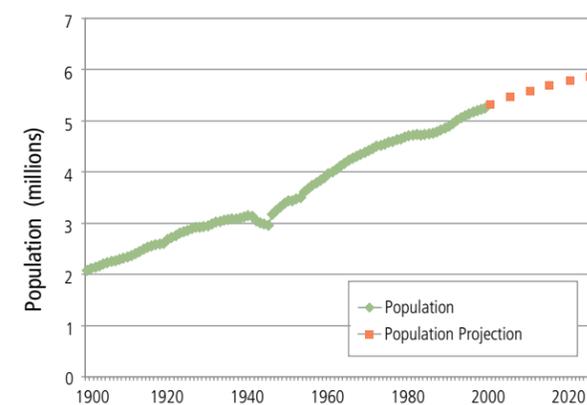


Figure 3: Wisconsin's rural and urban population, 1900 to 2000⁵

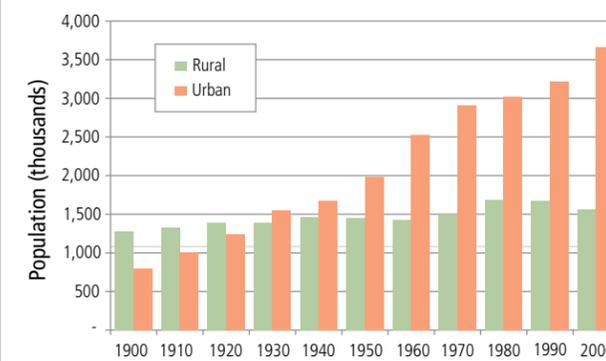


Figure 4: Fastest growing cities and villages in Wisconsin, 1990 to 2000⁹

By Population Gained		
Rank	Municipality	Population Gained
1	Madison	16,792
2	Kenosha	10,000
3	Oak Creek	8,943
4	Oshkosh	7,910
5	Waukesha	7,867
6	Franklin	7,639
7	Janesville	7,365
8	Green Bay	5,847
9	Menomonee Falls	5,807
10	Sun Prairie	5,036

By Percent Change*		
Rank	Municipality	Percent Change
1	Oak Creek	45.8%
2	Franklin	35.0%
3	Pleasant Prairie	34.9%
4	Germantown	33.7%
5	Sun Prairie	32.8%
6	Onalaska	31.5%
7	Fitchburg	31.0%
8	Muskego	27.3%
9	De Pere	24.1%
10	Menomonee Falls	21.6%

*out of the 50 largest cities and villages in 2000

Our People: Implications for meeting future conservation and recreation needs

As Wisconsin's population grows and continues to urbanize, we expect there will be increasing demand for opportunities to participate in a variety of outdoor recreation activities. Similarly, the large metropolitan areas near Wisconsin, most notably Chicago and the Twin Cities, are expected to grow. Many residents of these cities vacation and recreate in Wisconsin, and we believe there will be a corresponding growth in the number of out-of-state residents traveling to Wisconsin for camping, wildlife watching, biking, ATV riding, hunting, fishing, and other outdoor opportunities. This growth in demand for recreation opportunities will likely result in an increase in visitors to our existing public properties. Thus, it appears likely that more and more of our most popular properties, as well as those near urban centers, will experience heavy use.

In public forums held around the state, residents repeatedly stated the need to provide more places for the public to recreate close to where they live. For a variety of reasons, most of the existing large public land holdings in the state are several hours drive from where the majority of Wisconsinites live. As families have less time to devote to outdoor recreation, reducing travel time becomes increasingly important. Even residents in the northern part of the state emphasized the need to provide more easily accessible parks, forests, and wildlife, fishery, and natural areas in the southern part of the state. Figure 7 shows the percentage of Wisconsinites that live within 50 miles of each township. As can be seen, the area bounded by Milwaukee, Madison, Fond du Lac, and Janesville is within 50 miles (about an hour's drive) of over half the state's population.

Surveys have shown that age and gender are key indicators in determining participation levels in different types of recreation. Thus, as our state population structure changes over time there will likely be changing demands in recreation

activities. See the discussion on Recreation Demands on page 21.

Over the next 25 to 50 years, as the baby boom generation ages, the country is expected to experience the largest inter-generational transfer of wealth in its history, a large percentage of which will likely be in the form of real estate.¹⁵ This transfer will have significant implications for land ownership in our state. Many properties will be sold, others will be passed on to children who may or may not wish to live on or retain these lands. New owners may need significant assistance understanding land and water management practices, which could further burden government agencies that provide such services.

As our population continues to racially diversify, we expect there will be changing recreation demands and perspectives on natural resource management. We are unsure, however, how these changes may unfold and influence future conservation needs and recreation demands. The Department and others will need to assess these changing demands and perspectives over time and respond accordingly.



Relaxing in Stockholm

fewer residents now than 50 or even 100 years ago. Eighteen of Wisconsin's 72 counties lost population from 1940 to 1990.⁷ The nine most populous counties, all of which lie between Green Bay, Madison, and Kenosha, now comprise over 50% of the entire state population.⁸ The fastest growing population centers in the state are all south of State Highway 29 and are typically small to mid-sized cities at the fringe of large cities (Figure 4). Figures 5 and 6 show population increase by township, Figure 9 shows population density as topographic relief.

Consistent with national trends, the average age of Wisconsin's population is aging and is influenced by the large "baby boom" generation. As today's 40 to 60 year-olds enter retirement, they are likely to spend increasing amounts of time and money pursuing a variety of outdoor recreation activities.¹² Also consistent with national trends, the average age of Wisconsin farmers (52 years) is older than that of the average worker in the state (39 years).¹³ In addition to the social changes this aging farm population will bring to our rural communities, it is also likely to affect the pace and pattern of land ownership changes over the next fifty years.

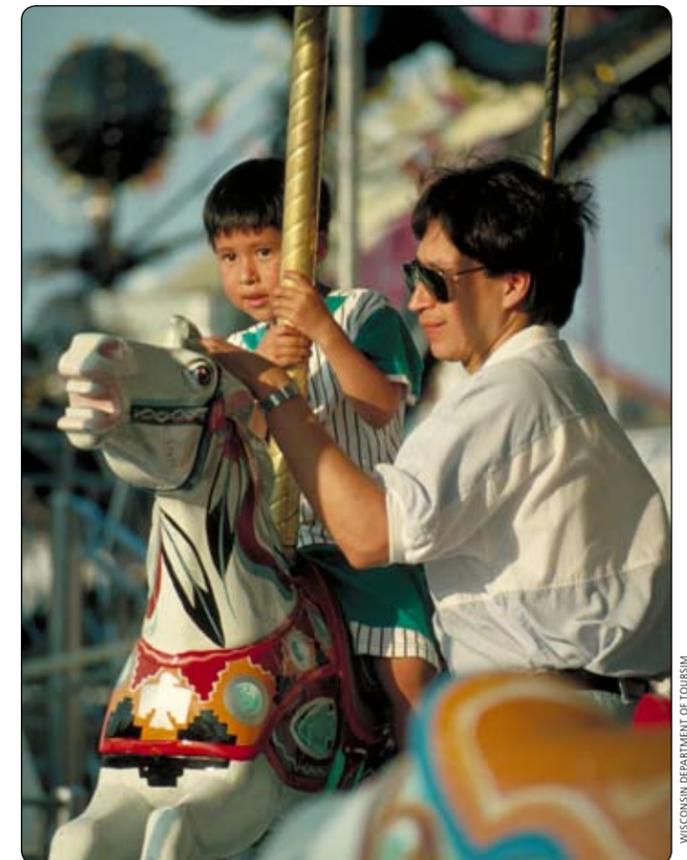
Although more homogenous than the country as a whole, Wisconsin's racial composition continues to diversify. Approximately 5.7% of the state's population is African American, 3.6% Hispanic American, 1.7% Asian American, and 1.0% Native American. All of these minority groups are expected to increase in population faster than the state's Caucasian population.¹⁴

period; the Lake Michigan coastal cities gained considerable population during the shipping and boat building era; the Fox Valley cities grew with the expansion of the paper-making industry; and the manufacturing industry has long kept the greater Milwaukee area as one of the largest metropolitan centers in the Midwest. The 2000 Census found that 5,363,675 people now live in Wisconsin, a 9.6% increase from 1990 (Figure 2). Our population is slightly older and increasing more slowly than that of the country as a whole.⁴

One trend that has remained consistent over the past 150 years is the growing urbanization of our population (Figure 3). At the beginning of the 1900s, Wisconsin had a predominantly rural, farm-based population; now, more than half of the state's residents live in municipalities with over 10,000 people.⁶ Some villages and rural towns, particularly those that played important roles in the timber and mining industries in the north as well as some in the southern and western part of the state away from major highways, have



Cinco de Mayo Festival in Milwaukee



Summer fun

Figure 5: Population change by township, 1990 to 2000¹⁰

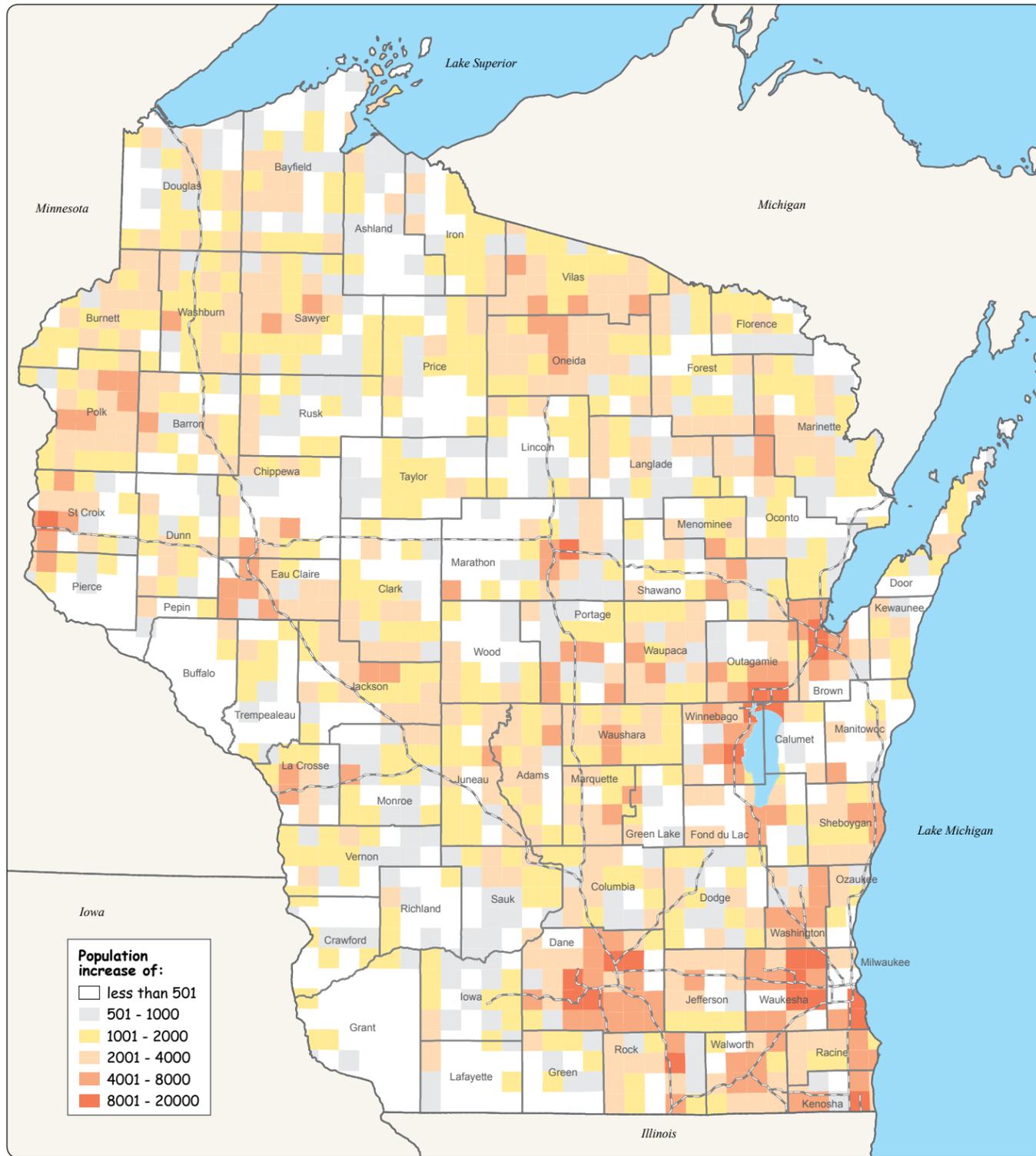


Figure 6: Percentage population change by township, 1990 to 2000¹¹

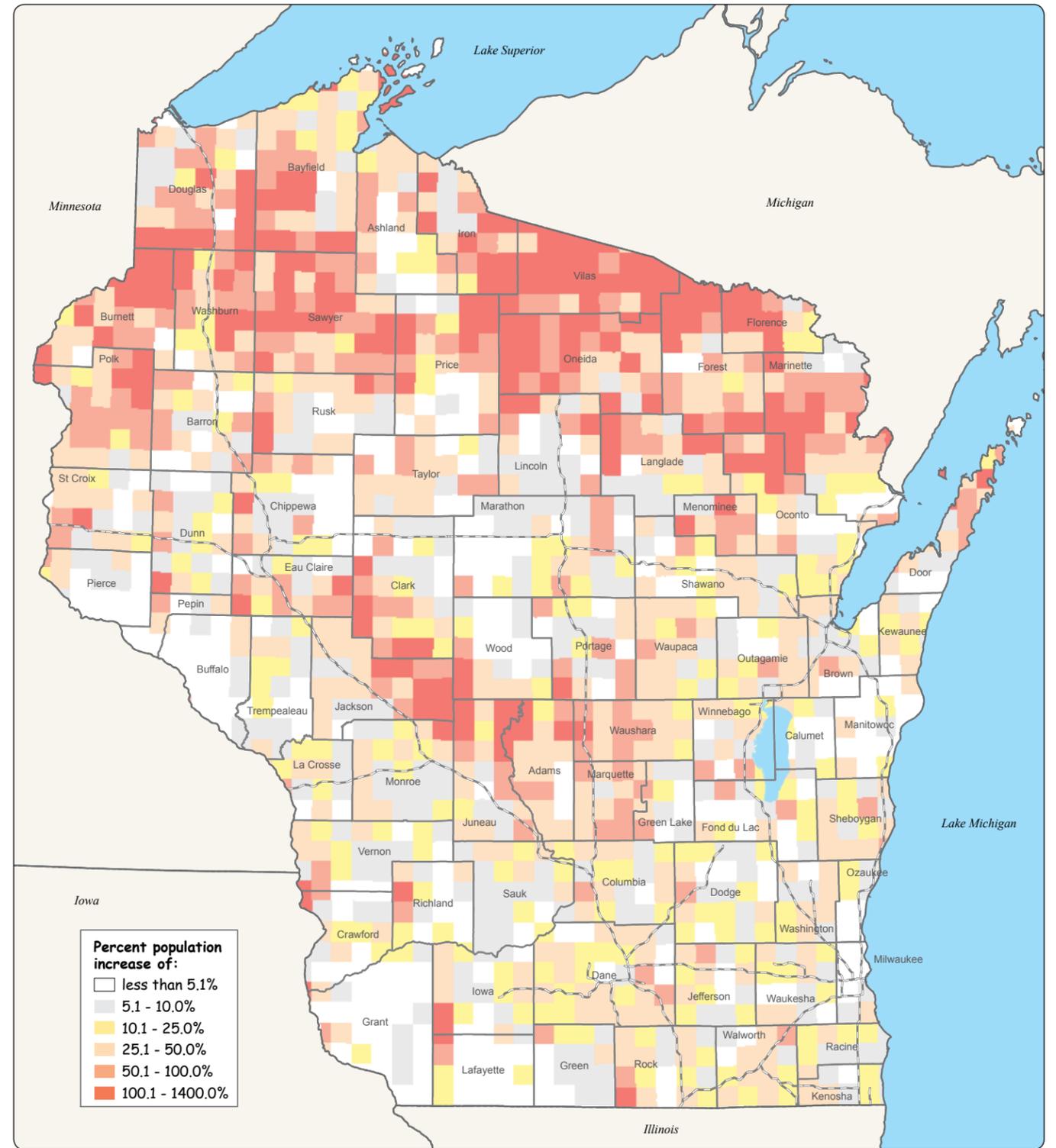
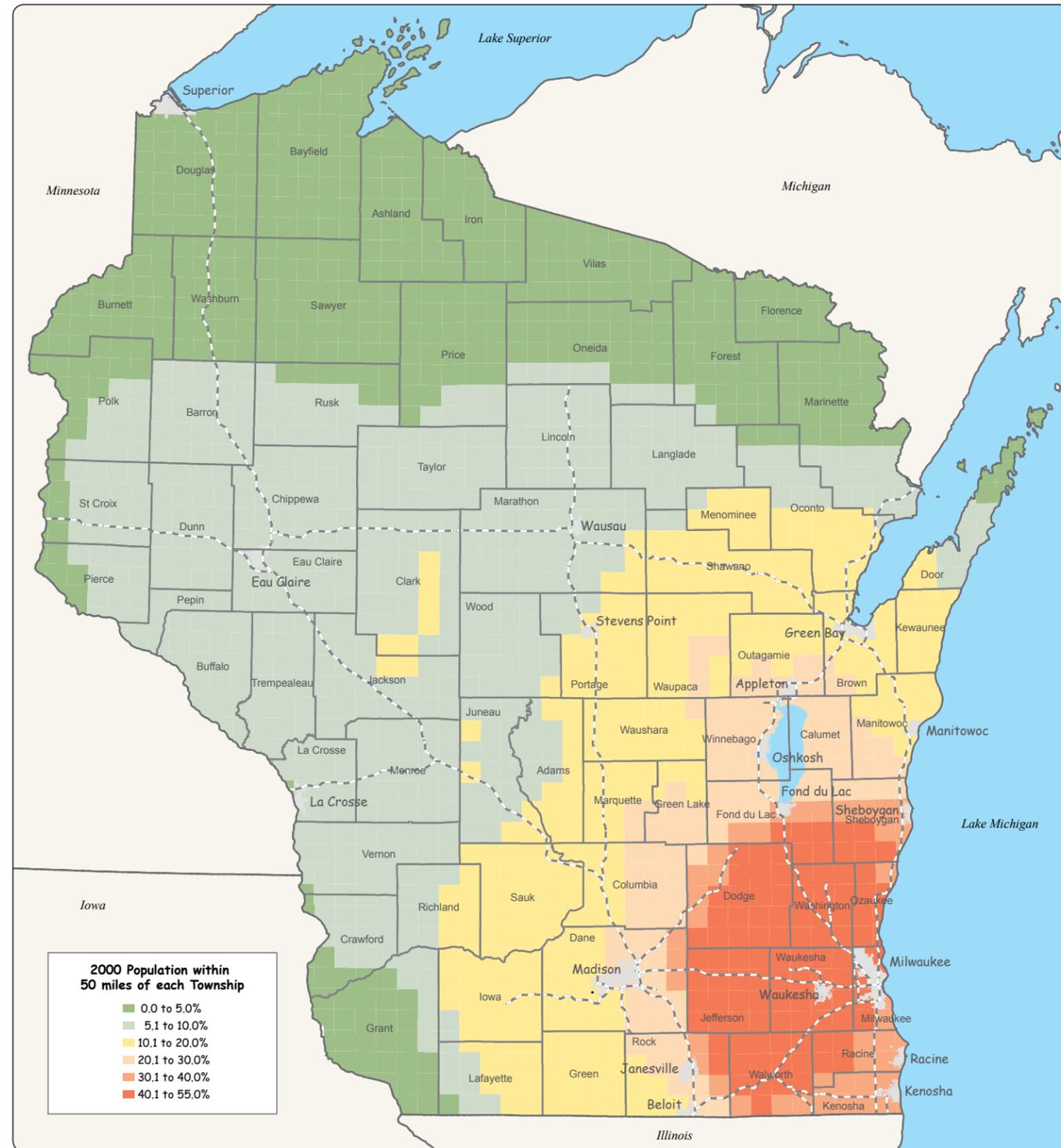
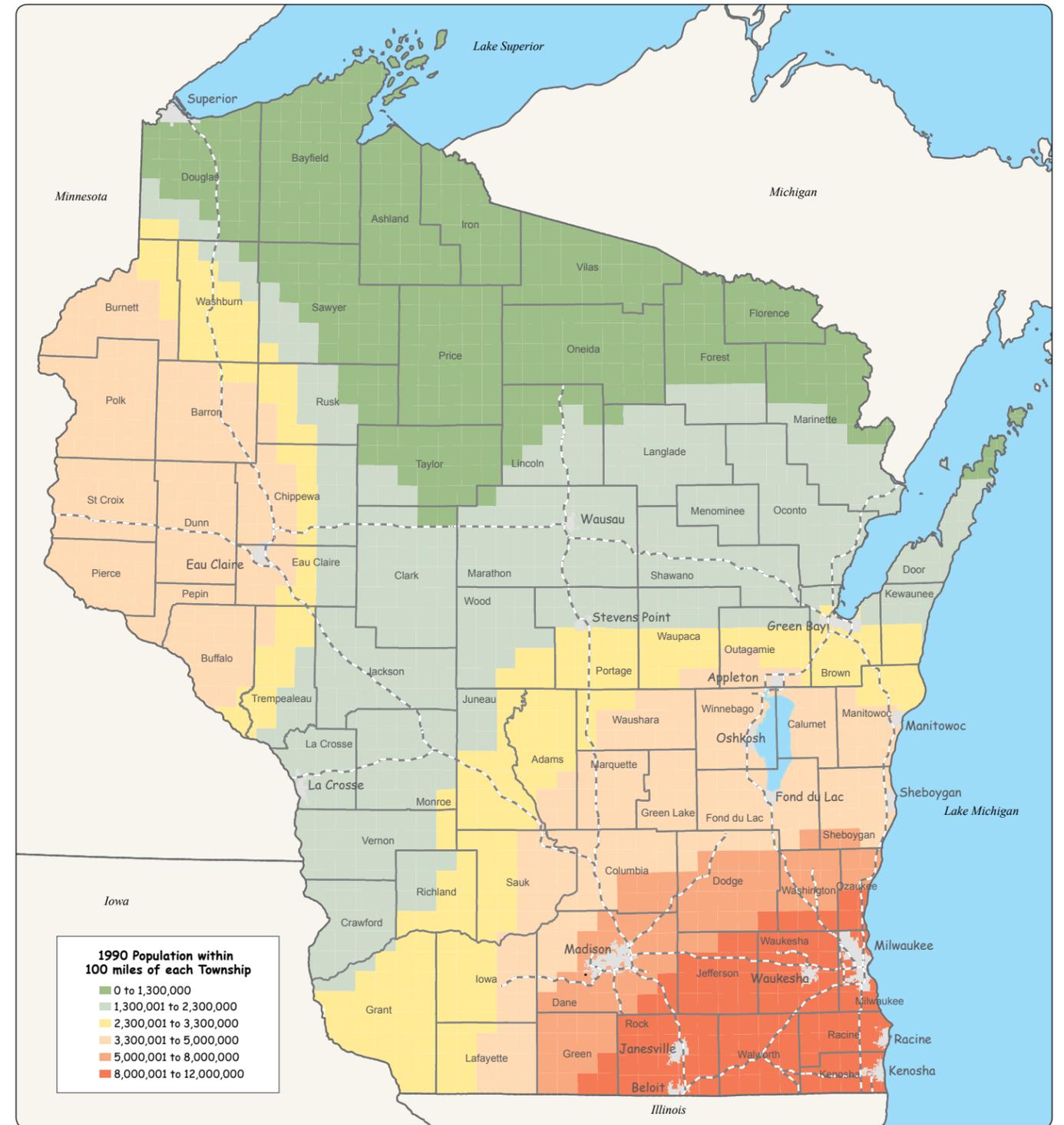


