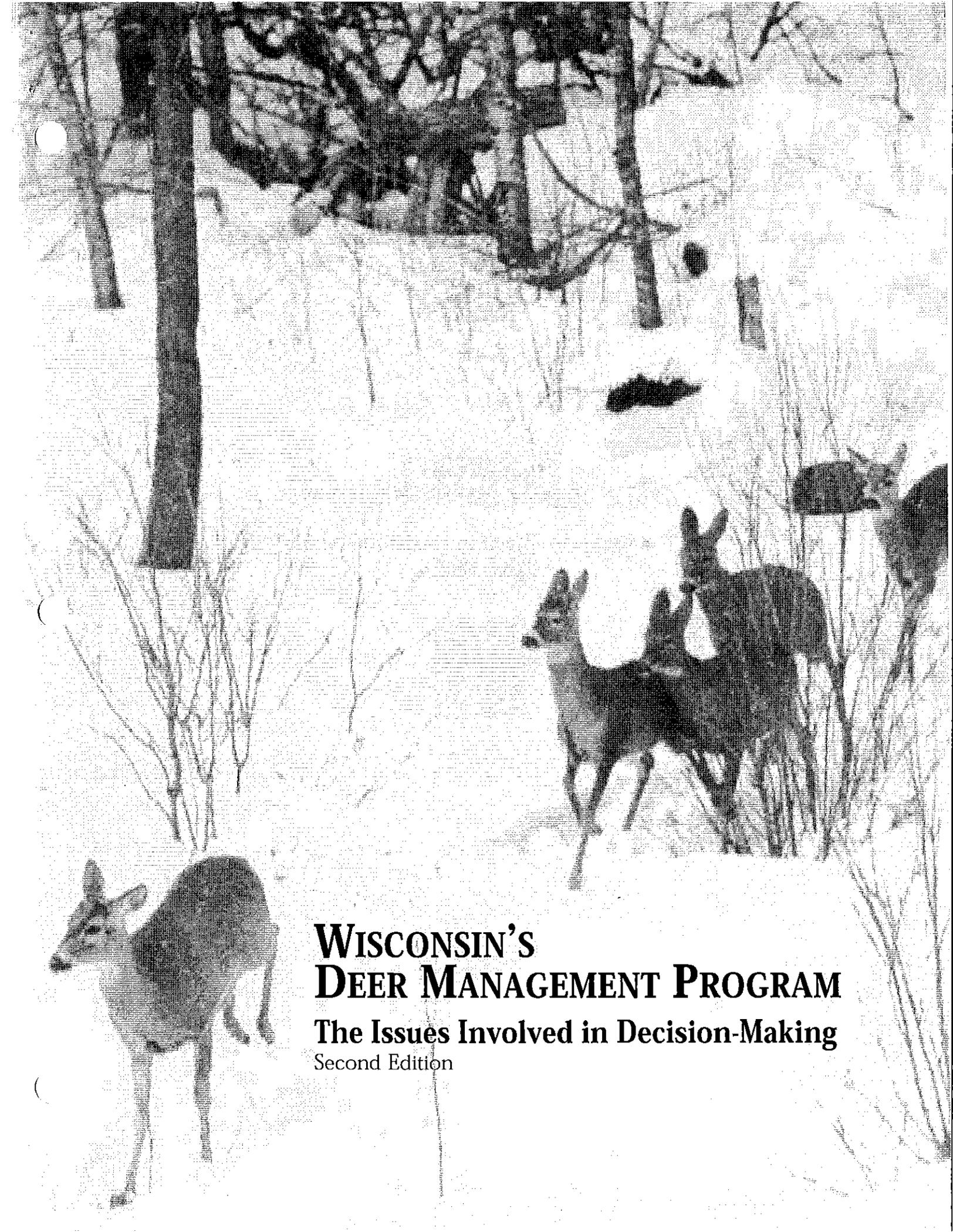


Unit	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	# of Years in Zone T/EAB	
67A			1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	14
67B				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14
68A	1				1	1	1	1	1	1	1	1	1	1	1	1	1	1	14
68B					1	1	1	1	1	1	1	1	1	1	1	1	1	1	10
69										1		1	1			1	1	5	
69A																		0	
69B					1													1	
69C										1							1	4	
70		1			1	1	1											4	
70A	1				1	1	1	1										4	
70B					1	1	1											1	
70C	1					1												2	
70D	1					1												2	
70E	1					1	1											4	
70F			1			1												2	
70G	1				1	1		1										4	
71	1				1	1												2	
72						1	1	1	1									12	
72A						1												3	
73A																		3	
73B					1			1	1	1	1	1	1	1	1	1	1	10	
73C	1																	1	
73D																		7	
73E					1	1												2	
74A			1		1		1		1	1	1	1	1	1	1	1	1	11	
74B									1	1	1	1	1	1	1	1	1	8	
75	1																	1	
75A																		0	
75B																		0	
75C					1	1	1											3	
75D					1		1											2	
76						1												1	
76A					1													2	
76M					1				1									2	
77A																		0	
77B	1		1		1	1												3	
77C	1				1	1		1	1	1	1	1	1	1	1	1	1	12	
77D																		4	
77E										1								1	
77M																		2	
78					1	1	1	1	1	1	1	1	1	1	1	1	1	10	
80A	1	1			1	1	1	1	1	1	1	1	1	1	1	1	1	16	
80B	1	1			1	1	1	1	1	1	1	1	1	1	1	1	1	14	
80C	1	1			1	1	1	1	1	1	1	1	1	1	1	1	1	9	
81					1	1	1	1	1	1	1	1	1	1	1	1	1	13	
# Units	4,010	4,004	3,997	4,005	4,086	4,077	4,048	4,052	4,081	4,059	4,086	4,104	4,090	4,058	4,058	4095	4075	849	
Zone T (Herd Control)																			
EAB																			

Source: Wisconsin Department of Natural Resources, Wisconsin Big Game Hunting Summary



**WISCONSIN'S
DEER MANAGEMENT PROGRAM**

The Issues Involved in Decision-Making

Second Edition