Figure 7: Percent of Wisconsin residents living within 50 miles of each township, 2000



This map shows the percent of Wisconsin residents living within 50 miles of each Public Land Survey township. A 50-mile radius circle was drawn around each township and the population values for all census block groups occurring within this circle were totaled and divided by the state's total population.

Figure 8: Midwest residents living within 100 miles of each township, 1990



This map shows the number of all residents (Wisconsin, Illinois, Michigan, Minnesota, and Iowa) living within 100 miles of each township in Wisconsin. A 100-mile radius circle was drawn around each township and the population values for all census block groups occurring within this circle were totaled.

Figure 9: A 3-dimensional view of population density in Wisconsin and surrounding states, 1990



This map shows population density within each census block group as topographic relief. The higher the "mountain" the more densely populated the area.



Haying in Lafayette County



From Bayfield to Kenosha, land use changes increasingly affect many areas of the state.

Our Land

Many factors have shaped our landscape over time, but the greatest historical event impacting Wisconsin's land and water has been the periodic advancement and melting of massive continental glaciers. Over the last 2.5 million years an estimated 12 to 15 major advances occurred, scouring away vegetation and soil, planing down mountains, and leaving behind a rolling plain covered by a layer of fertile and productive soils. Glacial meltwater fed powerful rivers that carved channels and deposited ton after ton of sand and gravel. During each interglacial period, including the present one, plants and animals—some migrating from as far away as the Ozarks, Pennsylvania, and Texas—repopulated what is now Wisconsin. The most recent advance, 25,000 to 10,000 years ago and known as the Wisconsin Glaciation, ended about halfway across the state and is a primary reason the state harbors some of the finest examples of glacial geography in the world (*Figure 10*).

The distribution and abundance of plants and animals across the state has been, and continues to be, determined by environmental factors (e.g., soil, moisture, temperature, and climate), topography, historical events, and both natural and human-induced disturbance patterns. Historically, many species reached the edge of their range in a narrow band that runs from northwestern to southeastern Wisconsin. Known as the “tension zone,” it separates the northern forest (including the boreal forest) from the southern forest and prairies (*Figure 11*).

For thousands of years before Euro-American settlement, Native Americans lived in the area now known as Wisconsin. The size of their populations and the extent to which they manipulated and influenced the landscape remains unclear, although it is likely there were differences between northern and southern parts of the state. In areas of the state more susceptible to fire, primarily south of the tension zone, native peoples used fire to concentrate game for hunting, increase game habitat, and clear paths for travel. Also, natural fires went largely unsuppressed. The result was the development of extensive plant communities—prairies, savannas, barrens, and oak woodlands—that were fire-dependent. Prior to Euro-American settlement, an estimated 40–45% of Wisconsin's land surface was covered by these

fire-dependent communities.¹⁸ Although it is likely that only a small amount of land was in agriculture before Euro-American settlement, there is archeological evidence and historical accounts of irrigation, raised beds, and other farming practices, primarily in the southern part of the state.

In what is now northern Wisconsin, native populations hunted and fished, gathered firewood, created clearings for settlements, and may have favored certain plants useful for medicine and food through cultivation and management.¹⁹ Much of the area north of the tension zone is more fire resistant and far less conducive to farming. Consequently, it is likely that the influence that native peoples had in the northern part of the state was far less than in the southern part.

The first substantial wave of Euro-American settlers, arriving in Wisconsin in the 1830s and 1840s, found a landscape characterized by extensive forests, grasslands, wetlands, and a variety of other biotic communities (*Figure 12*). Euro-Americans brought technologies of the industrial age that began more intensive manipulation of the environment. They also introduced, both purposely and accidentally, many non-native plants and animals that competed with the native species, often resulting in broad changes in ecosystem composition, structure, and function. Euro-American settlement marked the beginning of a simplification of Wisconsin's landscape and a decrease in biological diversity.²¹

For instance, nearly all of the forests in northern Wisconsin were cut between 1860 and 1910 to supply timber for rapidly expanding cities. In the absence of periodic fires, fire-dependent plant communities throughout the state, such as barrens, savannas, and oak woodlands, gradually filled in with shrubs and trees. Prairies, savannas, and many southern forests were converted to agricultural use.²²

Today, many of the major conversions of land for agriculture and forest production have slowed or ceased. Because of regulatory protection, now fewer than 500 acres of wetlands are legally filled each year. Forest cover has been slowly increasing as marginal agricultural land, particularly in the north, reverts to woods. The very small amount of prairie that remains in the state is typically located on hillsides too steep to till, on very poor soil, or within some form of protective ownership. As such, the primary

Figure 10: Extent of glacial lobes during the Wisconsin Glaciation¹⁶

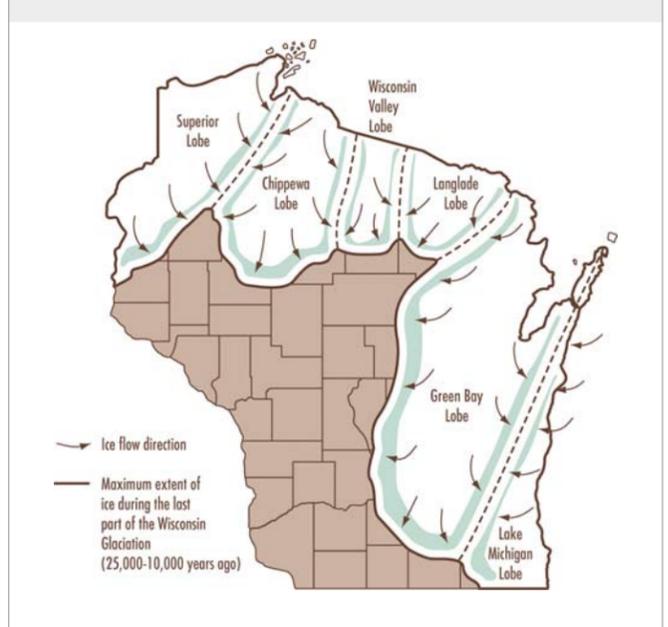


Figure 11: Location of the transition zone, adapted from Curtis¹⁷

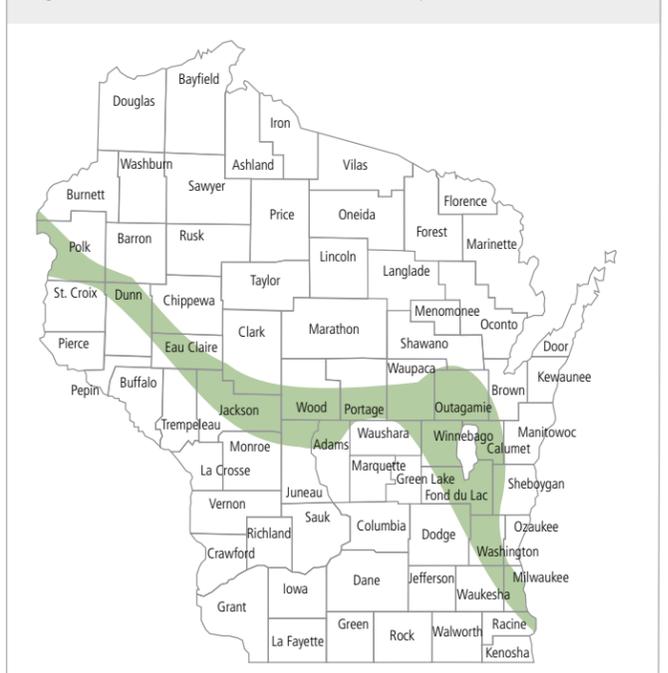


Figure 12: Vegetation during the 1850s²⁰

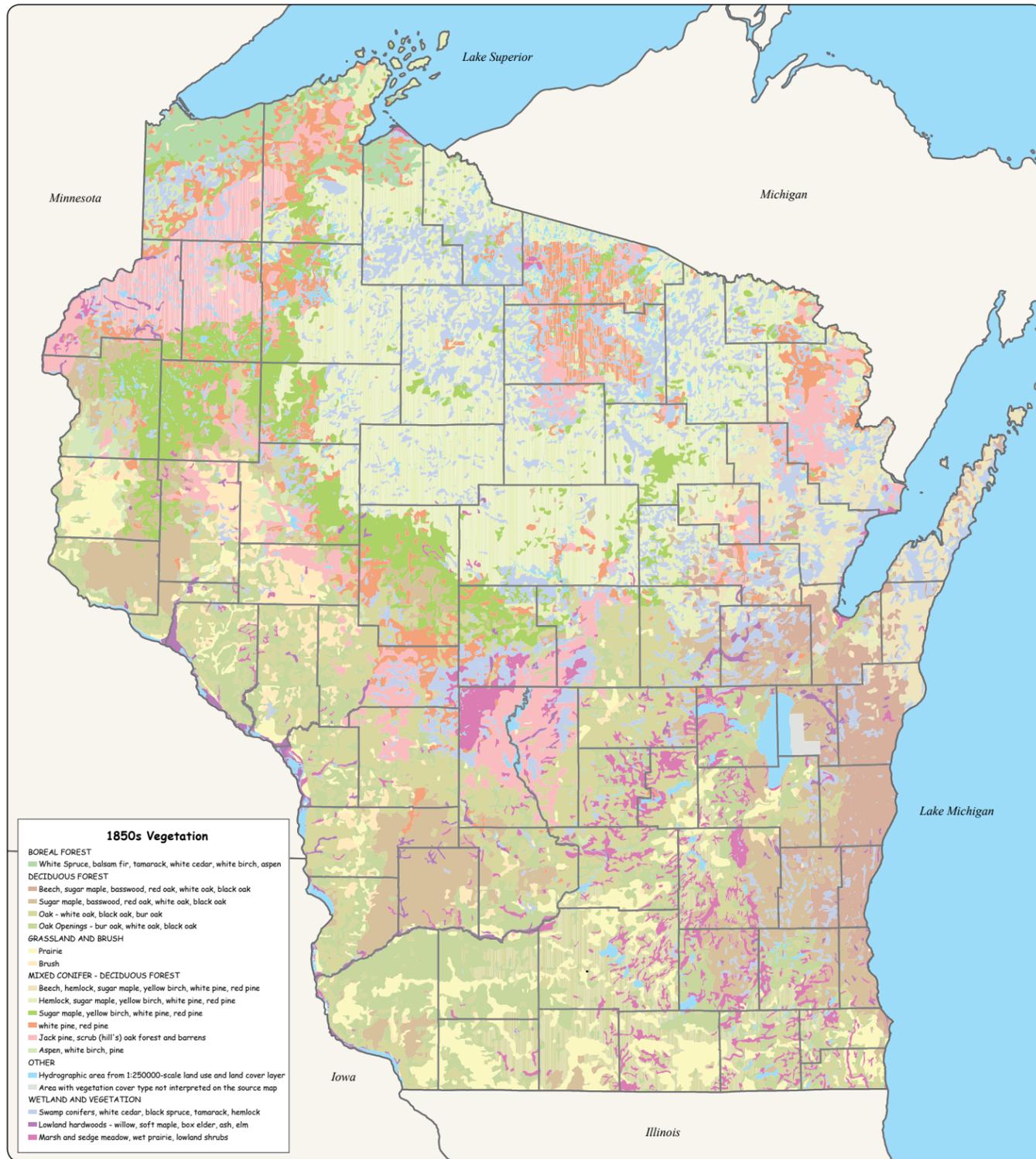
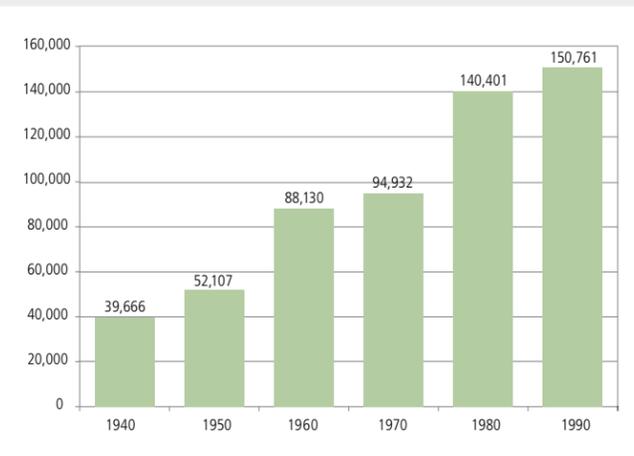


Figure 13: Vegetation during the 1990s²³



Figure 14: Seasonal and recreational housing units in Wisconsin, 1940 to 1990³⁰



threats to remaining prairie remnants are not large-scale conversions, but rather invasive (mostly exotic) species, the growth of woody plants, and home construction on hillsides and bluffs. Similarly, savannas and barrens (two natural communities for which Wisconsin plays a critical role in their long-term viability), are probably most threatened by invasive species, conversion to forest, lack of prescribed fire use, and continuing fragmentation. Recent land cover can be seen in *Figure 13*.

Although the major impacts to, and conversion of, native habitats mostly occurred before 1950, our landscape continues to be significantly altered. The changes occurring now, albeit not as dramatic as the felling of forests or the plowing of prairies, also have great and long-lasting effect. One change to native habitats that may not be readily evident to many residents is the increasing impacts caused by invasive species. Fed by our increasingly mobile society and the changes we have brought to our lands and waters, many invasive species are adversely affecting natural communities. From honeysuckle and garlic mustard to zebra mussels and Eurasian watermilfoil, invasive species have displaced native ones and disrupted ecosystems throughout the state.

However, the most pervasive and potentially damaging changes occurring now are the continuing fragmentation of habitats (now more a result of rural and suburban development than farming and forestry use), the accelerating fragmentation of ownership parcels into smaller and smaller tracts, and sprawling growth. These changes have debilitating impacts to many of our native species and the natural systems that support them.

At their root, these changes are a function of how we choose to use land and how many of us there are. As described earlier, the state's population is climbing at a relatively consistent rate. More importantly though, Wisconsinites use significantly more developed land per person now than fifty years ago. Housing has become more affordable in recent decades to a growing percentage of the population and about 70% of Wisconsinites now own their homes.²⁴ Yet, houses today are typically bigger and sit on larger lots than 50 years ago. In addition, new commercial and retail establishments tend to be larger, more spread out, and devote more space to parking than those in older neighborhoods. This reduction in the density of development, combined with our growing population, has led to a significant expansion of the amount of land devoted to our cities and suburban areas (*See Note at end of chapter: Urban land use*). Lower density developments that are spread out can also result in significant costs to local communities to provide police and fire protection, schools, water and sewer, and other services. Although new developments increase a community's tax base, research indicates that in some instances the cost of providing services to these developments can exceed the increase in revenue generated through property taxes (*See Note at end of chapter: Providing services to new developments: fiscal impacts*).

Not only are our cities growing, their "fringes" are becoming increasingly wide. A growing number of people are drawn to housing that is within commuting distance of their work but where they can "get away" from urban life. As more and more

Our Land: Implications for meeting future conservation and recreation needs

As land uses and vegetative cover in the state have changed, so has the land's ability to support Wisconsin's native plants, animals, and natural communities. Most species requiring large expanses of habitat have either been extirpated or occur in vastly diminished numbers. Future efforts that focus on maintaining large, open spaces with significant areas of native vegetation may prove effective in minimizing the number of area-sensitive species that are declining in the state. Some examples of strategies include: expanding already protected areas, connecting them together in a network, or establishing wide buffers that minimize the adverse impacts of incompatible adjacent land uses.