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DEER MANAGEMENT PROGRAM**
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Second Edition



Wisconsin Department of Natural Resources
1998

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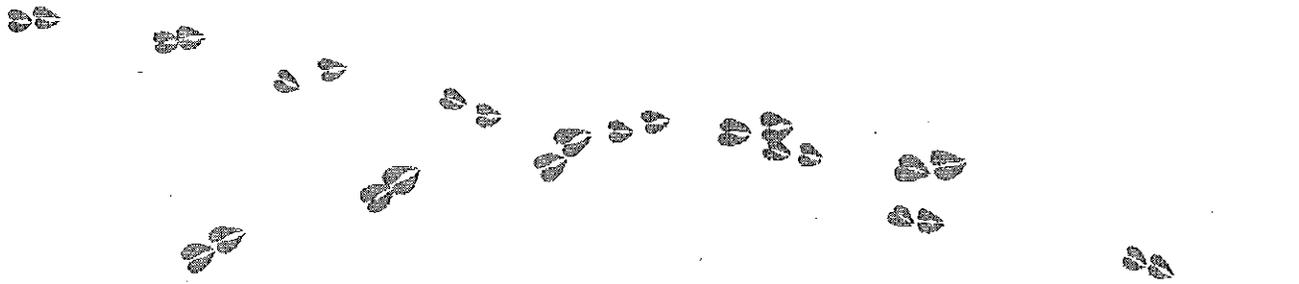
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INTRODUCTION

From many perspectives, the white-tailed deer is a very important part of the Wisconsin landscape and culture. Those perspectives include the:

- **hunter** who loves deer season more than any other time of year
- **photographer** who stalks deer with a camera
- **family** who depends on deer for food
- **small business owner** who depends on hunting season for a living
- **forester** whose tree seedlings cannot grow due to deer browsing
- **botanist** who sees grazed wildflowers disappear from the forest
- **farmer** who wants the deer out of the corn field
- **motorist** whose car has been totaled in a collision with a deer.

Deer are a wonderful and troublesome part of Wisconsin, depending on your point of view.

Wisconsin's deer herd is managed by setting overwinter population goals for sections of the state called **deer management units**. The overwinter goal for a deer management unit is the population level at which wildlife managers aim to keep the deer herd. Department of Natural Resources (DNR) wildlife managers strive to take all interest groups into account as they develop management plans and set overwinter population goals for deer. With recommendations from the public, wildlife managers propose overwinter population goals to the Natural Resources Board (a group of citizens selected by the Governor to review DNR policies). Once approved by the Board, the goals are subject to review by the Legislature. These goals then become law, used by wildlife managers to develop harvest recommendations.