The ownership fragmentation, or "parcelization," of our countryside has significant implications for how the Department and others interested in conservation and recreation issues approach land protection efforts. It is our experience that ownership fragmentation often leads to habitat fragmentation, primarily through construction of new residences and the installation of associated infrastructure, such as roads and transmission lines. With new residences come demands for more gas stations, convenience stores, restaurants, and other

establishments. This conversion of land use can make efforts to implement protection strategies more difficult and expensive.

Even if parcels in an area are not developed, new owners often want to manage their lands and waters to maximize the types and numbers of species that frequent their property. In some cases, gullies and intermittent streams are dammed to create ponds, openings are cut in large woods to create food patches for game species, and small ponds are scraped out of large wetlands to attract waterfowl. Although these actions may increase the number of species found at a *specific* parcel, often they are habitat "generalists" that thrive in highly fragmented landscapes. Species that require larger blocks of forests, grasslands, and wetlands are typically displaced in areas where ownerships and habitats become fragmented.

Ownership fragmentation also makes it substantially more expensive and difficult for the Department to establish new state parks, forests, and wildlife, fishery, and natural areas. Not only is the cost of smaller parcels typically more expensive per acre than that of larger parcels, but it becomes very difficult for the Department to purchase a large enough block of land to both meet conservation goals and accommodate different types of outdoor recreation. This dilemma is magnified in the southeastern part of the state, where the demand for recreation opportunities is greatest.

Ownership fragmentation, by significantly increasing the total number of landowners, also significantly increases the demand for management assistance. As an example, over the last four years, the number of requests the Department has received for assistance in developing sound forest management plans on private property has doubled. Other natural resource agencies are experiencing similar demands. This increase in requests for assistance is, of course, positive—it shows that many new landowners want to "do the right thing" and want to better understand their options.

Many new owners of rural land, not surprisingly and quite understandably, do not allow public access to their property. They have often purchased the land for personal use and aesthetic enjoyment; allowing unrestricted public access would conflict with these goals. With a growing number of people looking for places to watch wildlife, camp, fish, off road bike, hunt, and participate in other outdoor activities, and with more land closed to public access, the result is an increase in use of public properties, particularly those close to urban centers. As anyone who has visited the Kettle Moraine State Forest, Devil's Lake State Park, or Richard Bong State Recreation Area on a summer weekend knows, overcrowding can detract from many visitors' enjoyment.

of these scattered residential developments occur in an area, the rural setting that attracted people to the area in the first place is slowly degraded, which leads some to move farther and farther into the countryside. Since most Wisconsin cities are surrounded by farms, much of this growth consumes agricultural land and is a primary reason the state has lost almost 4,000,000 acres of farmland in the last 30 years.²⁶

Concurrent with the increase in housing, commercial, and industrial development is the growth in our “developed infrastructure” (e.g., roads, schools, wastewater treatment plants, landfills, and utility lines). This infrastructure is an integral part of our strong economy and quality of life. Exact figures for how much land is devoted to our developed infrastructure do not exist, but almost 1,000,000 acres are estimated within our road network alone.²⁷

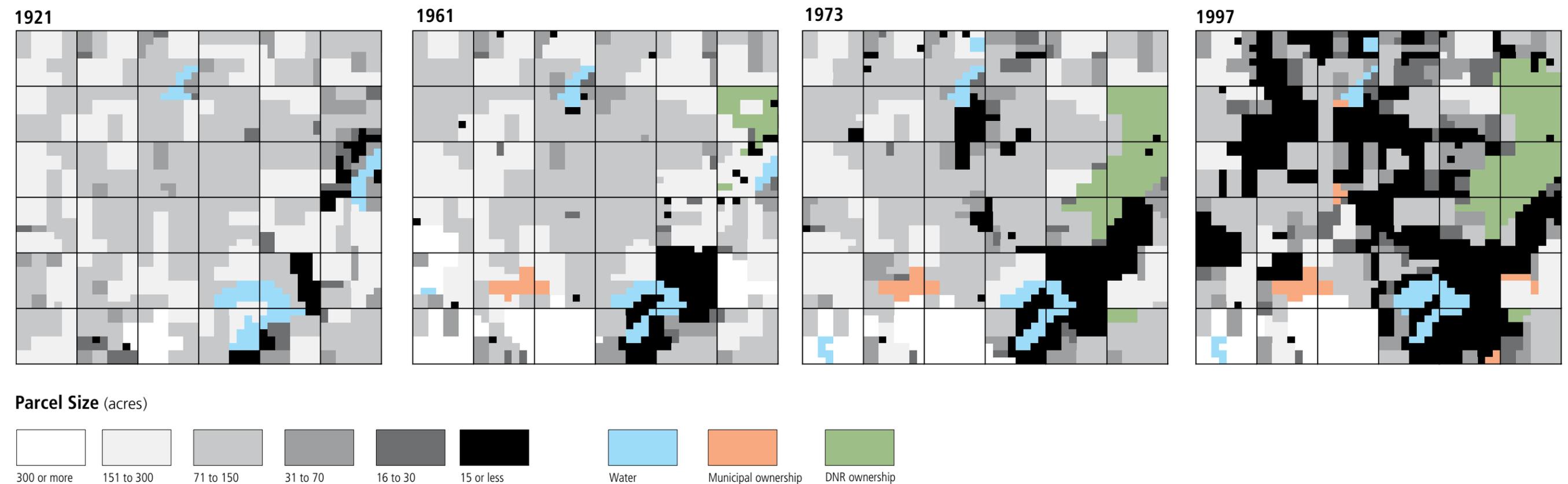
Reflecting its scenic beauty and abundant recreation opportunities, Wisconsin is also experiencing considerable growth in second home development (*Figure 14*). Although occurring throughout the state, growth in the number of homes for seasonal and retirement use is highly concentrated in northern Wisconsin, particularly along lakes. The majority of privately owned frontage on large lakes has been developed, often in 100-foot lots. As the number of available and affordable lake lots has dwindled, significant development pressure has shifted to places that, 25 years ago, few people would have considered desirable for a second home: rivers, streams, very small lakes, “farmettes,” woodlots, ridges, and hilltops. With expansions of our road network and the apparent willingness of some people to travel further distances to “get away,” even once remote

areas are now under considerable land use pressures. Often, people are drawn to the quietest, most scenic and pristine sites they can find—typically places that are of high ecological value, sensitive to development impacts, and increasingly rare.

Along with the growth in second homes has been a dramatic rise in the demand for recreational land for personal use. As a result, many former farms and large wooded tracts have been divided into 80, 40, and 20-acre parcels. As rural land is fragmented and increasingly owned by non-residents, land uses often change. In some cases, agricultural fields are taken out of production, forest and game management goals shift, and lands once open for public recreation are posted with “No Trespassing” signs. These changes can have dramatic impacts on local economies and the cultural identities of our rural communities.

A representation of our changing landscape is provided in *Figure 15*, which shows how the size of ownership parcels in the Town of Mukwonago (Waukesha County) has changed since the 1920s. The Town was dominated by farm properties ranging from 100 to 300 acres in the first half of the century. Although lands near cities, villages, and lakes had been split into smaller parcels over time, up to the 1970s, significant portions of the Town were in parcels of 70 acres or more. In the last 25 years, however, a rapid decrease in parcel size has occurred in much of the Town. The DNR began buying land in the large wetland northeast of the City of Mukwonago in the 1950s to establish the Vernon Marsh State Wildlife Area. Now “boxed in,” there is limited opportunity to expand or buffer this popular property. The same trend can be seen in many other parts of the state.

Figure 15: Changes in Parcel Size: Town of Mukwonago from 1921 to 1997³¹



Reflecting the unique roles that farmland and forests have played in our state's history and their social, economic, and ecological importance, the following discussion goes into more detail on how our farm and forest landscapes are changing and the effects these changes may have on meeting future conservation and recreation needs.



Iowa County farm

Our Farmland

Wisconsin farms substantially contribute to local and state economies. It is estimated that over 500,000 people in the state rely directly on agriculture for their jobs. Wisconsin farmers produced and marketed milk, crops and livestock valued at \$5.9 billion in 2001.³² Although the farming lifestyle is often romanticized in popular culture, in reality farming is a business subject to a variety of economic, social, and environmental forces that shape and influence decisions. Just as other business owners do, farmers and their families make choices about how to most effectively and efficiently manage their talents and capital investment—their land, machinery, buildings, and livestock. Because farming uses large tracts of land that remain primarily undeveloped, unlike many other businesses, it can also help meet some important conservation and recreation needs.

Most farms in Wisconsin are a mix of agricultural fields, pasture, scattered woodlots, and occasional creeks and wetlands. Together, these environments provide habitat for many game and non-game species. Farmland also provides valuable “open space,” allowing species to move from one area to another. And when situated adjacent to conservation lands, farms provide a buffer that eases the transition—ecologically, recreationally, and aesthetically—between our parks, forests, and wildlife, fishing, and natural areas and nearby residential, commercial, and industrial areas. Issues that affect the agricultural economy have a large impact on how land in Wisconsin is used, and will ultimately be used, and how successful efforts to meet conservation and recreation needs will likely be. This is particularly true in the southern and eastern parts of the state, where farming is the dominant land use.

The farming community has experienced dramatic changes over the past fifty years. The amount of land in farms has dropped from 23.6 million acres in 1950 to 16.2 million acres in 2001 (an average loss of 145,000 acres a year). Similarly, during those 51 years, the number of farms has fallen from approximately 174,000 to 77,000 (Figure 16). The size of the average farm steadily increased from 135 acres in 1950 to 221 acres in 1991 (it has been hovering around 210 acres for the last several years). Yet, due to a variety of economic factors, farm size has undergone a dichotomous change.

Figure 16: Number of farms and total acres in farms in Wisconsin, 1950 to 2001³³

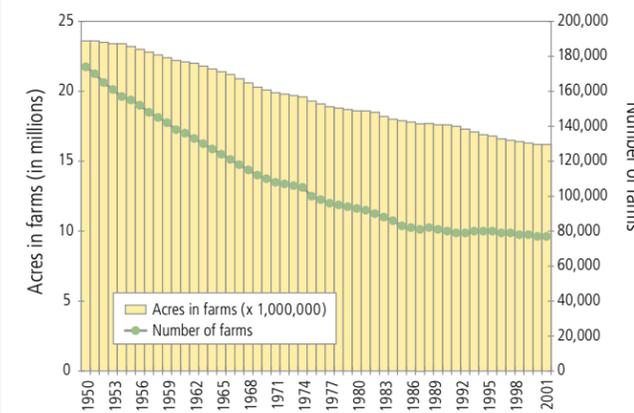


Figure 18: Total acres held by different size farms in Wisconsin, 1959 to 1997³⁶

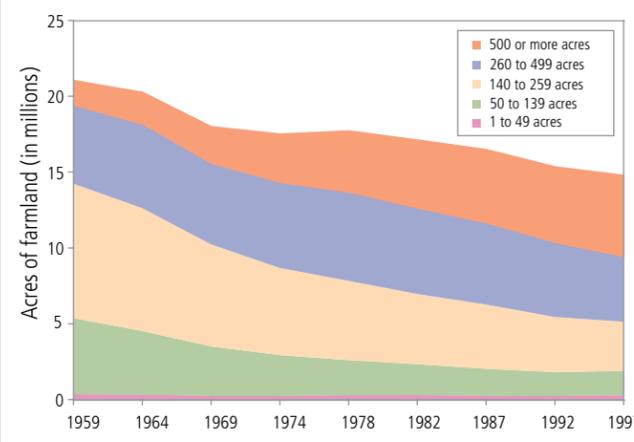


Figure 17: Number of farms in Wisconsin, by size, 1959 and 1997³⁵

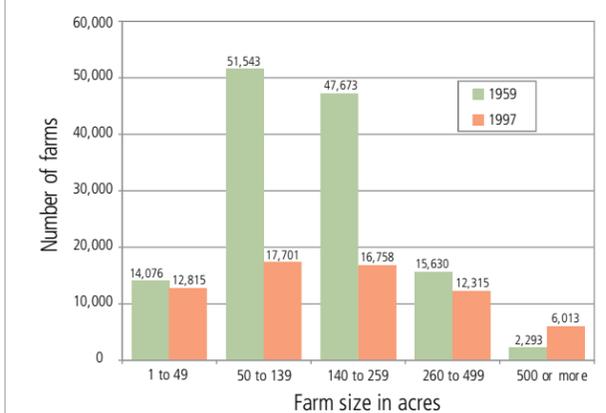


Figure 19: Acres of farmland sold and new owners' expectations for future use, 1988 to 2000³⁸



From 1959 to 1997,³⁴ the number of “medium” sized farms—those between 50 and 259 acres—fell dramatically from 99,000 to 34,000 (*Figure 17*). The number of smaller farms remained relatively constant and the number of farms over 500 acres more than doubled. This change in the number of small, medium, and large farms has led to a dramatic shift in who owns and manages remaining farmland. As *Figure 18* shows, in 1959, two-thirds of Wisconsin’s farmland was held in farms less than 260 acres. By 1997, the situation had flip-flopped; two-thirds of farmland was held in farms with 260 or more acres (and more than one-third of remaining farmland was in farms with 500 or more acres).

The distribution of small and large ownership parcels is not uniform across the agricultural part of the state. A quick look at nearly any plat book in the southern part of the state shows that the closer one is to cities, the more likely it is that ownership holdings are smaller. Rural areas within commuting distance of cities are typically a mix of mid-sized parcels (40 to 260 acres, many of which contain some active farm fields), smaller parcels (5 to 20 acres, many of which have homes on them), and scattered subdivisions. Larger ownerships (over 260 acres) tend to be distant from urban centers.

When residential developments begin to spread into an agricultural area, changes occur that are often self-perpetuating. Some new non-farming residents are not prepared for the practices that accompany most farm operations. Manure spreading, loud machinery, chemical application, and other day-to-day activities sometimes lead to conflicts between new residents and farmers. Some new non-farming landowners, particularly those that do not rely on farmland as a source of yearly income, decide not to rent out their farm fields to nearby farmers. If landowners elect not to rent out their pasture or cropland, nearby farmers are forced to travel farther, pay higher rents, or both, to find additional lands to farm. Between 25 and 30% of farmland in Wisconsin is rented, and many farmers need to rent cropland and pastures in order to keep their operations economically viable.³⁷ Hauling machinery long distances on roads presents serious safety and traffic flow problems.

Owners of newly acquired farmland are surveyed to determine how they anticipate using the land in the future. As *Figure 19* indicates, when asked what their expectations are for their newly acquired farmland, owners of 27% of the farmland sold in 2000 already had decided to divert the land to other uses. As new developments occur in areas once dominated by agriculture, the value of land typically climbs. If the price of farmland far exceeds its “farming value,” farmers cannot purchase or rent an adequate land base for their operations.

Together, these social and economic pressures can often lead farmers to sell their land, sometimes cleaving off pieces over time or, in other cases, selling their entire business operation and their land base. In either case, as the number of farms and the amount of land in farms declines, the area’s service industry that supports the agriculture economy—seed, chemical, and implement dealers, mechanics, veterinarians, farm credit organizations, and others—also declines, thus exacerbating the difficult conditions for remaining farmers.

Combined with the aging population of our farmers, this economic situation is likely to result in rapid changes to our rural countryside. In a 1999 study, when asked to estimate how long they would be able to continue farming given their financial situation and age, one-third of Wisconsin’s farmers did not expect to be farming in five years.³⁹

It is the Department’s general policy not to buy prime agricultural land. However, in the course of buying land to meet conservation and recreation objectives, farmland is occasionally purchased. The farmland acquired is almost always a part of a larger land holding of forest, grassland, or wetland. In some cases, the farmland is restored to prairie, savanna, wetland or forest; in other cases, the land is resold or rented out to area farmers. Over the past decade, the Department has purchased on average an estimated 2,000 acres of cropland a year (most of which is not classified as prime agricultural land). This represents less than 2% of the cropland diverted from agricultural operations in the state.⁴⁰

Our Farms: Implications for meeting future conservation and recreation needs

To be sure, farming practices can adversely impact lands and waters and the habitats that support the state’s native plants and animals. Although dramatic improvements have been made in many watersheds, non-point pollution from some farms continues to degrade waterbodies. Pesticides and fertilizers have contaminated groundwater and some drinking water sources. Intensive corn-soybean rotations have replaced fields of small grains and pasture and thus displaced many grassland-dependent species. However, as history has shown, these are solvable problems. What farms provide, even farms that adversely impact some natural resources, are large blocks of undeveloped rural land—a critical component to meet conservation and recreation needs.

Farmers benefit when they have some level of assurance about the future: that an adequate amount of farmland will be available in their area, that an adequate farm base will be maintained to support the local farm service industry, and that their ability to go about day-to-day farming operations will not be impaired by new residential or commercial (non-agriculture related) developments.

The agricultural and conservation communities share many goals, but maybe the most important is the desire to maintain large areas of open space. Future efforts to protect places to meet conservation and recreation needs might prove most effective if they are dovetailed, where appropriate, with efforts to protect areas most important to maintaining an agricultural economy in the state.

An example of collaboration between the farming and conservation communities, and what may become a template for future projects, can be seen at the recently initiated North Branch Milwaukee River Wildlife and Farming Heritage Area. Located about 30 miles north of Milwaukee, this area is under tremendous development pressure, yet still retains many productive family farms and is one of the largest blocks of open space left in the region. What makes the North Branch project unique is the Department’s intent to integrate working farmland into the larger conservation strategy. The Department seeks to buy (but not use) the “development rights” on farmland within the project area as a way to help farmers liquidate a large portion of their land’s value. It is the Department’s hope that this strategy will provide farmers another, more attractive, option than selling their land for development and will help maintain an adequate base of farmers in the area.

The Department also expects that helping maintain a large base of farms in the North Branch area will directly and indirectly help protect the many high quality wetland and forest remnants that occur primarily along the North Branch of the Milwaukee River and its tributaries. These wetlands and forests provide substantial wildlife habitat and offer the potential to meet the great demand for outdoor recreation in the southeastern part of the state.

Clearly, farmland provides many benefits to conservation and recreation lands, but it is not a one-way relationship. Conservation and recreation lands can provide many benefits to farmland, too. Just as farms can buffer and ease the transition from natural areas to developed areas, lands devoted to conservation and recreation uses can help minimize conflicts between developed areas and farmland. As mentioned before, as residential development becomes more and more scattered through a farming community, for a variety of reasons many farms are slowly “squeezed out.” One solution may be to target the protection of places to meet conservation or recreation needs in a way that helps buffer important farming areas.

Our Forests

Wisconsin's forests have experienced dramatic changes since the last glaciers melted. Early human populations had a relatively slight impact on forest species and ecosystems through their planting, harvesting, burning, foraging, hunting, and trapping activities. At the beginning of Euro-American settlement, an estimated 20 to 30 million acres of forested land covered the state.⁴¹

Forests south of the tension zone were comprised primarily of oak and hickory in dry areas, maple, basswood, and cherry in the moist areas, and elm, ash, and cottonwood in lowlands. Many of these forests, particularly those in the glaciated southeastern part of the state, were burned and cleared by early Euro-American settlers for agriculture. Former large wooded tracts were reduced to small fragments as farmers reaped the benefits of the rich soil. Forests in the Driftless Area fared better, although they were also heavily logged.



ROBERT OULLEN

Beautiful fall colors

Before Euro-American settlement, the northern forest harbored a significant, and in many places a dominant, conifer component. Hemlock, white and red pine, tamarack, and cedar were all integral parts of the forest. By the late 1800s, the rapidly growing cities of the Midwest were consuming huge volumes of lumber. After much of the forest in eastern states was depleted, attention focused on the great pine forests of northern Wisconsin. Following the Civil War, logging dramatically increased and the forest industry became a vital component of the state's economy. Early loggers used rivers to move huge rafts of pine logs to the many sawmills that sprang up. When the old-growth pinery dwindled and railroad shipping became available, trains were used to move the heavier hardwood logs to mills.

Logging peaked in the 1890s when an estimated 3.5 billion board feet of timber were harvested annually (enough to run a 2"x4" around the earth, forty times). In many cases, the forests were "high-graded" by removing the largest, healthiest, most valuable trees. Although the adverse effects of this practice were not understood at the time, the remaining tree species and individuals left to re-seed the forests were not representative of the overall forest composition, were less dominant, and in many cases less healthy, than those that were removed. Fires, fed by the enormous quantities of slash (branches, treetops and other debris) left behind following logging, were both unintentionally set by railroad engines and intentionally set by settlers attempting to clear land for agriculture. Together, these types of fires burned wide swaths of the north including many regrowing forests, especially white pine.

After the valuable timber had been removed, the logging companies sold much of their land to speculators who, in turn, sold the land to settlers enticed to travel north and farm these cut-over lands (See Note: *A brief history of Wisconsin's public forests, page 33*). These attempts at farming largely failed, and a substantial percentage of the land was abandoned and reverted to county ownership due to tax delinquency. These lands became the foundation of what would become the County, State, and National Forests in Wisconsin. Through the combined efforts of the counties and state agencies, much of the northern part of the state has been reforested and provides many economic, ecological, and social benefits.

In 1936, the first statewide forest inventory was conducted and found a very young forest; not surprising since this was about forty years after the peak of the lumbering (Figure 20). Aspen and birch were prevalent and covered 35% of forested land, more than any other cover type. Over the next sixty years, forest inventories revealed changes in coverage, age, and species composition. The overall amount of forested land has been slowly increasing (to almost 16 million acres — 46% of the state), due to reforestation efforts and the gradual natural succession of idle farmland back to forest. Maple-basswood forests are now the most prevalent forest type.

Although the amount of forested land has rebounded, particularly in the north, the tree species present, their distribution and relative abundance, and their age structure now all differ markedly from 150 years ago. In the northern forests, hemlocks have been significantly reduced from their former abundance and white pines are virtually absent as a dominant overstory tree (although well represented as an understory species), and several others are far less common than before.⁴³ Recent research indicates that with the explosive growth in the state's deer herd (from 400,000 in 1955 to over 1.5 million today) has come the progressive decline in tree regeneration and understory plant diversity in many forests.

Despite the changes that have taken place in the northern forest, their regrowth and management has allowed many species to flourish. For many, such as wolves, eagles, and many Neotropical migrant birds, these forests support source populations that supplement populations in areas with lower quality habitat. In particular, the forests in northern Wisconsin are part of a larger swath that now supports the highest bird species richness of any region north of Mexico (Figure 21). Maintaining the integrity of this forested landscape will be critical in maintaining the diversity of breeding birds in the region.

The southern forests remain highly fragmented, with some community types — notably oak openings — virtually absent. Although northern forests have largely regrown since the cut-over, no large scale conversion of farmland back to forest has occurred in the south. With ownership and land use fragmentation of remaining southern forests have come increased problems with the loss of species

Figure 20: Acres of forest types in Wisconsin, 1936–1996³⁹

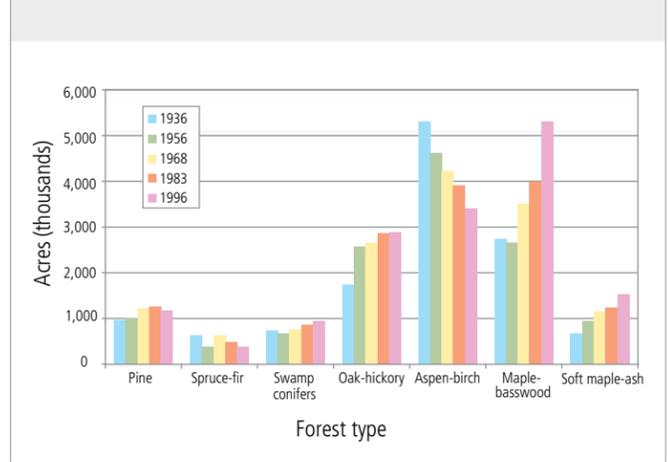


Figure 21: Breeding Bird Survey strata of diversity⁴¹

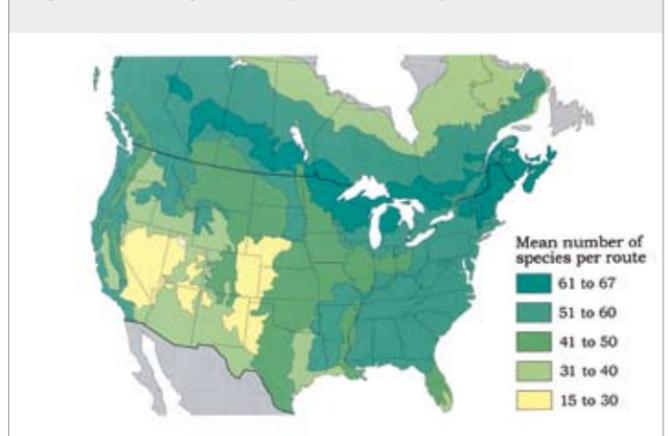
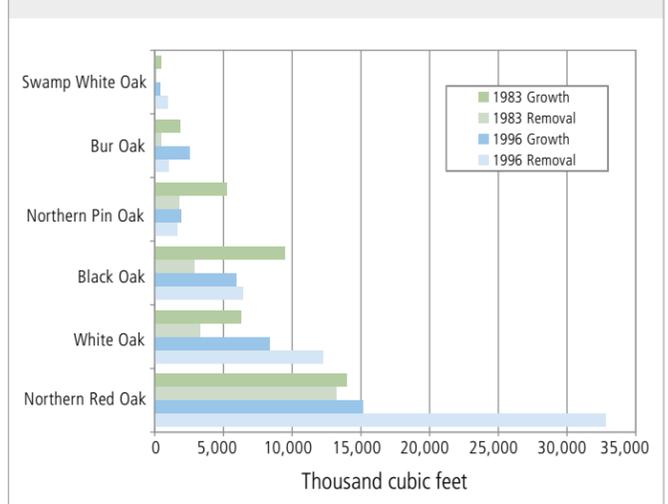


Figure 22: Growth and removal of oaks in Southern Wisconsin, 1983 and 1996⁴²





Tapping maple trees up north



ATV riding in Wisconsin

requiring larger blocks of habitat, the increase of habitat “generalists,” and the introduction of several invasive plant species which often limit regeneration.

Native and exotic insects and disease-causing organisms have also had a major impact on the distribution and abundance of many native tree species. White pine blister rust, Dutch elm disease, butternut canker and the gypsy moth are all examples of exotic pests that have affected the health and complexity of forest ecosystems. The butternut canker alone has infected an estimated 90% of Wisconsin’s butternut trees. As with invasive species, the mobility of people and commerce today appears to play a role in the increasing frequency with which injurious insects and disease-causing organisms enter the state.

The total timber volume in Wisconsin continues to expand as growth outpaces harvest over most of the state. From 1983 to 1996, sawtimber volume increased 1.68 billion board feet with about 60% of this growth offset by harvests. However, for some commercially valuable species such as red oak, harvest currently far exceeds growth in the southern part of the state (*Figure 22*).

Possibly the most striking change occurring in Wisconsin’s forests now is the rapid change in ownership pattern of the private, non-industrial forest. Some examples of this change include:

- » The number of private forest owners has doubled in the last forty years to an estimated 270,000.⁴⁶
- » Every year almost 3,400 new parcels are created within forest land.⁴⁷
- » The average size of privately owned forest parcels in southern Wisconsin is now just over 30 acres.⁴⁸
- » 90% of forest owners own fewer than 100 acres.⁴⁹
- » Almost 20% of forest land owners acquired their property in the last seven years.⁵⁰

Our Forests: Implications for meeting future conservation and recreation needs

Much of the northern part of the state has been reforested, and significant portions are within some form of protective ownership. As such, the swath of forests running across northern Wisconsin (and into northern Minnesota and Michigan’s Upper Peninsula) offers one of the Midwest’s best opportunities to manage an ecosystem on a large landscape scale.

Connecting the many large blocks of forest currently protected may help ensure that wide-ranging animals can maximize their populations and minimize the adverse impacts of isolation.

The forests south of the tension zone are heavily fragmented. To the degree possible, efforts to “block in” these fragments to establish larger wooded tracts will benefit many species. Particularly in the south, there is a need to restore community types that have been widely reduced in their abundance and distribution—notably oak savanna and oak woodland.

Many good quality lowland forests occur along major rivers. There is concern, however, that these ecosystems have been destabilized by the loss of the structurally important American elm and are now vulnerable to invasion by reed canary grass. As a result, there appear to be significant regeneration problems in many lowland forests. Although species diversity, composition, and distribution may be significantly

different from pre-settlement conditions, these winding—sometimes narrow, sometimes wide—forest corridors offer many opportunities to connect isolated blocks of habitat, improve water quality, maintain fish and wildlife populations, and provide various recreation opportunities.

We do not anticipate the rise in the number of forest landowners to reverse course in the foreseeable future. As such, the Department and others will need to continue to find ways of efficiently and effectively distributing information and technical assistance on forest management practices.

With changing ownerships come many other issues. Many of today’s new forest owners are from urban areas and own land primarily for personal recreation use and aesthetic enjoyment. They tend to be less interested in allowing public access to their property (in 1986, an estimated 32% of forest owners allowed open public access to their woodland; by 1997, that figure had dropped to 21%).⁵¹

Forests owned and operated by forest products companies are also undergoing rapid changes as local, national, and international economics change. *Additional discussion on these large blocks of land is provided in Part II, Chapter 5: Statewide Places and Needs.*

Our Wetlands

Wisconsin has a rich diversity of wetlands that play a critical role in our environmental quality and ecological health. Examples of wetlands include those along rivers and lakeshores, deep- and shallow-water marshes, ephemeral wetlands, sedge marshes and meadows, bogs, beaver ponds, fens, shrub wetlands, and man-made wetland impoundments. Wetlands are found throughout the state, although the largest concentrations are in northern, eastern, and central Wisconsin (Figure 23). In the southwestern, unglaciated portion of Wisconsin, wetlands are usually found only along rivers.

Compared to other ecosystems, wetlands have a high rate of productivity allowing them to support an abundance of plant and animal life. Wetlands provide breeding and non-breeding habitat for a great variety of birds, mammals, herptiles, and invertebrates in this state. For example, about 1/3 of Wisconsin's endangered and threatened plants and animals depend on wetlands for some or all of their life cycles.⁵⁵ Wetlands have long been recognized for their importance to migrating birds, particularly waterfowl and shorebirds. Of Wisconsin's 370 species of resident and migratory birds, almost 40% live in, or extensively use, wetlands. In addition, wetlands often provide critical spawning habitat and support the productivity of many fish species. Coastal marshes and meadows along the Great Lakes shoreline are particularly valuable for fish and wildlife. Wild rice stands have played, and continue to play, a central role in Native American culture.

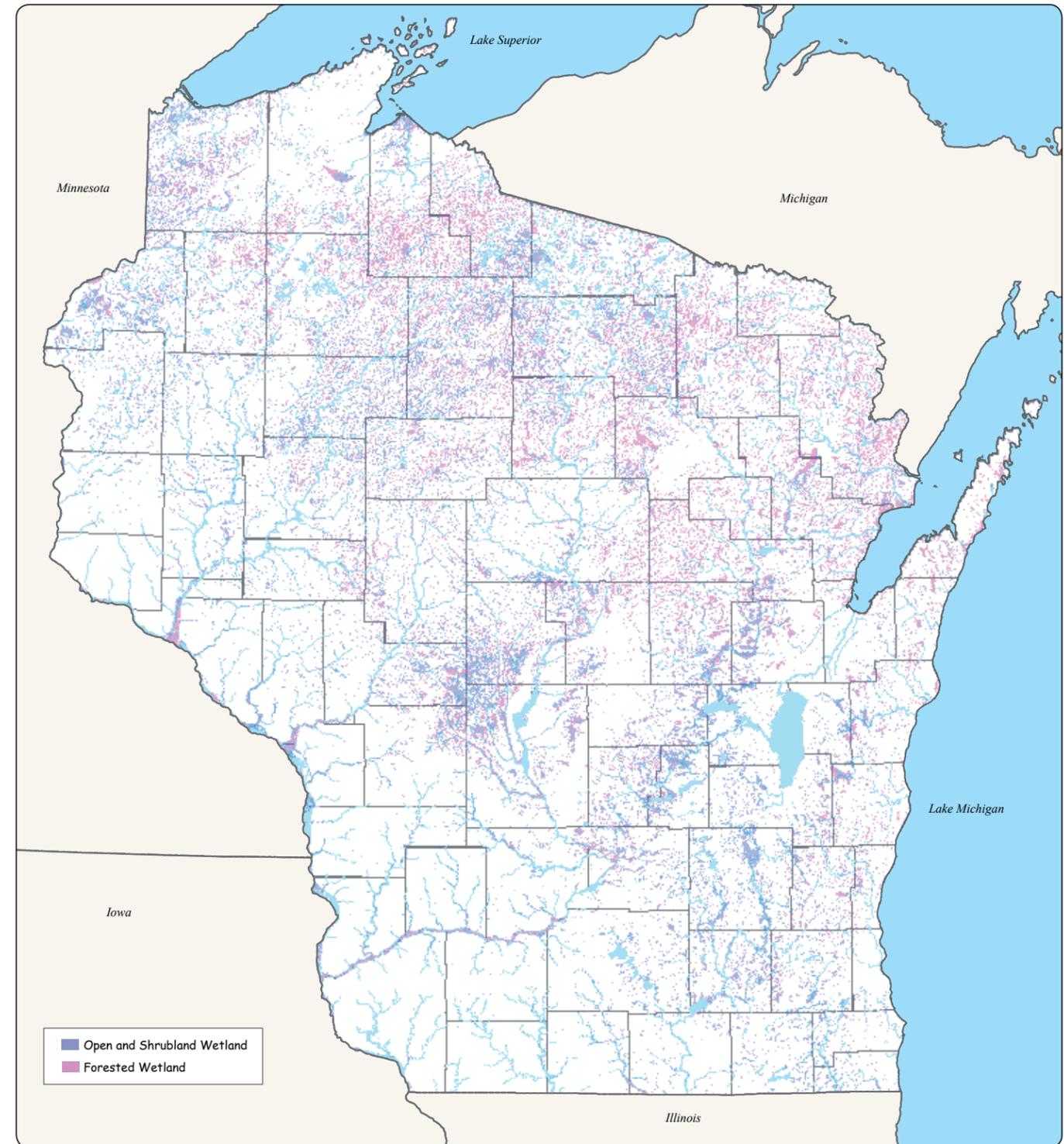
Wetlands serve other important environmental and ecological functions, such as retaining water during floods and trapping sediments and nutrients. Wetlands play a very important part in the hydrology, water quality, and functioning of aquatic ecosystems across the state. Wetlands along rivers, lakes, and the Great Lakes provide critical habitat for many species as well as important ecological functions.⁵⁶

In addition to these environmental and ecological values, wetlands offer recreation opportunities. Although wetlands cannot support the variety or intensity of recreation activities that uplands can, they do provide some unique and popular outdoor opportunities. Waterfowl hunting and fishing are common recreational pursuits in open and emergent wetlands. Bird watching, canoeing, nature study, trapping of aquatic furbearers, turtles, and frogs all take place in a variety of different types of wetlands. Large open wetlands also have an aesthetic appeal for many people, much like lakes and other water bodies.

Almost 10 million acres of wetlands were once present in Wisconsin. By 1940, nearly 8 million acres remained, but improvements in drainage technology in the 1940s coupled with massive federal subsidies to convert wetlands to agricultural use led to large losses through the 1980s. In response to the growing body of evidence highlighting the adverse impacts this large-scale loss of wetlands was having on the environment, federal policy shifted dramatically in 1985. Replacing incentives to farm wetlands with financial penalties for doing so, the 1985 Farm Bill's "Swampbuster" provision greatly slowed wetland conversions. Soon after, in 1991, the state adopted wetland water quality standards that also dramatically slowed direct wetland losses.

Although the rate of wetland dredging and filling has slowed considerable, the state's remaining wetlands, estimated at approximately 5 million acres, still suffer from a number of impacts. Wetlands throughout the state are affected by the consequences of past fragmentation, invasive species, impaired hydrologic functions, urban and agricultural runoff carrying sediments and pollution, water level manipulation, or other factors.⁵⁷

Figure 23: Wetlands in Wisconsin, mid-1990s⁵⁴





Catching frogs with your buddies—priceless

Our Wetlands: Implications for meeting future conservation and recreation needs

Wetlands are offered some level of protection through federal, state and local regulations. These regulations are primarily designed to prevent direct wetland losses from filling. Current regulations, however, do not offer the same level of protection to prevent wetland drainage and other harmful impacts. Ditching of wetlands to drain them, excavation of wetlands to construct ponds, or the spread of invasive species, such as purple loosestrife and reed canary grass, continue to degrade wetlands. And, of course, regulations do not provide for public access to wetlands.

We believe that although regulations have an important role to play in protecting wetlands from direct losses, other protection approaches will be critical in maintaining both their functional values and public access. Because constructing buildings within wetlands is generally prohibited by regulations that limit filling, purchasing development rights in wetlands will be of limited value as a protection tool. However, many other opportunities exist, some of which might be:

» Develop outreach and technical assistance programs for wetland owners and managers focused on how to avoid and minimize impacts, address invasive species, preserve wetland functions, and restore past conversions and impacts.

- » Establish incentives, such as property tax reductions, to encourage sound and sustainable wetland management.
- » Work with farmers to limit adverse impacts from agricultural operations. As an example, there appear to be opportunities to collaborate with cranberry growers to meet some conservation goals on their large upland and wetland holdings.
- » Encourage landowners to enroll property in the “Farm Bill” programs (Wetland Reserve Program, Conservation Reserve Program, and Conservation Reserve Enhancement Program).
- » Acquire key parcels to protect biological diversity and provide public recreation opportunities.

Our Waters

Wisconsin's water resources play a vital role in the state's economy, ecology, and way of life. With over 44,000 miles of rivers and streams, over 15,000 lakes, 800 miles of Great Lakes shoreline, and over 250 miles of Mississippi River frontage, Wisconsin lives up to its Ojibwe name of "gathering place of waters." We rely on water for many aspects of our day-to-day lives (See *Figure 24*). Our lakes, streams, and rivers provide countless hours of enjoyment for residents and visitors alike. Without question, the quality and quantity of our water is one of Wisconsin's most distinguishing characteristics and valuable resources.

As with our upland landscape, our waters have experienced many changes over the years. Water quality in many of our larger streams and rivers has been steadily improving as pollution from "point" sources (primarily industrial and municipal wastewater discharges) has been substantially lowered since the 1970s.⁵⁹ The fisheries of many of these waterbodies have dramatically rebounded and now support robust populations of many popular game species. It is difficult for many younger residents to believe that in the 1950s the middle stretches of the Wisconsin River were so polluted that virtually no walleye, bass, or northern pike fishery existed.