Ideally, the overwinter population goals wildlife managers propose to the Natural Resources Board will produce a healthy herd, a healthy ecosystem, few damage complaints, and good hunting opportunities. Part of the challenge of deer management involves the need to set goals that are ecologically responsible and that blend well with the desires of a majority of citizens. While someone will always want more or fewer deer in a given area, the DNR must look at "the big picture" in attempting to keep deer numbers within the tolerance range of most Wisconsin residents.

This publication has been produced to provide an overview of the different factors that come into play in reviewing overwinter population goals, deer management unit boundaries, and other deer management decisions. We want to make this information available so citizens included in the decision-making process will be fully informed and prepared to actively participate.

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THE IMPORTANCE OF DEER IN WISCONSIN

How important are deer to us? We know from numerous studies that deer are the favorite type of wildlife in Wisconsin—among both hunters and non-hunters. The popularity of deer in this state combined with the size of the herd translates into a wide variety of both positive and negative impacts on our economy and our way of life.

Popularity of Deer

Let's first consider deer hunters. Wisconsin is a relatively small state, yet it ranks third nationally (behind Pennsylvania and Michigan) for both the number of firearm deer hunters and the number of bow hunters. This fall the DNR expects about 670,000 gun hunters and about 240,000 bow hunters to take to the field to hunt deer, and with favorable weather, the number of days spent hunting deer will approach seven million. Research conducted by the DNR and the University of Wisconsin consistently shows deer hunters to be a highly committed group. When asked how much they would miss deer hunting if they could no longer participate, over 60% of Wisconsin's deer hunters say they would miss it more than all or most of their other interests. Nearly the same number say they have few or no substitutes for the deer hunting experience. The deer hunting experience is obviously important to deer hunters, providing a satisfaction they cannot find in other activities.

The fall gun season is viewed by many as the biggest social event of the year, and vacation plans often focus around the nine-day gun deer season, which traditionally starts the Saturday before Thanksgiving. Some schools close their doors, northern industries shut down, and businesses downstate adjust work schedules to reduce absenteeism during the gun deer season. Such high levels of commitment feed the social foundation of deer hunting in Wisconsin—encouraging continued participation by passing the tradition down from one generation to the next.

This fall 670,000 gun hunters and 240,000 bow hunters will take to the field hunting deer, and will spend more than \$897 million in the process.

In 1982, the Wisconsin legislature declared the white-tailed deer Wisconsin's state wildlife animal.



PHOTO: J MEYER



PHOTO: K WALLENFANG

Deer are the most popular type of wildlife, for both non-hunters and hunters.

Deer are also important from a non-hunting perspective. In 1996, 2.3 million state residents participated in observing, feeding, or photographing wildlife, and 423,000 nonresidents made trips to Wisconsin to do the same. If you think all these people were primarily birdwatchers, guess again. A study by the University of Wisconsin and similar studies across the country found that among non-hunters, deer are the most popular type of wildlife. In fact, when Wisconsin non-hunters were asked what wildlife they most enjoy, deer were chosen as the favorite over songbirds and bald eagles, long thought to be the favorites among non-hunters.

Importance to Chippewa Tribes

Deer and deer hunting are very important in the maintenance of the cultural life of the Chippewa or Ojibwa people. This importance was recognized by Ojibwa leaders in the 1800's, and they specifically reserved their hunting and gathering rights in treaties. In court decisions and in agreements in the late 1980's, six Wisconsin Ojibwa tribes and the State of Wisconsin agreed to strive for consensus in the management of deer in the Ceded Territories (Figure 1). This cooperative management includes establishing deer management unit boundaries and over-winter deer population goals for the deer management units in the Ceded Territories. These discussions take place on a government-to-government basis and not as part of a public-input process. The Ojibwa tribes are legally entitled to a portion of the harvestable surplus of deer in the Ceded Territories. The tribes harvest about 4,000 deer each year.