Pollution problems still persist, though. Several waterbodies, most notably the Lower Fox River, remain the focus of clean up and remediation



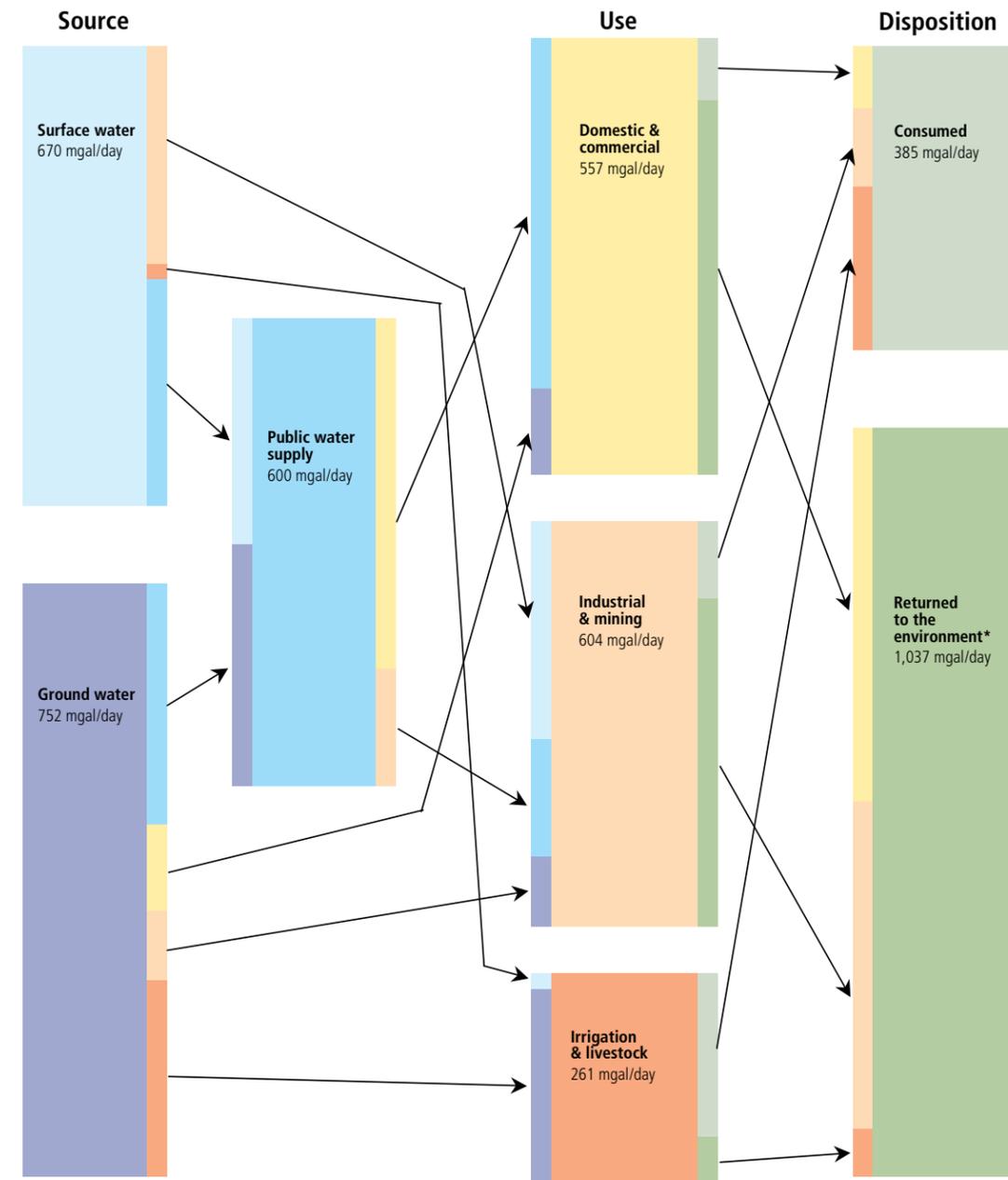
More and more, communities are labeling storm sewers to discourage people from dumping any materials that might pollute the water.

efforts following decades of extensive discharges of polluted materials. And, although the quantity and toxicity of discharged pollutants have been drastically curtailed over the last 15 years, in 1999, more than 3.5 million pounds of toxic materials were legally discharged into Wisconsin waters.⁶⁰ Several public sewage treatment plants continue to struggle in their efforts to meet growing demand.

However, in many ways, a more challenging, complicated, and damaging form of pollution comes from "non-point" sources. The sediments, nutrients, and toxic materials that wash off farm fields, city streets, construction sites, parking lots, and barnyards have degraded many surface waters and entered some of the state's groundwater. Primarily due to impacts from non-point sources of pollution, 44% of Wisconsin's river miles and 61% of lake acres recently assessed do not fully support the fish and other aquatic life uses they should be able to support.⁶¹ In response to public concerns about this situation, the State Legislature recently passed legislation that seeks to significantly reduce non-point pollution.⁶²

Urban areas also significantly affect the quantity and base flow of waters in their watershed. Roads, parking lots, rooftops, and other impervious surfaces divert rain and snow to storm sewers and roadside ditches that drain directly into streams, rivers, and lakes. Because impervious surfaces also prevent precipitation from seeping into the ground and replenishing groundwater supplies, the base flow of nearby streams and rivers often drops. As a result, these streams and rivers experience widely fluctuating flows — higher flood waters and lower low flows during periods of drought. This can lead to a loss of habitat, increases in water temperature, and a decrease in water quality. Underwood Creek, which flows through Wauwatosa and has an estimated 20% of its watershed covered in impervious surfaces, is an example — its volume has varied from 2 to 7,500 cubic feet per second over the last several years. Recent research has found that once the impervious surfaces of a watershed exceed about 8%, the area's streams, rivers and lakes begin to markedly lose their ability to support species requiring high water quality.⁶³ Some examples of the amount of impervious surfaces in Milwaukee County can be seen in *Figure 25*.

Figure 24: Water Use in Wisconsin, 1995⁵⁸



Note: This graphic does not include water used in the production of electricity from coal, gas, or nuclear plants. The amount of water used in these facilities (5.8 billion gallons/day) is more than four times greater than all other uses combined, of which 99% is returned to the environment. In addition, an average of 51 billion gallons/day from flowages pass through turbines that generate electricity. Including these uses in this graphic would make it difficult to see the other uses of water in the state.

*Includes water that passes through wastewater treatment facilities.

Our Waters: Implications for meeting future conservation and recreation needs

Clearly, protecting land along our lakes, rivers, and streams is of utmost importance in both protecting the state's biological resources and providing satisfying outdoor recreation for Wisconsinites and our many visitors. Not only are shorelines of native vegetation critical to maintaining our wealth of aquatic species, but water-based recreation is, for most folks, central to enjoying the outdoors.

We will likely continue to address many pollution-related issues by watershed (Figure 27), through a combination of regulations, incentives, and land protection strategies. One of the most effective ways to reduce non-point pollution, particularly sediments, from entering our waters is to maintain permanently vegetated buffers along our

streams, rivers, and lakes. Even relatively narrow buffers, if appropriately managed, have been shown to significantly reduce the amount of sediment, nitrogen, phosphorous, and other chemicals draining from farm fields, lawns, and construction sites.⁷¹ Improving the water quality of streams, rivers, and lakes (particularly Lake Michigan) has a direct impact on the large percentage of our residents that derive their drinking water from surface water sources. Efforts to improve the quality of surface waters in these watersheds will minimize treatment costs. Protecting wider corridors along long stream and river corridors could provide a number of other ecological benefits, including facilitating the movement of native species between protected areas.

Although precipitation that falls throughout a watershed contributes to groundwater quantity and quality, certain areas supply a far greater percentage than others do. These "groundwater recharge areas" can be large or small and can

occur many miles from where ground-water is removed for use or is naturally discharged as springs. Incorporating these recharge areas with other land protection objectives will likely prove increasingly important in the future.

As the demand for water-based recreation has increased and the price of waterfront properties has escalated, it has become significantly more difficult for local governments, agencies, and organizations to provide places that accommodate a variety of demands. As the popularity of both motorized and non-motorized boating has increased, conflicts have risen. One issue that all users can agree on is the desire for clean, clear water for swimming, fishing, paddling, sailing, boating, and other uses. Future land protection measures that focus on maintaining and improving water quality and providing access to larger stretches of lake and river shoreline will likely be most popular and productive.

waters have been transformed. Examples of some of the most problematic species include the rusty crayfish, purple loosestrife, Eurasian watermilfoil, and zebra mussels. A number of invasive species are currently found in Lakes Michigan and/or Superior—including the spiny water flea, round goby, ruffe, and white perch—and could invade inland waters.⁶⁶

In a place blessed with an estimated two quadrillion gallons of groundwater, it seems improbable that parts of the state are experiencing groundwater shortages. But, there is growing concern about the overall availability of good quality groundwater for municipal, industrial, agricultural, and domestic use and for adequate baseflow to our lakes, streams, and wetlands. Groundwater problems have occurred naturally (from drought and bedrock structures that yield low volumes) and from human activities (excess withdrawal and land use activities limiting infiltration rates). Parts of north-central Wisconsin are underlain by fractured crystalline rocks that yield sufficient groundwater for domestic wells but not for large water supply wells.

Largely due to groundwater pumping, there have been substantial declines in groundwater levels in the three most populated areas of the state—southeastern Wisconsin, Dane County, and the Lower Fox River valley (*Figure 26*).

When groundwater levels are lowered many problems can arise. Pumping costs are increased because pumps must lift water higher. Wells often yield less water and the baseflow of groundwater into streams, springs, lakes and wetlands can slow, cease, or even reverse course. As groundwater levels drop, underground areas are exposed to air, which can lead to the oxidation of some minerals. This can lead to serious water quality problems, for example with arsenic. When covered with groundwater, underground deposits of this toxic mineral are stable and are not soluble (that is, they do not dissolve in the water). However, when exposed to the air, arsenic oxidizes and is then able to dissolve in water. If precipitation filters down through these deposits, or if the groundwater rises back up, the arsenic can enter and contaminate the groundwater.

The southeastern part of the state provides an example of the impacts that excess groundwater pumping can have. The potentiometric surface (the level to which water will naturally rise in a well that is cased in an aquifer) was near the land surface and in some cases above the land surface when pumping began in the 1880s. Since then, the potentiometric surface has dropped by as much as 350 feet, and as a result, the flow of groundwater has reversed. Water from Lake Michigan now moves through the bottom of the lake and into the aquifer under Milwaukee.⁶⁸

Despite the many challenges that our waters face, they remain as important a component of our quality of life and as popular a recreational asset as ever. The number of vacationers flocking to open water, anglers wading trout waters, paddlers running rapids, and boaters cruising lakes and flowages continues to rise. Boat registrations in Wisconsin have nearly doubled since the 1960s to 575,000 in 2001. Registrations of personal watercraft (jet ski-like machines) have exploded from 6,500 in 1991 to 30,000 in 2001.⁶⁹

The demand for public access to water has dramatically increased and become significantly more expensive to accommodate. The price of undeveloped lakefront in the northern part of the state increased 100 to 400% from 1990 to 1994, with lots on lakes in Vilas County routinely selling for more than \$1,000/foot. Residential lots on Lakes Michigan and Superior are often more expensive. These prices, not surprisingly, are beyond the means of many local governments and non-profit groups seeking to protect shoreline for conservation and recreation purposes. The Department, too, has difficulty financing and justifying such high cost acquisitions.

Not surprisingly, these prices have pushed many to look elsewhere for locations on which to build vacation or retirement homes. A popular "second choice" has been along many of our high quality rivers and very small lakes. Shoreline development has had a profound impact on the ecological diversity, aesthetic appeal, and recreation use of our state's waters. (*See Part II, Chapter 5 for a more in-depth discussion on lakes and shoreline development.*)

Our Ecology

Although several ecological issues have been covered in the preceding discussions of our land and water, a more in-depth assessment of how ecological conditions in Wisconsin have changed over time is provided here. The following discussion is based upon the 1995 Department report titled, *Wisconsin's Biodiversity as a Management Issue*.⁷²

Today, Wisconsin's landscape reflects a high degree of human use. It is a mosaic of urban areas (cities, towns, suburbs), production areas (farms, mines, industries, commercial forests), multiple-use areas (parks, lakes, public forests), and protected natural areas (conservation and wilderness areas). This patchwork bears little resemblance to the landscape the native populations knew, or to the one the first European explorers saw.

Most of our lands and waters harbor considerably less complex and diverse groups of species than were present before Euro-American settlement. Cities and farms have replaced most of southern Wisconsin's forests, savannas, grasslands, and wetlands, and as a result many native species now occur in significantly lower numbers than in the past. The northern portion of the state is blanketed with second- and third-growth forests. Although most native species remain, a considerable number have experienced large population reductions, particularly species adapted to older, larger blocks of forest.

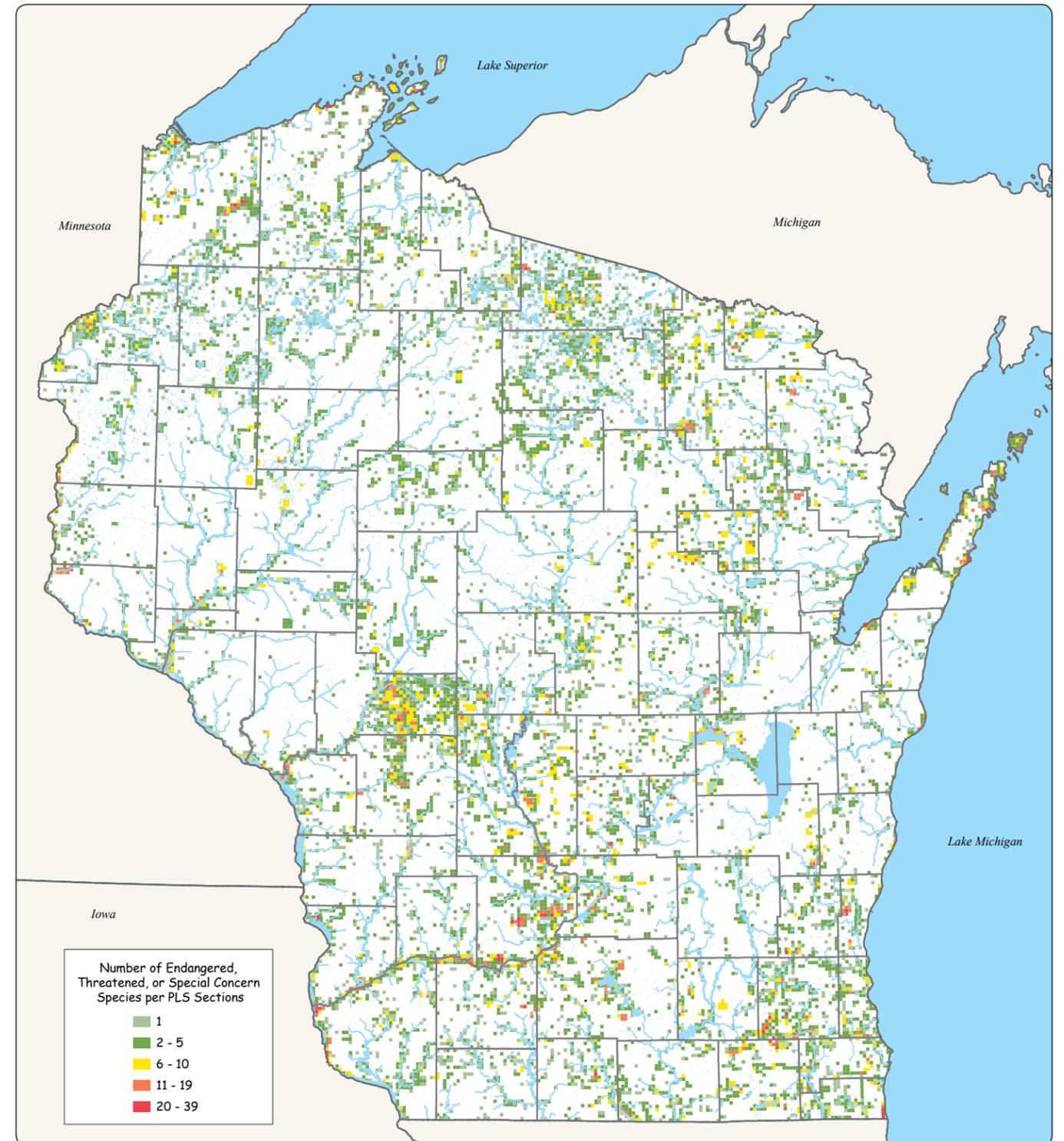
Invasive species also continue to displace native species. Many wetlands throughout the state have become overrun with purple loosestrife and reed canary grass and now have little wildlife value. Garlic mustard, common buckthorn, and Japanese honeysuckle have invaded many southern forests, wiping out native spring wildflowers and significantly reducing oak regeneration. Twenty-two percent of the vascular plants species now occurring in the state are considered to be non-native; how many acres these plants impact is unknown, but clearly is a rapidly growing number. And, as has been mentioned earlier, our waters have suffered repeated invasions from non-native species.

Along with a reduction in the numbers and types of species found in much of the state has been a corresponding decrease in the functional complexity of most remaining natural communities. That is, because the number of species has declined in most of our remaining savannas, barrens, grasslands, wetlands, forests, and other ecosystems, the number of interactions between species, as well as the ecological processes that support them (e.g., water, nutrient, energy, and carbon cycles), have been simplified. In less diverse systems, "ecological resiliency" decreases and minor changes in ecological processes can lead to large and chaotic changes to the components of the ecosystem.

As the size of remaining pieces of habitat has been reduced and fragmented in much of the state, there has often been a corresponding shift in the types of species that can be supported. Some animal species need a high degree of "patchiness" because their life requirements are met by using different habitats at different times. Similarly, many plant species thrive in highly fragmented areas. As the size of habitat patches shrinks, the amount of "edge habitat" increases. Some species, such as deer, raccoons, and cowbirds, are adapted to these environments and, not surprisingly, have flourished. However, many other species are negatively affected by too much edge habitat. Species that require large expanses of continuous habitat of similar vegetation are quickly displaced from areas that become fragmented. Grassland birds and forest interior songbird species—groups that require extensive habitat blocks—have dramatically decreased in recent decades with many on the state and federal Endangered and Threatened species lists (*Figure 28*). Roads, sewers, utility corridors, dams, and land clearing for residential, commercial, and industrial development continue to contribute to fragmentation throughout the state. Some traditional resource management practices have also contributed to habitat fragmentation.

Another factor contributing to the loss of habitats and ecological complexity is pollution. Environmental pollution is the human-induced addition of many types of substances to air, land, and water in quantities and/or at rates that harm organisms, habitats, ecosystems, or human health. There are many types of pollution: some

Figure 28: Frequency of rare species occurrences in Wisconsin, 2001⁷³



Our Ecology: Implications for meeting future conservation and recreation needs

Our landscape has significantly changed since Euro-American settlement and will continue to change in the future. As a result, there have been considerable impacts not only to our biological diversity, but also to the ecological processes on which our native species and natural communities depend. We believe that protection efforts should not attempt to stop or prevent change, but rather will need to focus on ways to minimize the negative aspects of ecological change. Some protection goals could include:

» Protect large sections of habitat where possible and restore areas that “block in” expanses of grassland, savannas, forests, and wetlands. The larger protected areas are, the more likely

that existing plant and animal populations will be able to survive and re-colonize portions that are periodically disturbed by fires, wind storms, floods, disease outbreaks, and other events.

- » Protect and buffer areas with the greatest ecological integrity; places with minimal habitat fragmentation, high biological diversity, minimal invasive species, and intact ecological systems.
- » Protect places that harbor natural communities and species that are rare or declining and most likely to be lost in the absence of protection efforts. The state’s list of Endangered, Threatened, and Special Concern species continues to grow as we better understand the distribution and population sizes of our flora and fauna.
- » Create corridors that connect isolated blocks of habitat and thus help minimize the adverse effects that isolation can cause.

- » Protect large areas in a configuration that best allows species to move as climate changes in the future. If temperatures climb in the centuries to come, the distribution of our forests and grasslands will likely shift northwards. Savannas and dry forests of oaks and hickories may replace maple-beech-coniferous forests that currently dominate the northern part of the state. Grasslands may replace much of the woodland in the southern part. Establishing a series of north-south corridors, in conjunction with other states and Canada, would likely facilitate movement of species in response to climate change.
- » Develop aggressive control strategies to address the spread and impacts of invasive species.



Avon Bottoms State Natural Area in Rock County

appear to be assimilated into the environment with minimal impacts; others appear to have much larger consequences. For many types of pollution, we do not yet adequately understand their impact to the environment or human health. Some examples of pollution include:

- » sediments that wash off bare land and smother gravel riffles in streams,
- » excessive organic waste that flows into lakes or streams and uses up dissolved oxygen as it decays,
- » chemicals present in industrial and municipal effluent, such as dioxin, that have been shown to cause diseases, suppress the immune systems of a variety of species, and harm reproductive capability,
- » warm temperature of discharged wastewater and cooling water used by power plants that changes normal aquatic temperature gradients,

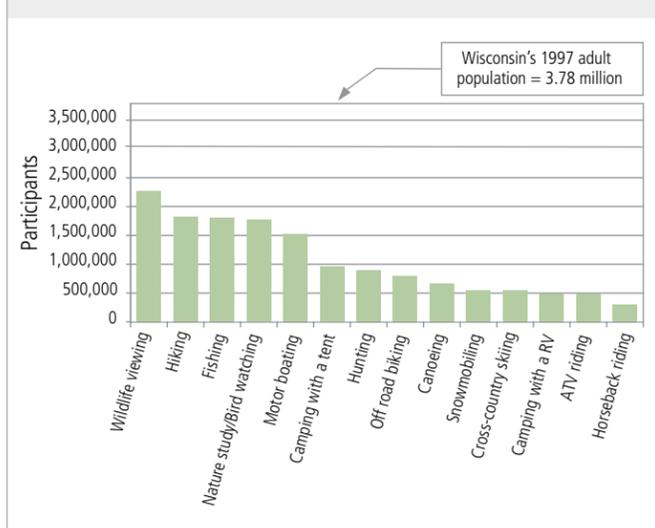
- » acid deposition from air-carried pollutants that change water chemistry in some lakes, which in turn can enable the release of mercury already present in sediments or substrates.

There has been active debate on global climate change in recent years. The earth’s climate has warmed and cooled over the eons. A growing body of evidence suggests that the burning of fossil fuels in the last hundred years is a primary source of the build-up of carbon dioxide in the atmosphere that is occurring. To what degree this is responsible for changing weather may be debated, but it appears clear that nothing humans are doing now is preventing climate change. Recent modeling suggests that the average temperature in Wisconsin over the next hundred years could increase 4°F in the winter, spring, and fall, and somewhat less in the summer, and that the amount of precipitation on extremely wet days in the summer would most likely increase. Increased temperatures are expected to result in lower lake levels in Lake Michigan as more water is transpired and evaporated.⁷⁴



Multi-tasking at Echo Lake

Figure 29: Number of Wisconsin adults participating in selected outdoor recreation activities, 1997⁷⁶



Our Recreation Demands

Not only is our landscape undergoing rapid change in many areas, but recreation demands and opportunities are also shifting. The number of people participating in outdoor recreation is growing, a trend that appears to be primarily due to a combination of our growing population and the state’s changing demographic profile. Public lands, particularly those close to population centers, are experiencing increasing levels of use. The growth in “non-traditional” outdoor activities—ranging from bird watching to off road biking to ATV riding—has led to conflicts for public land managers in their efforts to provide satisfying recreational opportunities. And, it seems certain that new ways to recreate will continue to be invented.

Many factors influence participation in outdoor recreation activities, including cultural preferences, economic means, tradition, and ease of access. Age and gender are key indicators in determining participation levels in different types of recreation. Generally speaking, older age groups tend to participate more frequently in lower impact and quieter forms of recreation. Wildlife watching (in particular bird watching), nature photography, and camping with recreation vehicles tend to be popular with those over 50 years of age. Younger age groups tend to participate in activities that are more “rugged,” faster-paced, or motorized. Tent camping, whitewater canoeing, snowmobiling, ATV riding, downhill skiing, and riding personal watercraft are more popular with those under 40. Participation rates for most outdoor recreation activities reach their peak in 30 to 50 year-olds, with participation trailing off in older age groups. Unlike most other recreation pursuits, hunting and fishing participation is heavily skewed towards men.⁷⁵ A chart showing participation in some selected outdoor activities is shown in *Figure 29*.

As our population grows, a corresponding increase in the number of people participating in outdoor recreation is expected. Similarly, as our population’s age structure shifts (most notably, the large “baby boom” generation aging), some activities are likely to be even more popular, while others will likely see a decrease in participation. Based on the projected number of residents in different age groups in 2010, if the participation rates remain constant,

Our Recreation Demands: Implications for meeting future conservation and recreation needs

With our increasing population, an aging population that is expected to have more free time to participate in outdoor recreation, and a progressively more urbanized citizenry, one of our society’s greatest recreation needs is simply to provide more places near population centers that can, collectively, accommodate a variety of outdoor recreational opportunities. The largest current demand appears to be for day use opportunities—easily accessible areas that people can get to for a Saturday outing or even after work.

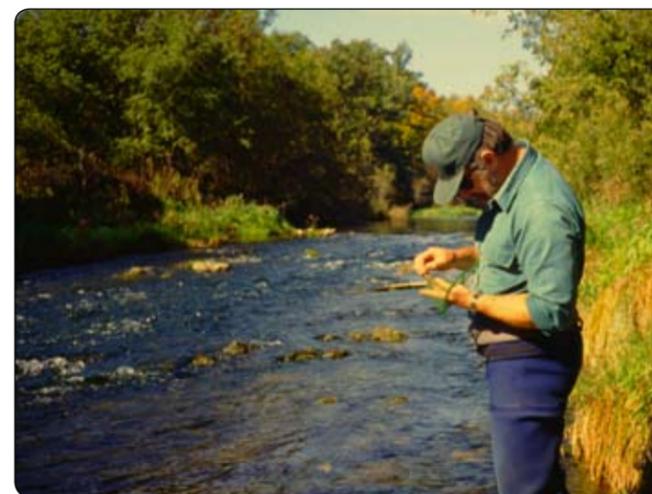
Although the Department can assist communities in their efforts, cities, villages, towns, and counties are in the best position to identify both their community’s needs as

well as the sites that best meet these needs. Establishing a greater number of easily accessible places (and expanding those that currently exist) would likely succeed in meeting several goals: encourage more people to participate in outdoor recreational activities, facilitate a more comprehensive understanding of natural resources and their management, help alleviate overcrowding at existing public recreation areas, and reduce conflicts between different recreation groups

It appears likely that tension between motorized and non-motorized recreationists is increasing and with few signs of resolving itself. No doubt, establishing more places for outdoor recreation will help reduce the number of conflicts. But, clearly, many activities are incompatible with others. Off road bikers can startle horses, personal watercraft can spoil a fishing experience, and ATVs can impact a snowmobile trail.

Care and creativity will be needed in determining which recreation activities are most appropriate when, where, and at what level of intensity. Attempting to accommodate many forms of outdoor recreation at a site will likely be frustrating to most users.

If the size of ownership parcels continues to decrease and properties are purchased primarily for reasons other than economic benefits (two trends we believe will continue), private landowners will likely continue to limit public access to their lands. As such, there probably is only limited value in offering private landowners financial incentives to allow public access on their properties. Thus, public conservation lands will continue to play the critical role in providing outdoor recreation opportunities.



Matching the hatch on the Rush River



Practicing patience



Taking a break along the Elroy-Sparta State Trail

significant increases in the number of participants are expected for nature photography, swimming, fishing, nature study/bird watching, and day hiking. Projections beyond the year 2010 are not available.

For some recreation activities, participation rates have risen, in some cases dramatically, over the past several decades. A generation ago, few would have anticipated the rise in off road biking, sea kayaking, and ATV and personal watercraft riding. These newer forms of recreation provide users with more options for enjoying the outdoors, and in some cases supplement users' recreational experience. That is, off road biking can be another way to enjoy a trail experience. Sea kayaking can be another way to watch wildlife and fish. ATV riding can be another means to get to a favorite hunting spot.

Unfortunately, little data are available documenting the changing participation rates of specific recreation activities over time. As a result, it is difficult to anticipate how popular some activities

may become in the future. Of course, there is also no reliable way to predict what new ways people will invent in the future to enjoy the outdoors, their level of impact on the environment, or their compatibility with other users. What can be expected in the years ahead, though, is that new forms of outdoor recreation will emerge and that more established forms, like wildlife watching, camping, fishing, and hiking, will continue to enjoy widespread popularity.

Many of our treasured parks, forests, and wildlife areas in northern and central Wisconsin are more popular than ever. Some residents and out-of-state visitors continue to "get away" by getting away from where they live and going to a distant and different setting. To many residents of Milwaukee, Oconomowoc, Janesville, or Fond du Lac, enjoying the smells of the north woods, snowmobiling through deep snow, or leisurely canoeing a cool, clear lake is what taking a vacation is all about. Yet, as popular as most of our public lands are, most

remain impractical day-trip or even weekend destinations for much of our state's population. Major public land holdings are as unequally distributed across the state as our population, and largely in an inverse relationship. As a result, the Kettle Moraine State Forest, Devil's Lake, High Cliff and Kohler-Andrae State Parks, Richard Bong State Recreation Area, and other places that provide more easily accessible public recreation opportunities are overwhelmed with visitors. *Figure 30* shows the growth in one outdoor recreation activity—camping use in the state park system. As can be seen, the growth in camper nights exceeds the growth in the number of campsites, indicating an increasing "occupancy rate" and, for many visitors, overcrowding.

As mentioned earlier, the amount of private land available for public recreation is decreasing. In the past, a higher percentage of our population lived in rural settings and those who lived in cities were more likely to have a relative or friend that lived in the country. Consequently, many residents were able to get permission to hunt, fish, hike, pick berries or other activities on land owned by someone they knew. Now, both our population and the character of the state's rural landscape are changing. More and more residents live in urban or suburban settings and no longer have a direct contact to rural landowners. Farms and private industrial forests are increasingly purchased and subdivided for residential or personal recreation use. And landowners, whether they recently acquired their land or have owned it for generations, are understandably wary of allowing unfamiliar people on their land to recreate. As the amount of private land available to the public for outdoor recreation continues to decline, there will likely be increasing pressure on public lands.

Outdoor enthusiasts recreate in different ways. One common thread among most who participate in outdoor activities is that they participate in multiple activities, often on the same trip. Canoeists watch wildlife while paddling down a river. Horseback riders take nature photographs. Motor boaters swim and fish; hunters ride ATVs and camp. What differs, often dramatically, is the overall type of outdoor experience that people favor. Some prefer quiet, secluded settings with few (if any) other groups around where they can experience the subtleties of nature. Popular activities for these people include wildlife watching,

fishing, canoeing, cross-country skiing, hiking, hunting, and horseback riding. Others prefer the thrill of faster, louder, and often motorized activities such as ATV riding, motor boating and personal watercraft riding, and snowmobiling. Most people tend to fall into one group or the other, although some participate in both non-motorized and motorized recreation activities at different times or places.

Many public lands have attempted to accommodate several different types of recreation concurrently. For years, when the number of participants was lower, more spread out, and involved substantially fewer forms of motorized recreation, few conflicts between users of public recreation areas developed. As the number of people participating in motorized and non-motorized recreation activities has risen, there has been an increase in the tension between user groups. Those seeking quiet experiences are frustrated by the lack of places where one can be free of the noise generated by ATVs, personal watercraft, and snowmobiles. Those enjoying motorized forms of recreation fear their access to places is being restricted or that they will not be able to find an adequate number of places to recreate. Where before the level of interaction between incompatible forms of recreation was low and generally tolerable, now the Department and others involved with providing and managing outdoor recreational opportunities repeatedly hear from disgruntled participants.

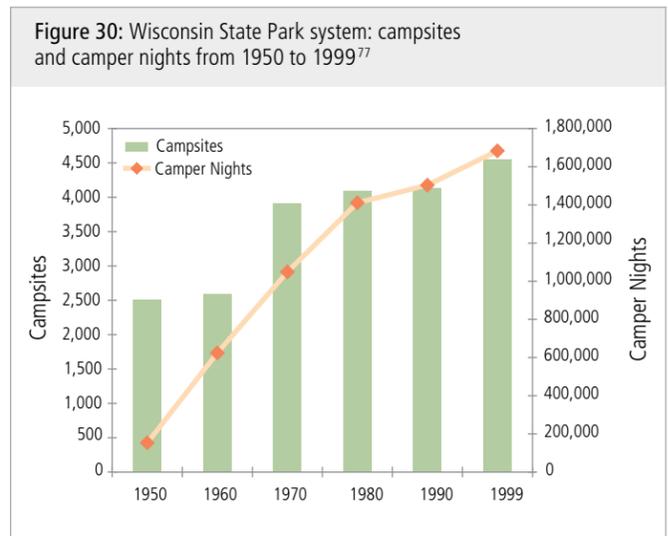
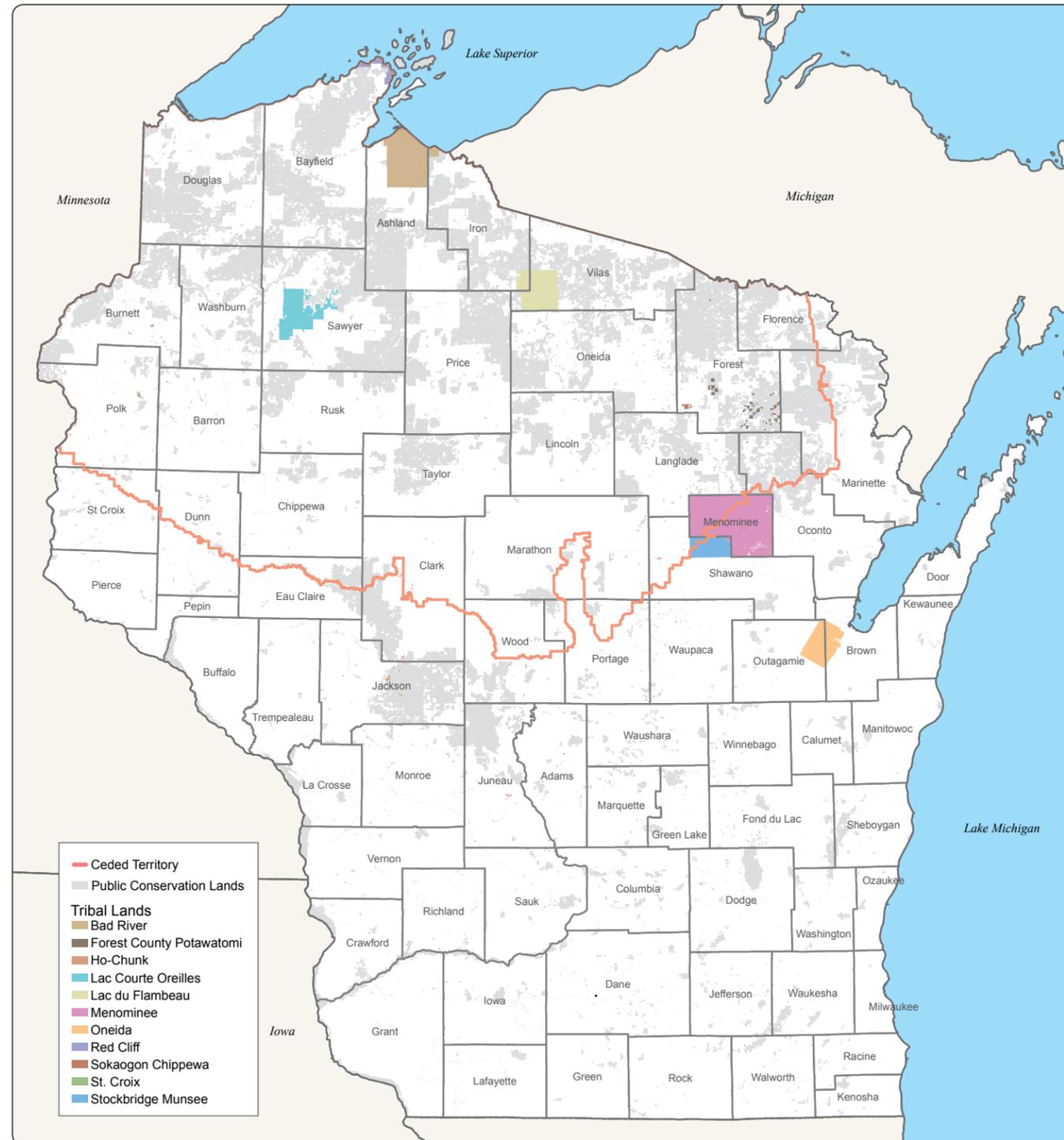


Figure 31: Native American tribal lands in Wisconsin⁸⁰



B. Native Americans in Wisconsin

Native peoples have occupied what is now Wisconsin for thousands of years. By the time of the first treaties between the U.S. government and the tribes in this area, there were at least 8 tribes that had claims in the region. Directly involved in the 1825 Prairie du Chien Treaty were the Ho-Chunk (Winnebago), Menominee, Ojibwe (Chippewa), Sioux, Sac, Fox, Ioway, and Potawatomi. Later, bands of the Oneida and Stockbridge-Munsee Tribes moved from the east and eventually settled here as well. While the respective histories of all of these tribes are complicated and intertwined, a common thread that runs through their cultures and lifestyles is a profound connection to the natural world.⁷⁸

Throughout the 1800s, the young nation's expanding Euro-American population inexorably pushed further and further into the western Great Lakes. For Wisconsin's native peoples, the influx of settlers accelerated the changes already underway. The new settlers were focused on staking a claim to property they could call their own. By 1860, through a series of sales, treaties, and armed conflicts, most tribal lands in Wisconsin had passed into the hands of non-Native Americans.⁷⁹

Today, the federal government recognizes eleven Tribes in Wisconsin (six Ojibwe, and the Menominee, Ho-Chunk, Potawatomi, Oneida, and Stockbridge-Munsee) and has established reservations for each (Figure 31). The six Ojibwe Tribes are the Bad River, Lac Courte Oreilles, Lac du Flambeau, Red Cliff, Sokaogon (Mole Lake) and St. Croix. In addition to their tribal lands, the Ojibwe tribes retained their right to hunt, fish, and gather on lands in Michigan, Wisconsin, and Minnesota that were ceded to the federal government in treaties from 1836 to 1854. In Wisconsin, these treaties cover a large portion of the northern part of the state. Although disputed through a number of lawsuits during the 1970s and 1980s, the Ojibwe's right to hunt, fish, and gather — and to regulate these activities in cooperation with the state to ensure that they do not adversely impact species' long-term conservation needs — was affirmed in federal court in 1983 in what is known as the "Voigt decision."⁸¹

With both their reservation lands and treaty rights, Wisconsin Tribes have an active interest in some of the state's most important natural resources and habitats, including many of the places identified in this report.