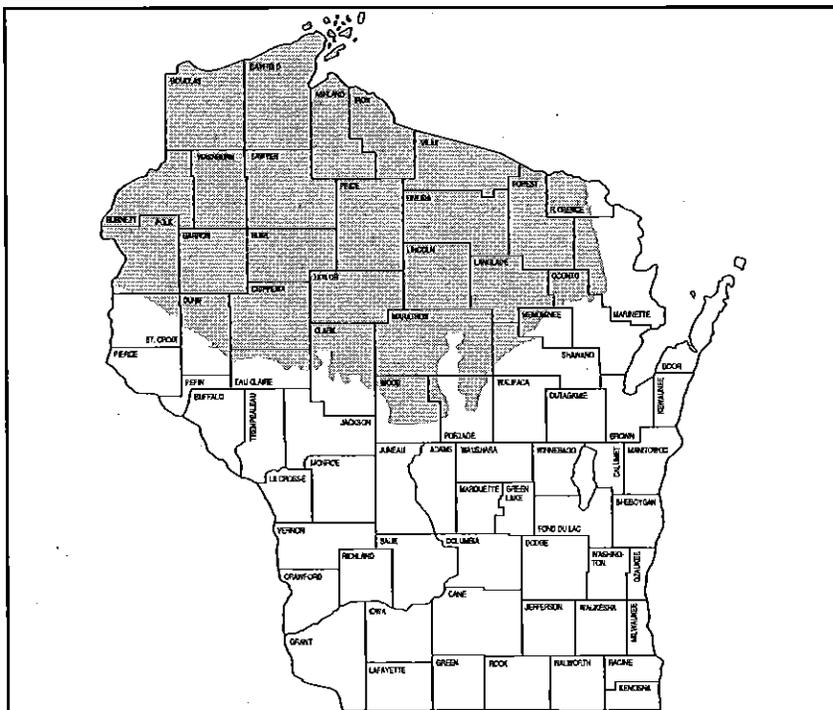


Figure 1. Ceded territories of Wisconsin. Ojibwa tribes and the Wisconsin DNR cooperate on deer management issues in the Wisconsin portion of the territories that were ceded in the treaties of 1837 and 1842. For the exact location of the ceded territory boundary, please consult the DNR or the Great Lakes Indian Fish and Wildlife Commission.

Hunters spent an average of about \$1,300 each on deer hunting in 1996.



DNR PHOTO

Deer hunting licenses brought in more than \$20 million in 1997.

In 1996, 2.3 million Wisconsin residents observed, fed, or photographed wildlife, and spent \$1.5 billion in the process. Their favorite animal? The white-tailed deer.

Positive Social and Economic Impacts of Deer

Deer are a major factor in Wisconsin's recreational economy. In addition to direct expenditures, there are many deer-related benefits to Wisconsin citizens and communities.

How much money do deer hunters contribute to the state? The Wisconsin deer hunting season is a major social and economic event. Information for Wisconsin deer hunting expenditures from the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation estimated that our hunters spent on average about \$1,300 each while hunting deer in 1996, including costs for food and lodging, transportation, equipment, and licenses. For 1996, that translates into more than \$897 million in sales flowing into our state economy from nearly 676,000 deer hunters during the nine-day hunting season. In terms of total sales, if all the state's deer hunters spent their money in one place, that business would rank among Wisconsin's top 15 most profitable companies! These expenditures in turn support more than 16,000 part-time and full-time jobs.

What's the size and value of the resource base that provides these economic returns? In terms of numbers, biologists tell us the deer herd this fall will exceed 1.2 million. Getting at dollars takes a little figuring. Assuming 50 pounds of meat per deer at \$2 per pound, a Wisconsin harvest of 350,000 deer equals \$35 million in venison steaks, sausage, and brats. Adding this food value to the \$897 million of recreational sales, the estimate of the annual value of the deer hunt is at least \$930 million. When salaries, wages, and taxes are added to sales, the total amount associated with deer hunting in the state is more than \$2.6 billion.¹

¹ Although the number of hunters in Wisconsin remained stable from 1991 to 1996, the trend in spending increased sharply. Nationwide hunting expenditures increased 43% during this period, with hunting expenditures for 4x4 vehicles, campers, vans, cabins, boats increasing by 215%. In Wisconsin, expenditures for purchase and rental of hunting lands increased more than in other states. These increases are attributed to the robust economy in 1996 as compared with 1991, when the U.S. economy was in recession (1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation).

The revenues generated from deer hunting also help support other wildlife programs. Deer hunting licenses brought in more than \$20 million in 1997. In addition to deer-related programs and activities, these funds also support a wide variety of wildlife-related activities, including land acquisition and management to benefit wildlife, wildlife education programs, wildlife research, and law enforcement.

How about the economic contribution of non-hunters? While we don't have specific data related to deer, we know that the 2.3 million state residents who observed, fed, or photographed wildlife in 1996 spent about \$1.5 billion in the process. Since deer are the favorite type of wildlife for this group, we assume that some undetermined but hefty portion of those expenditures were deer-related.

Negative Social and Economic Impacts of Deer

While the positive economic impacts of deer hunting and deer-related recreation are impressive, not everyone views Wisconsin's deer population as an asset. Deer are associated with some significant problems, including:

- agricultural damage
- deer-vehicle collisions
- commercial forestry damage
- damage to ornamental plants
- airport safety issues
- spread of disease.

Statewide damage by deer to corn crops alone was estimated at \$15 million in 1993. Since it began in 1984, the DNR's abatement and compensation program has spent over \$23 million to prevent and pay for agricultural damage caused by deer. The number of deer-vehicle accidents has increased along with populations of both deer and motorists. The number of deer killed by vehicles was estimated at over 18,000 in the 1970's—that number swelled to over 44,000 by 1997. Combined property damage and personal injury from deer-vehicle accidents was recently estimated to be over \$100 million per year. Damage to non-agricultural plants includes destruction of valuable tree plantings and landscaping. In crowded conditions, deer can carry and spread diseases to domestic livestock and to people.

These negative impacts translate into what we call **social carrying capacity**, which is the limit to which the human population will tolerate the problems associated with deer. These problems are discussed in more detail later.

Ecological Impacts of Deer

As a "keystone species," deer can have a major impact on the natural community in which they live. As deer numbers increase, some plant species they prefer for food become less abundant or are lost, which in turn hurts the other animals that depend on those plants. Meanwhile, other plants may increase in abundance. Generally, large

Deer are associated with some significant problems, including agricultural damage, deer-vehicle collisions, commercial forestry damage, damage to ornamental plants, airport safety issues, and spread of disease. These negative impacts translate into what we call **social carrying capacity**, which is the limit to which the human population will tolerate the problems associated with deer.

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Combined property damage and personal injury from deer-vehicle accidents was recently estimated to be over \$100 million per year, with an average accident estimated at \$2,000 in property damages and personal injuries.



The number of deer killed by vehicles reached over 44,000 by 1997.

numbers of deer are associated with a reduction in the ground-level plants and shrubs needed by some insects, small mammals, and birds for breeding, nesting, foraging, and escaping predators. Large numbers of deer can also affect tree regeneration, and selective browsing can change the tree composition in the forest. The situation is obviously out of hand when the forest looks like a park with nothing growing under the trees except where fences or fallen tree tops prevent deer from grazing and browsing. On the other hand, plentiful deer support larger numbers of predators such as the timber wolf.

Effective deer management aims for a deer herd size that will allow the animals and their plant environment to be healthy, while striking an acceptable balance between these other positive and negative impacts on people and the environment. It's a complex process, which strives to balance ecological and social realities.

THE BASICS OF DEER MANAGEMENT IN WISCONSIN

To understand the importance of overwinter population goals and deer management unit boundaries, it helps to know how this process fits into the overall deer management program.

Regions

Wisconsin can readily be divided into three regions of similar soil and vegetation characteristics and land use. The principal regions are the northern forest, central forest, and farmlands (Figure 2). Because deer herds and habitats in these three regions have had different attributes, different approaches have been taken in goal-setting.

Deer Management Units

Deer management units give managers a framework for gathering data. These units are areas of similar land use bounded by major roads or rivers. Managers record deer harvests for each unit every year. Over time, a history of the unit evolves. A harvest and population history is the principal tool a manager uses to predict the status of the fall deer population each year.

Deer management units were initially established in Wisconsin during the mid-1950's. There were 77 units statewide then. Most were blocks of land bounded by as few as three or four major highways. The primary purpose of the units was for conducting deer surveys. Units were about 700 square miles in size, and land use within units was similar.

More than forty years later, the number of units has increased to 130, and some units are now bounded by as many as 13 highways (Figure 3). Of these 130 units, the 12 state parks are considered separate units, but each state park has the same overwinter population goal as its surrounding unit to protect the vegetative features that are a natural part of the preserved area. Today the average total land area of deer management units is 450 square miles.

Deer management units are areas of similar land use bounded by major roads or rivers. Each of these units has a harvest history. A harvest and population history is the principal tool a manager uses to predict the status of the fall deer population each year.

Changes in unit boundaries break the unit history and destroy the long-term perspective that is essential to effective deer management. After a change in boundaries, it usually takes at least 5-10 years before adequate data again becomes available.