Tribal members throughout the state remain closely linked to the land and waters of Wisconsin. Far more than most residents, Native Americans harvest plants and animals for cultural, subsistence, medicinal, and spiritual purposes. For many, hunting, fishing, and gathering are more than simply recreational pursuits; they are a way of life that helps maintain tribal members' close relationship with the environment. Although the Tribes have experienced extraordinary changes, their continued focus on their intimate relationship with the natural world and its stewardship is an endearing legacy from which all of society can benefit.



Ojibwe children in grass dance costume at a Green Bay Pow Wow

C. Protection efforts to date in Wisconsin

Wisconsin has enjoyed a long and successful history of maintaining the quality and quantity of our natural resources. To be sure, we have made mistakes over the years in our use and management of natural resources. We mined the southwest for lead without properly treating the waste; we cut the north with little regard for long-term sustainability of the forests and fisheries; we logged and grazed hillsides in the Driftless Area and, as a result, turned fragile topsoil into muddy river bottom; and we drained, ditched, and tiled millions of acres of wetlands, setting the stage for future floods, water quality problems, and plummeting waterfowl populations. Although we may look back at past actions with some level of disbelief, we can take pride in how citizens rose, and continue to rise, to environmental challenges. Wisconsin has been, and continues to be, at the forefront of identifying natural resource problems and responding with creative, effective, and equitable solutions. We have a well-deserved reputation for adapting old protection strategies and adopting new ones to meld the realities of the day with future generations' right to inherit a sustainable, productive natural world.

There are many ways in which our natural resources are protected to meet conservation and recreation demands. Rural landowners and city dwellers alike have worked for generations



Wetland restoration in Barron County

to protect and conserve our lands and waters through a variety of means. When approaching land management decisions, an overarching consideration for many is how future generations will be affected. What follows is a brief discussion of different ways in which important places and natural resources have been protected in Wisconsin.

With about 85% of the state in private ownership, private landowners are the most important reason why Wisconsin enjoys such a productive, scenic, and healthy natural resource base. Many rural landowners, working by themselves, take great pride in successfully balancing their economic needs with their dedication to managing their property for personal conservation or recreation purposes. Others prefer to work cooperatively with neighbors on a goal of managing a larger network of private lands. Many landowners choose to receive technical assistance on woodland management, soil conservation, wetland restoration, and other topics from locally-based resource professionals working for county, state, and federal agencies.

In addition, many landowners enroll part or all of their property in government conservation programs that offer financial incentives in return for implementing various management practices. The Managed Forest program provides significant reductions in annual property taxes in return for following a sound forest management plan tailored to meet the landowner's needs and the land's capability and a deferred tax when timber is harvested. Participants in this popular state program can also choose whether or not to allow public access for some forms of recreation (if they do, they receive an increased financial benefit). Another example of an incentive-based approach is the set of programs available through the federal "Farm Bill." The Conservation Reserve Program (CRP), the Wetland Reserve Program (WRP), and the new Conservation Reserve Enhancement Program (CREP) provide significant financial incentives to remove environmentally sensitive lands from agricultural production and restore perennial vegetation. Currently, over 650,000 acres of land are enrolled in these programs resulting in substantial improvements to water quality and wildlife habitat.⁸²

These incentive-based programs are popular with many landowners, in part, because they are limited term contracts. Most of these programs offer

landowners a couple of contract lengths from which to choose, typically 10 to 15 years for agricultural programs and 25 to 50 years for forestry-related programs. After this time period, the contract expires and they (or subsequent landowners) can elect to re-enroll (if the program is still offered) or not. For many landowners, these programs offer a good way to "get their feet wet" in conservation without having to make a permanent commitment. They also provide landowners a yearly income stream or annual property tax reductions.

In a similar vein is the purchase of short-term leases to meet conservation objectives or provide public recreation access. The Department has leased about 22,000 acres on an annual basis to provide public hunting opportunities. Some private conservation and recreation groups lease land as well, although no data are available on the amount or distribution of these lands.

Because both incentive-based and leasing programs in essence "rent" land, over time they become an expensive way to achieve conservation and recreation objectives. They also offer no certainty that the resources of interest will be permanently protected or publicly available. As a result, most private conservation and recreation groups and government agencies prefer to expend most of their time and money on measures that offer more permanence, namely purchasing property or specific land rights.

In legal terms, land is often referred to as a "bundle of rights"—that is, a set of distinct and separable rights. Some commonly known parts of the "bundle" include the mineral, access, and development rights. These rights can be bought and sold (within some parameters) individually, in combination, or as a complete set (commonly referred to as "fee simple" or "fee title"). For example, a landowner can sell or give to someone the right to hunt, cut timber, or mine gravel. The sale or transfer of rights can be for a set period of time (e.g., 20 years) or can be permanent. The ability to sell or donate certain rights to a property has proven to be an effective and efficient tool to protect many different types of lands and resources.

Easements are the most common legal agreement used by landowners to sell or donate specific rights to another person, organization, or agency.



Typical Wisconsin farm scene

Easements go by different names, typically according to the resource of interest: historic preservation easements, agricultural easements, access easements, conservation easements, and others. In most cases, particularly for conservation and access purposes, easements involve the permanent transfer of rights. Not surprisingly, easements are popular with many landowners because they enable them to sell or donate particular rights (often some of the most financially valuable ones) while retaining ownership of the property.

Because they allow limited financial resources to be focused on specific needs, easements are also popular with private and public conservation and recreation groups. For many years, the Department has purchased fishing access rights on narrow strips of land along trout waters. In these cases, access easements allow the Department to acquire the specific rights it needs (a place for the public to fish) while not paying for rights it doesn't need (e.g., vegetation management rights, hunting rights, or development rights). The Department also has an easement program focused on protecting streambanks to improve water quality.

Similarly, programs that purchase (and then “retire”) development rights (PDR) on property are gaining popularity as communities across the nation struggle to maintain their open, undeveloped landscapes. The Department has, on a limited basis, acquired development rights from landowners. A recent example is the acquisition of development rights on 400 acres of agricultural land near a State Wildlife Area in Dunn County in recognition of resource values associated with undeveloped, active agricultural land. PDR programs are being used increasingly by local units of government in other areas of Wisconsin to help maintain the rural character of land within their jurisdiction.

Although acquiring specific rights to land has many advantages, there are some limitations associated with this approach. For example, it can take as much (or more) time and effort to monitor and enforce the provisions of an easement than simply owning the land outright.

Similarly, in some cases acquiring only part of the “bundle of rights” may prove an ineffective strategy in the long run. For example, fishing access easements allow anglers to walk along streams, rivers, and lakes, but typically do not include rights associated with how the land is used or managed. As a result, poor land management practices or substantial increases in impervious surfaces from developments can lead to water quality and quantity problems in nearby waterbodies. In order to maintain the quality of the fishery (and thus the demand for access) it may be appropriate to protect wider buffers to protect springs, wetlands, and other lands important in maintaining water quality and quantity.

Also, because development, access, and vegetation management rights are among the most valuable parts of the bundle, they can cost a very high percentage of the total value of a property. Because of these and other issues, it is common for private organizations and public agencies to conclude that, if they have the opportunity and means, it is simpler, more effective, and more economical over time to purchase property in fee.

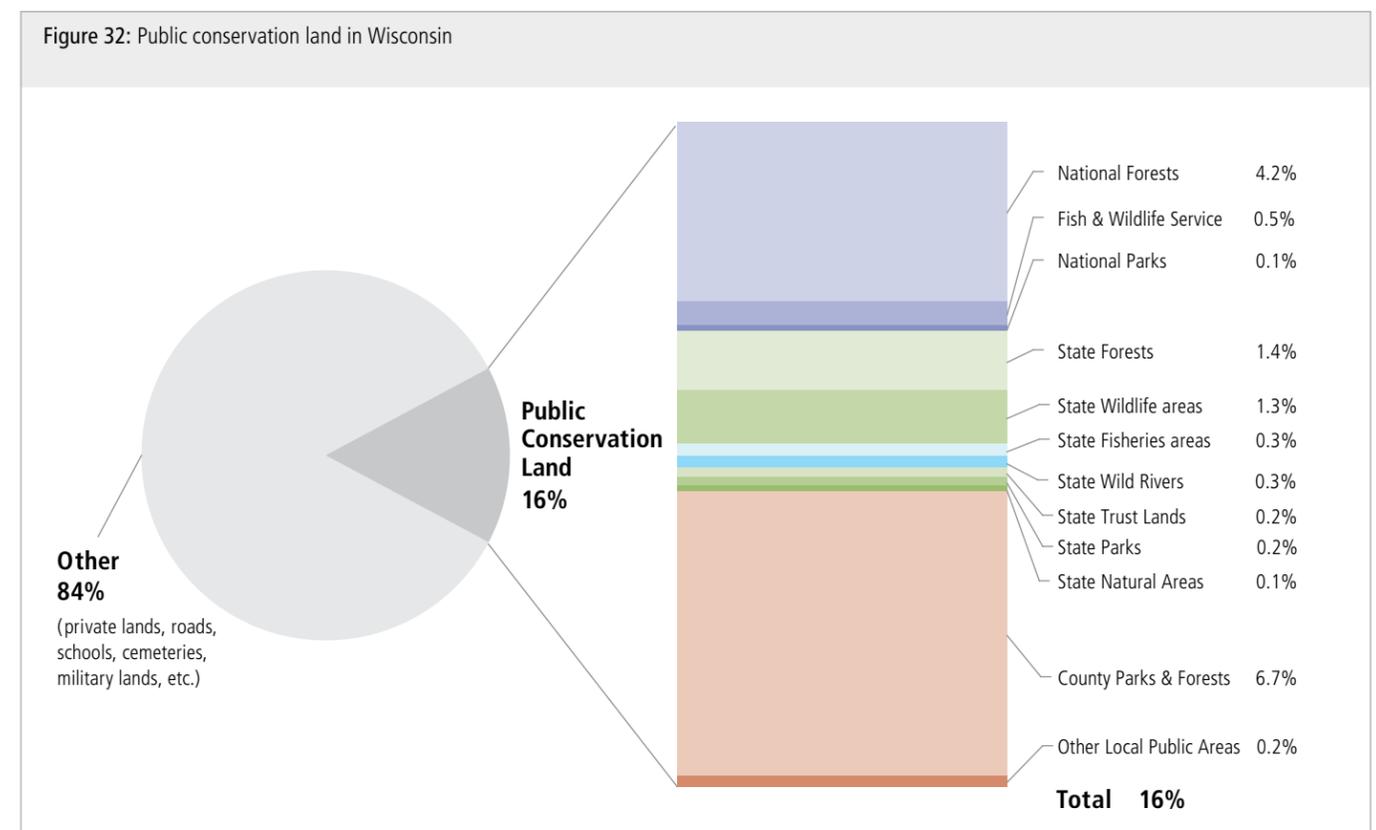
Outright purchase of land (buying the entire “bundle of rights”) has been, and continues to be, a successful approach to meeting conservation and recreation needs. Currently, about 5.7 million acres

in Wisconsin are publicly owned for conservation and recreation purposes. This constitutes about 16% of the state’s total 35 million acres. Of this 5.7 million acres, the State of Wisconsin owns approximately 1.4 million; the federal government owns approximately 1.8 million; and counties and local governments own approximately 2.5 million (Figure 32). Public fee ownership of land provides both a high degree of permanence as well as public access.

The state’s Knowles-Nelson Stewardship 2000 program provides funds through 2010 for the acquisition of land and easements and to develop facilities for recreational use. The Stewardship program, which began in 1990, has enabled the Department and partner groups to purchase almost 300,000 acres to meet conservation and public recreation needs.

The distribution, ownership pattern, and classification of public conservation lands in Wisconsin are uneven. The overwhelming majority of public land is located in the northern counties. The 18 northern-most counties comprise a third of the state but contain 75% of the state’s public conservation land. Similarly, public ownership patterns are skewed; the largest county-owned and federally-owned blocks are nearly all in the north or central parts of the state. Finally, almost 80% of the public lands in Wisconsin are within the national, state, or county forest systems. This unevenness in distribution, ownership patterns, and classification of public lands are all rooted in the state’s early settlement patterns and economy.

In recent years, federal conservation agencies have purchased only a relatively small amount of land in Wisconsin, typically inholdings within their established boundaries. Counties vary in their acquisition efforts; some have active programs to purchase park and recreation lands, others have acquired very little. Most counties with lands in the County Forest program generally follow a “no net change” approach—buying lands that help block in large tracts and selling outlying parcels. Occasionally, local, state, and federal conservation agencies also acquire land through donation. Conservation-minded landowners may donate land for use as a fisheries area, lake access, wildlife area, outdoor education center or for other



natural resource purposes. Likewise, conservation organizations may purchase and later donate land to government agencies with the understanding that it will be used for conservation purposes.

A final way in which important natural resources are protected is through various local, state, and federal regulations. These range from local zoning ordinances to the state Endangered Species law to the federal Clean Water Act. Regulations are established because people, through their elected officials, authorize their governments to limit certain actions. The intent of these regulations and laws is to protect a societal interest in natural resources and not to protect specific places. When natural resources require a level of protection beyond what regulation can provide, then the purchase of land or land rights is necessary.

Similarly, regulations and laws typically focus on specific natural resource attributes and not on all the attributes and characteristics of a place. That is, although laws and regulations

may prohibit certain actions, other actions are allowable that can minimize the overall suitability of a site to meet conservation needs. For example, Wisconsin’s Endangered and Threatened Species law prevents the killing of animals listed by the state as Endangered or Threatened. However, the law does not require landowners to manage their property for the benefit of these species.

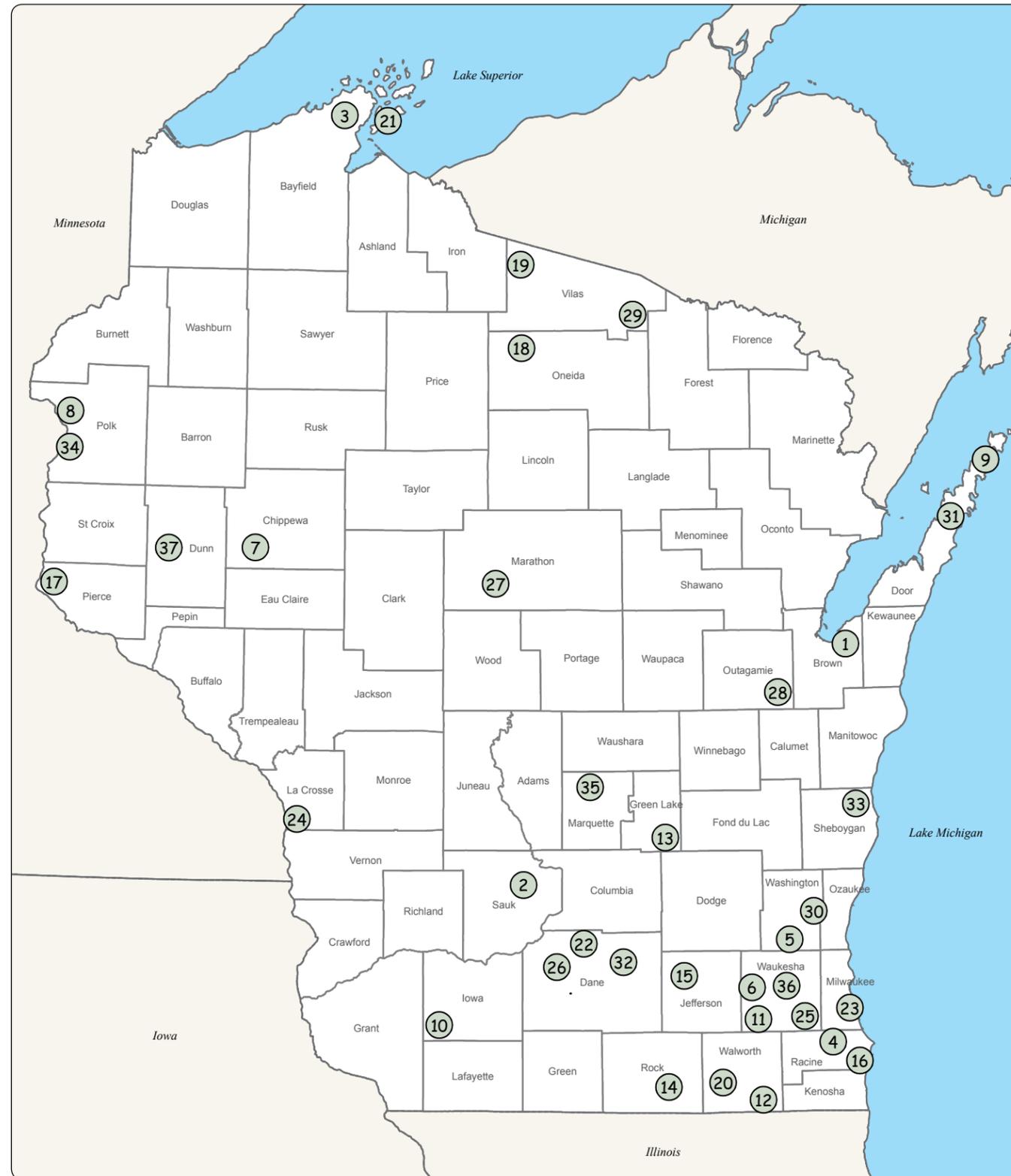
Finally, laws and regulations change over time as societal attitudes evolve and as our understanding of environmental systems and processes improves. For example, wetlands were long considered “wastelands”—worthless pieces of property best suited for draining or filling. As scientific evidence emerged, we came to realize the folly of this approach. Following nearly three decades of some level of protection from the federal Clean Water Act, in 2000 a federal court ruling in Illinois suspended application of the Act for wetlands that were not directly connected to navigable waters. In response, the state legislature passed a law that re-instituted protection for these wetlands.

Over the last decade, Wisconsin has witnessed a dramatic rise in the participation of private citizens in land conservation activities. Private, non-profit organizations provide a focus for these community-based efforts and offer an organized framework where citizens can become directly involved in preserving the outstanding natural features of their communities. Land trusts, nature centers, conservation and science organizations, sportsman's clubs, lake associations, service groups, recreation groups, and garden clubs are all active in efforts to protect land resources for public benefit. Often working in conjunction with each other, local units of government, and the Department, these groups rely on grants, donors, and volunteers for both financial support and long-term stewardship of lands they have protected. Their supporters provide a local perspective on conservation priorities, as well as local leadership and expertise.

Land trusts are at the forefront of private land conservation efforts. A land trust is a private, non-profit conservation organization that has as its primary mission the protection of land and land resources for ecological, aesthetic, agricultural, recreational or cultural purposes. The growth of land trusts in Wisconsin has been rapid, in large part due to the efforts of Gathering Waters Conservancy, an organization that provides education and technical assistance for land trusts and landowners throughout the state. More than half the state's land trusts have been established since 1992. There are now more than 45 community-based land trusts in Wisconsin, with nearly every region being represented by at least one land trust (Figure 33). In addition are several regional and statewide organizations, the largest being The Nature Conservancy, an international organization with a statewide membership exceeding 25,000.