Much of this increased complexity in unit boundaries came in the farmland areas where deer populations were historically low but have increased dramatically in the past 40 years. Some of the fragmentation of units was in response to damage complaints. Units in the two forested zones have changed little since they were initially drawn.

Changes in unit boundaries have the effect of breaking the unit history and destroying the long-term perspective that is very important for accurately predicting herd responses to varying harvest intensities and winter conditions. After a change in unit boundaries, it usually takes a minimum of five to ten years before adequate data are available for management decisions. It is often popularly believed that smaller units result in more precise management, but

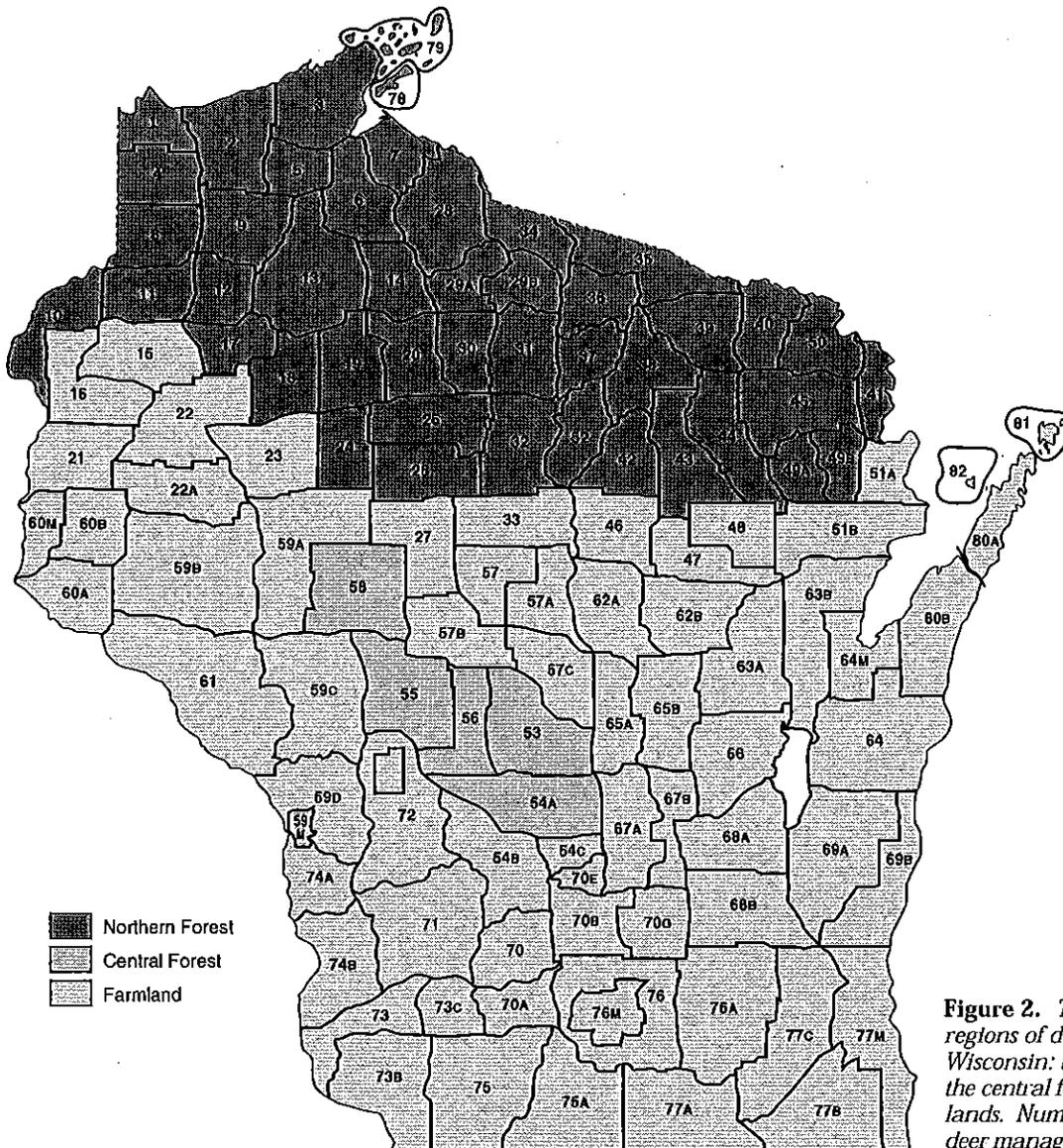


Figure 2. The three principal regions of deer habitat in Wisconsin: the northern forest, the central forest, and the farmlands. Numbered divisions are deer management units.

the opposite is more often true. Fragmentation of units reduces the precision of herd monitoring capability because sample sizes for key herd data (age data, hunting pressure, productivity) are smaller and subject to more inaccuracy. A change in any unit boundary also affects adjacent units. So, **realignment of boundaries should be a last resort** to resolving perceived problems within a unit. The cost in lost information and consistency of herd management is high every time a unit boundary is changed.

Deer Range

Not all land within the boundary of a deer management unit provides a good year-round home for deer. For example, deer don't live in lakes and are not often found in heavily urbanized areas or large uninterrupted agricultural fields (Figure 4). Even though deer are never spread evenly throughout a unit, deer harvests

Realignment of unit boundaries should be a last resort to resolving perceived problems within a unit. The cost in lost information and consistency of herd management is high every time a unit boundary is changed.

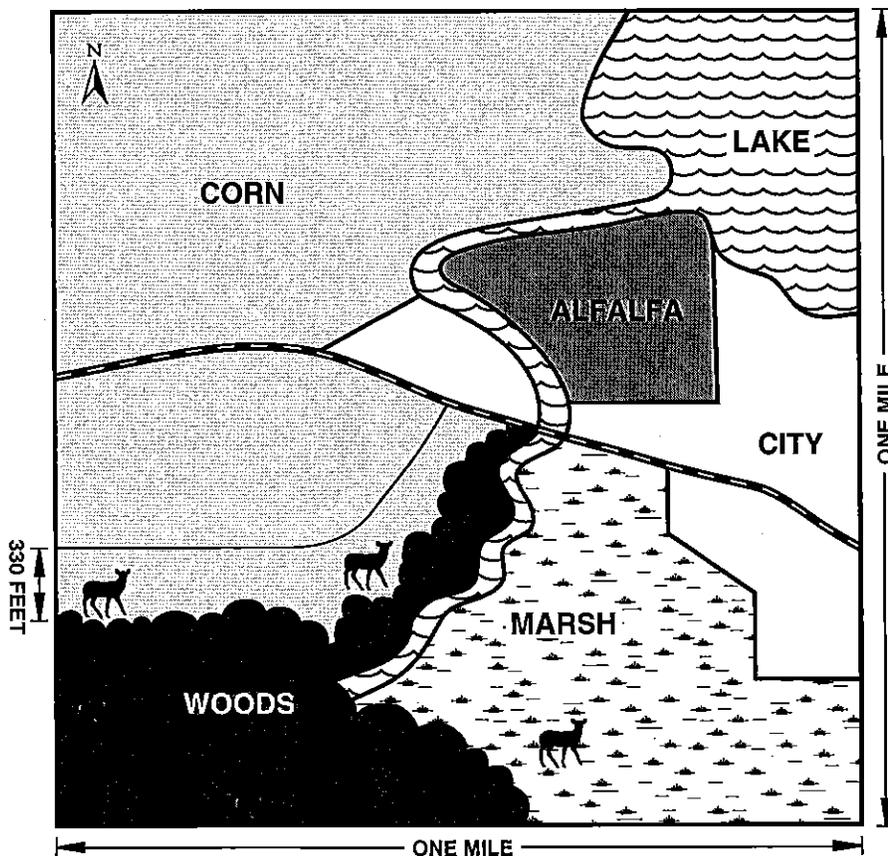


Figure 4. Not all land within a deer management unit is considered part of deer range. In this square-mile parcel of an imaginary deer management unit, only about a third—the woodland, the marsh, and a portion of the cornfield south of the highway—would be counted as suitable deer habitat. If deer were spread evenly throughout a unit with 15 deer per square mile of deer range, then only five deer would likely inhabit this parcel.

tend to occur in proportion to deer density, especially in forested regions. Hunters generally scout areas prior to hunting and over time move to the areas with the most deer.

Managers estimate the number of square miles that provide suitable habitat for deer. The amount of deer range in a unit is always smaller than the total area in a unit. So when wildlife managers say there are "25 deer per square mile" in a unit, they are referring to the number of deer per square mile of **deer range**.

Managers determine how much deer range exists in their units from photographs of the land taken from the air and images from orbiting satellites. Deer range includes all permanent cover—forest, woodlot, brush-covered land or marsh—at least ten acres or more in size. Because deer often use farm fields adjacent to permanent cover, 330 feet into these fields is also included in calculations of the amount of deer range in a deer management unit.