There are no exact figures regarding how much land has been protected by non-profits in Wisconsin. However, it is estimated that land trusts alone have permanently protected more than 100,000 acres of wildlife habitats, natural areas, farms, forests, urban gardens, parks, and trails.

Figure 33: Local land trusts in Wisconsin⁸³



Local land trusts in Wisconsin

- 1 Baird Creek Parkway Preservation Foundation
- 2 Baraboo Range Preservation Association
- 3 Bayfield Regional Conservancy
- 4 Caledonia Conservancy
- 5 Cedar Lakes Conservation Foundation
- 6 Chenequa Land Conservancy
- 7 Chippewa County Land Conservancy
- 8 Deer Lake Conservancy
- 9 Door County Land Trust
- 10 Driftless Area Land Conservancy
- 11 Friends of Milwaukee's Rivers
- 12 Geneva Lake Conservancy
- 13 Green Lake Conservancy Foundation
- 14 GRASland Conservancy
- 15 Jefferson County Land Trust
- 16 Kenosha/Racine Land Trust
- 17 Kinnickinnic River Land Trust
- 18 Lakeland Conservancy
- 19 Last Wilderness Conservation Association
- 20 Lauderdale Lakes Conservancy
- 21 Madeline Island Wilderness Preserve
- 22 Madison Audubon Society
- 23 Milwaukee Area Land Conservancy
- 24 Mississippi Valley Conservancy
- 25 Muskego Lakes Conservancy
- 26 Natural Heritage Land Trust
- 27 North Central Conservancy Trust
- 28 Northeast Wisconsin Land Trust
- 29 Northwoods Land Trust, Inc.
- 30 Ozaukee Washington Land Trust
- 31 Ridges Sanctuary, Inc.
- 32 Riverland Conservancy
- 33 Sheboygan Area Land Conservancy
- 34 Standing Cedars Community Land Conservancy
- 35 Twin Lakes Conservancy
- 36 Waukesha Land Conservancy
- 37 West Wisconsin Land Trust

National or statewide land trusts operating in Wisconsin:

- American Farmland Trust
- Gathering Waters Conservancy
- Ice Age Park & Trail Foundation
- Sand County Foundation
- The Nature Conservancy
- The Prairie Enthusiasts
- Urban Open Space Foundation

Note: Urban land use

In 1945 Wisconsin's urban population was approximately about 1.8 million. At that time, about 400,000 acres were classified as "urban." Thus, for every 100 urban residents, there were approximately 22 acres of developed land.

By 1969, Wisconsin's urban population had grown to 2.9 million on about 700,000 acres of urban land. Thus, the new urban development to accommodate the new 1.1 million urban residents consumed about 27 acres for every 100 people.

By 1992, our urban population stood at about 3.3 million situated on about 1,000,000 acres of urban land. The new urban development between 1969 and 1992 (to accommodate an additional 400,000 urban residents) now used about 85 acres for every 100 residents.²⁵

Note: Providing services to new developments: fiscal impacts

Local governments are responsible for providing many services affecting our day-to-day lives. They build, maintain, and staff schools, fire and police stations, social services, roads, sewers, landfills, and other services and infrastructure. Collectively, the services local governments provide and the infrastructure they maintain are critical components of residents' quality of life and help define a community's sense of place. Communities that provide high quality services are often desirable places to live and work. As a result, housing, retail, and other properties in these communities tend to maintain or increase their value over time more so than in communities offering fewer services. But providing services and building and maintaining infrastructure costs money.

The primary source of revenue for most local governments is the property tax.²⁸ Cities, villages, towns, counties, school districts, technical college districts, and special purpose districts determine their respective property tax levies by first budgeting their expenditures for the upcoming year and then reducing that total by the amounts of anticipated state aids and other revenue sources. The remaining amount represents their property tax levy—that is, the total amount of money needed from property taxes. Taxes are then proportionally distributed based on a property's value relative to the total values of all properties in the taxing jurisdiction. Thus, a city spreads its tax levy across all the properties in the city; each county spreads

its tax levy across the entire county; and so on. Municipalities total each property's individual share of each taxing jurisdiction's tax levy and send out property tax bills each December. In many parts of Wisconsin, total property tax bills range between \$20 and \$30 for each \$1,000 of property value.

Typically, when new housing developments are built, the community's property tax base increases because the assessed value of that land goes up. For example, if a 40-acre parcel is converted from farming into 40 one-acre house lots, the assessed value of the land may increase from, say, \$2,000/acre to \$10,000/acre. And, if forty \$200,000 houses are built, the total assessment of the property may jump from \$80,000 (40 acres of farmland valued at \$2,000/acre) to \$8,400,000 (40 houses valued at \$200,000 each, on \$10,000 lots). As a result, the value of the municipality's total tax base in this example would increase by \$8,320,000. If the municipality's budget does not change as a result of the new development, then the tax rate (often referred to as "mill rate") would decrease because the tax levy would be spread out over an extra \$8,320,000 in tax base. Thus, existing homeowners would pay a lower property tax bill.

However, new developments, especially larger ones, often require a municipality to spend more to provide services and build or improve infrastructure. In addition to the economic growth they bring, new housing developments in many cases lead to increased demand for classrooms and teachers, police and fire protection, social services, road maintenance, and other services. The cost of building and maintaining this additional infrastructure and providing services is influenced by several factors including the new development's density, distance from existing infrastructure, and the amount of excess "capacity" in school, wastewater treatment, and water supply systems. As such, residential developments vary in their fiscal impact—some may result in a fiscal benefit, others in a fiscal deficit.

Much research and debate around the country has focused on how new development affects local government budgets. Studies, both in Wisconsin and nationally, have found that, generally, the higher the population density in a community, the less expensive it is to provide community services per unit.²⁹ Understanding how implementation of the state's new "use value taxation" (requiring property tax assessments to be based on current, rather than potential, use) will affect the amount of money generated and used by different land classes will require further study.

Note: A brief history of Wisconsin's public forests

A considerable portion of Wisconsin's public forest came into public ownership between the 1920s and 1940s as a consequence of devastating economic and ecological changes. By the early 1920s, virtually all of the northern forest, and much of the central forest, had been cut to feed the booming developments in Milwaukee, Chicago, and other cities to the south. These lands were subject to repeated and intense fires fed by the slash left behind. In an attempt to populate these areas and convert the lands to productive use, both the state and county governments encouraged people, mostly immigrants, to move north and farm this "cutover" land.

Unfortunately, after some initial success with farming, soil and climate limitations proved too much for many of the new settlers. With nearly all of the marketable timber from the area harvested, logging companies closed their mills and moved further west. Without the mills as a source of revenue to supplement their farming operations and with falling agricultural commodity prices, many farmers and landowners could no longer afford to pay their property taxes. By the end of the 1920s, many northern Wisconsin residents had abandoned their land. By 1927, nearly one quarter of the land in the northern 17 counties, an estimated 2.5 million acres, was considered tax delinquent.⁵²

By state law, lands that were delinquent in property taxes came under county control. Now strapped with large and mostly unwanted land holdings, counties attempted to sell these delinquent parcels as quickly as possible. However, there were few buyers. By the end of the 1920s, less than twenty percent of the tax delinquent land that the counties had offered for sale had been sold. As the Great Depression rocked the country, more and more lands were foreclosed, fewer buyers emerged, and local governments found themselves with progressively smaller tax bases on which to gather revenue. With fewer funds, there was little ability to support schools, roads, fire protection, and other local government operations, particularly when residents were scattered throughout rural townships. From this chaos emerged two remarkable programs that would change northern Wisconsin.

County governments in the north, many nearing bankruptcy, recognized that the only way they could economically provide services to their residents was to segregate different land uses. In particular, there was a need to move isolated

settlers out of areas that were better suited to support large blocks of forest. Ironically, many of these isolated homesteaders had been encouraged by the counties to come north and farm the "cutover" lands. In 1929, the legislature passed a law authorizing counties to restrict and regulate rural land uses, and three years later, Oneida County instituted the country's first rural zoning system.⁵³ Many other northern counties followed suit. That government control of rural land use was not only accepted but also considered necessary to prevent the collapse of the north is an indication of the dire straits that faced the region and its people.

The second major change was the passage of a series of laws establishing a state forestry program designed to meet the unique needs of Wisconsin's northern forest. Although early attempts to establish a state forest program were ruled unconstitutional, the crisis facing the north finally created enough political pressure to facilitate a constitutional change to enable the development of an innovative, popular, and permanent program. One of the foundations of this new forestry program was the establishment of the County Forest system. Counties could enroll their tax delinquent lands into this long-term forestry management program and in return receive technical assistance, forest fire protection, and financial aid from the state. In 1929, Langlade County entered the first parcels into the County Forest system. Although some counties continue to sell or trade small parts of their land holdings, most have retained the bulk of the land that they acquired through tax delinquency and have enrolled nearly all of it in the County Forest system. Totalling approximately 2.35 million acres, the county forests represent the largest ownership category of public land in the state.

In 1924, Congress authorized the establishment of national forests in Wisconsin. Between 1925 and 1948, over one million acres (most of which were owned by the counties or the State Commissioners of Public Land) were sold to the federal government to establish the Chequamegon and Nicolet National Forests. These two forests, now managed as one unit and known simply as the Chequamegon-Nicolet National Forests, total just over 1.5 million acres.

The concept of establishing state forests, particularly in the north, also took shape during this same time. The initial goal was for a total state forest ownership of 2,000,000 acres, far exceeding the eventual program. Early acquisitions were almost exclusively in the form of state grant lands, tax delinquent lands, and donations. The state forest system got its start in 1904 when the

Commissioners of Public Lands set aside 60,000 acres, most of which is now in the Northern Highland-American Legion State Forest. In 1907, Frederick Weyerhaeuser deeded to the State 2,840 acres, which formed the nucleus of the Brule River State Forest. The state purchased many tax delinquent lands during the 1930s to establish the Flambeau River State Forest. A significant portion of what would become the Black River State Forest was granted to the state by the federal government following the abandonment of agriculture in the area. A 4,100-acre donation of land along the St. Croix River from Northern States Power Company formed the core of the Governor Knowles State Forest. The newest addition, the 9,200-acre Peshtigo River State Forest, was established in 2002 through a combination of donation and purchase from Wisconsin Public Service Corporation.

The two state forests in the southern part of Wisconsin, Point Beach State Forest and the Kettle Moraine State Forest, have somewhat different histories. During the 1920s, conservationists began a campaign to protect the forested swath of land that followed the ridges created during the last period of glaciation. The Kettle Moraine State Forest now comprises over 50,000 acres across five units. Efforts to protect the Point Beach area largely grew out of a locally-led initiative to enhance the tourist economy in the Manitowoc area. Now at over 2,800 acres, Point Beach State Forest is both a conservation and recreation gem. In total, there are now just over 490,000 acres in Wisconsin's State Forests.

Footnotes

¹ Wisconsin Conservation Commission and State Planning Board. *A Park, Parkway, and Recreation Area Plan for Wisconsin*. 1939.

² Gartner, William Gustav. "Four Worlds Without an Eden." Chapter 17 within *Wisconsin Land and Life*, ed. Ostergren and Vale, University of Wisconsin Press, 1997.

³ U.S. Census Bureau. See http://leire.census.gov/popest/archives/state/st_sts.php and <http://www.census.gov/population/projections/state/stpjpjpop.txt>.

⁴ The US population grew 13.1% from 1990 to 2000. See <http://quickfacts.census.gov/qfd/states/55000.html>.

⁵ U.S. Census Bureau. For Wisconsin's rural and urban populations see <http://www.census.gov/population/censusdata/urpop0090.txt>.

⁶ U.S. Census Bureau. In 2000, eighty-four cities and villages contained populations over 10,000 residents; in total, these municipalities contain 2.84 million residents, 53% of the state's population. See <http://www.census.gov/population/censusdata/places/55wi.txt>.

⁷ U.S. Census Bureau. See <http://www.census.gov/population/cencounts/wi190090.txt>. See also Ostergren, Robert C. "The Euro-American Settlement of Wisconsin, 1830–1920," Chapter 8 within *Wisconsin Land and Life*, ed. Ostergren and Vale, University of Wisconsin Press, 1997.

⁸ U.S. Census Bureau. See http://factfinder.census.gov/bf/_lang=en_vt_name=DEC_2000_SF1_U_GCTP5_ST2_geo_id=04000US55.html.

⁹ U.S. Census Bureau. See http://factfinder.census.gov/servlet/GCTTable?ds_name=DEC_2000_SF1_U&geo_id=04000US55&_box_head_nbr=GCT-PH1&format=ST-7.

¹⁰ U.S. Census Bureau, 1990 and 2000.

¹¹ U.S. Census Bureau, 1990 and 2000.

¹² University of Wisconsin, Applied Population Laboratory. Recreational Projections for Wisconsin: 1995–2020. 1998.

¹³ U.S. Department of Agriculture, National Agricultural Statistics Service. 1997 Census of Agriculture. See http://www.nass.usda.gov/census/census97/volume1/wi-49/wi1_01.pdf. U.S. Department of Labor, Bureau of Labor Statistics, 2000 Geographic Profile. See <http://146.142.4.22/lautable12full00.pdf>.

¹⁴ U.S. Census Bureau. See <http://quickfacts.census.gov/qfd/states/55000.html> and <http://www.census.gov/population/projections/state/stpjrce.txt>.

¹⁵ Shapiro, Harvey D. "The Coming Inheritance Bonanza," *Institutional Investor*, Vol. XXXVIII, No. 6 (June 1994), pp. 143–148.

¹⁶ This map, derived from several sources, was first published in *Wisconsin Forests at the Millennium: An Assessment, 2000*. Wisconsin Department of Natural Resources.

¹⁷ Les, Betty. "Overview of Wisconsin's Biological Communities," Chapter 3 within *Wisconsin's Biodiversity as a Management Issue: A report to Department of Natural Resources Managers*, Wisconsin Department of Natural Resources, 1995.

¹⁸ Curtis, John T. *The Vegetation of Wisconsin: an ordination of plant communities*. University of Wisconsin Press. Madison, Wisconsin, 1959.

¹⁹ Gartner, William Gustav. "Four Worlds Without an Eden," Chapter 17 within *Wisconsin Land and Life*, ed. Ostergren and Vale, University of Wisconsin Press, 1997. See also, Bieder, Robert E. *Native American communities in Wisconsin, 1600–1960: a study of tradition and change*. University of Wisconsin Press, 1995.

²⁰ The data for this map were originally developed by Robert Finley, University of Wisconsin–Madison, 1976. This map was derived from 1:500,000-scale sources showing the pre-settlement vegetation cover in Wisconsin. The original vegetation cover data was digitized from a 1976 map created from land survey notes written in the mid-1800s when Wisconsin was first surveyed. Lakes and other hydrographic areas from the 1:250,000-scale Land Use and Land Cover (LULC) data layer and the 1:100,000-scale state boundary were subsequently merged with the original vegetation cover data set to more closely match the source map.

²¹ Addis, James, Betty Les, Anne Forbes, and Kristin Visser. "Biodiversity: Issues and Implications," Chapter 2 within *Wisconsin's Biodiversity as a Management Issue: A report to Department of Natural Resources Managers*, Wisconsin Department of Natural Resources, 1995.

²² Les, Betty. "Overview of Wisconsin's Biological Communities," Chapter 3 within *Wisconsin's Biodiversity as a Management Issue: A report to Department of Natural Resources Managers*, Wisconsin Department of Natural Resources, 1995. Also see, Wisconsin Department of Natural Resources, *Wisconsin Forests at the Millennium: An assessment*. Wisconsin Department of Natural Resources, 2000.

²³ This map is derived from the WISCLAND (Wisconsin Initiative for Statewide Cooperation on Landscape Analysis and Data) Land Cover data set and is a raster representation of vegetation/land cover for the state of Wisconsin. The source data were gathered primarily in 1992.

²⁴ U.S. Census Bureau. See <http://quickfacts.census.gov/qfd/states/55000.html>.

²⁵ U.S. Department of Agriculture, Economics and Statistics System. *Major Land Uses from 1945 to 1992*. See <http://usda.mannlib.cornell.edu/usda/>. The urban populations for 1945, 1969 and 1992 were extrapolated from the 1940 to 1990 decennial censuses. See <http://www.census.gov/population/censusdata/urpop0090.txt>.

²⁶ Wisconsin Agricultural Statistics Service. See <http://www.nass.usda.gov/wi/misc/nofmbist.htm>.

²⁷ Wisconsin's road network consists of approximately 700 miles of interstate, 2,700 miles of US highway, 9,000 miles of State Highway, and 100,000 miles of local roads. Assuming right-of-way widths of 200, 99, 99, and 66 feet, respectively, the total land area equals 957,000 acres.

²⁸ Wisconsin Legislative Fiscal Bureau. *Property Tax Administration*. Informational Paper 14, January 2003.

²⁹ Real Estate Research Corporation. *The costs of sprawl: environmental and economic costs of alternative residential development patterns at the urban fringe*. Prepared for the Council on Environmental Quality, the Office of Policy Development and Research, Department of Housing and Urban Development, and the Office of Planning and Management, Environmental Protection Agency. 1974. See also, Chesapeake Bay Program. *Cost of providing government services to alternative residential patterns*. Chesapeake Bay Program, Subcommittee on Population Growth and Development. 1993.

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³⁰ U.S. Census Bureau. See <http://www.census.gov/hhes/www/housing/census/historic/vacation.html>.

³¹ This graphic was constructed using Plat books from 1921, 1961, 1973, and 1997. The parcels that a landowner holds were totaled to determine the effective parcel size in the graphic. For example, assume a landowner holds a 40-acre and a 60-acre parcel. Whether they were immediately adjacent or just nearby to one another, both would be considered part of a 100-acre parcel and thus would fall into the 71 to 150-acre range.

³² See <http://www.nass.usda.gov/wilannbull/page5.pdf> and also <http://www.wfbf.com/Facts.htm#impact>.

³³ Wisconsin Agricultural Statistics Service. See <http://www.nass.usda.gov/wi/misc/nofmbist.htm>.

³⁴ These years are used because they correspond to the years of the USDA's Census of Agriculture, which occurs every 4 or 5 years. The most recent Census of Agriculture were conducted in 1997, 1992, 1987, 1982, 1978, 1974, 1969, 1964, and 1959.

³⁵ U.S. Department of Agriculture, Census of Agriculture. For most recent data, see <http://www.nass.usda.gov/census/census97/volume1/wi-49/toc97.htm>.

³⁶ U.S. Department of Agriculture, Census of Agriculture. See http://www.nass.usda.gov/census/census97/volume1/wi-49/wi1_08.pdf.

³⁷ U.S. Department of Agriculture, Census of Agriculture. See <http://www.nass.usda.gov/census/census97/aeclos/tb105.pdf>.

³⁸ Wisconsin Agricultural Statistics Service. For most recent data, see <http://www.nass.usda.gov/wilandsales/total01.pdf>.

³⁹ Jackson-Smith, Douglas, Sunung Moon, Marcia Ostrom, and Bradford Barham. *Farming in Wisconsin at the End of the Century: Results of the 1999 Wisconsin farm poll*. Program on Agricultural Technology Studies, Wisconsin Farm Research Summary No. 4, University of Wisconsin–Madison, 2000.

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⁴³ Wisconsin Department of Natural Resources. *Wisconsin Forests at the Millennium: An assessment, 2000*.

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⁴⁵ Wisconsin Department of Natural Resources. *Wisconsin Forests at the Millennium: An assessment, 2000*.

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⁸⁰ This map shows all lands within tribal reservation boundaries, including inholdings.

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