The amount of deer range varies greatly among deer management units—from over 95% in some northern units to less than 30% in some of the highly urbanized and/or agricultural units in the south (Figure 5). (The statewide average is 280 square miles of deer range per unit.) By using deer range instead of overall area, we have a standard comparison for deer densities and their impacts among deer management units.

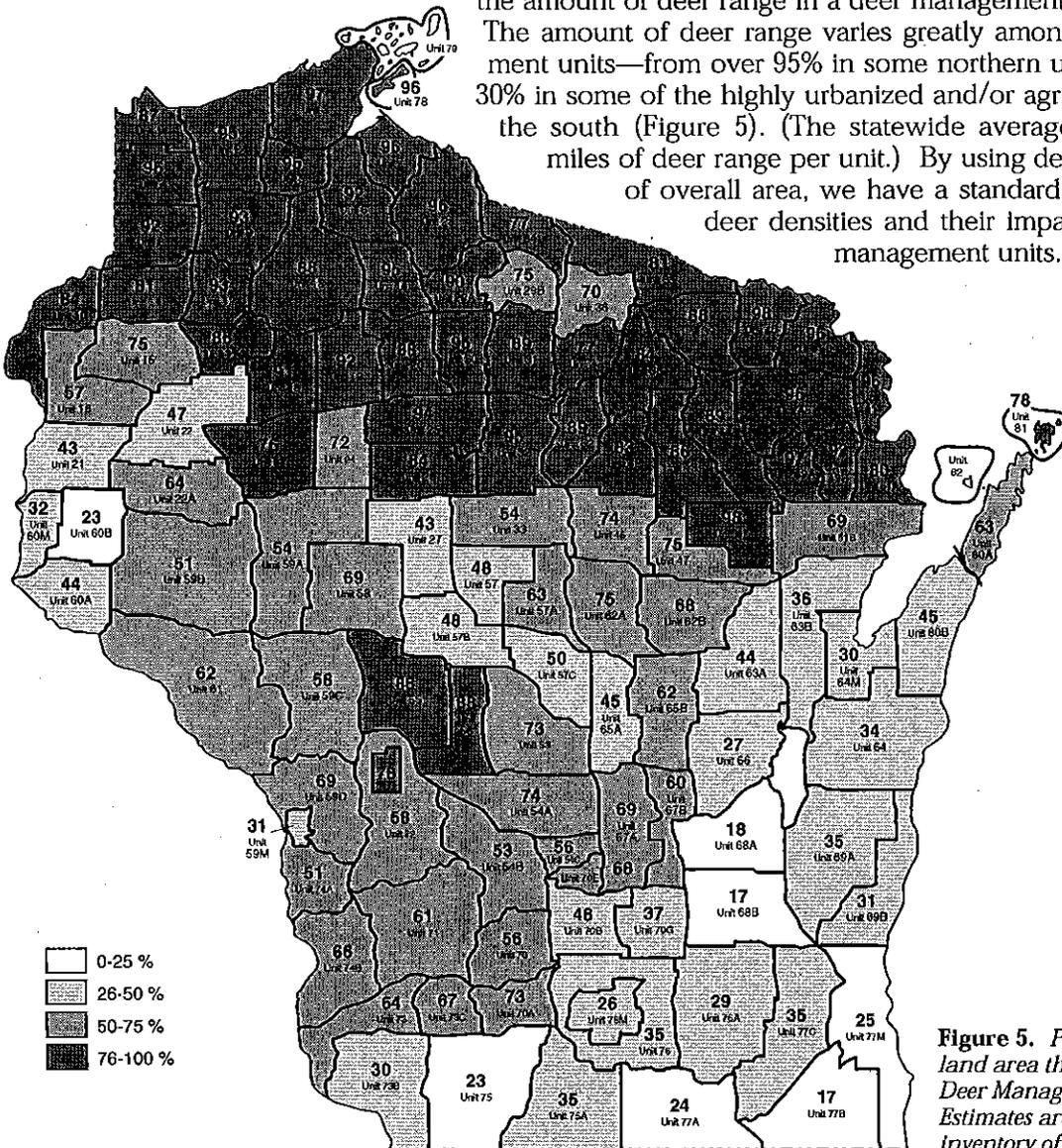


Figure 5. Percentage of total land area that is deer range in Deer Management Units. Estimates are from the 1986 inventory of deer range.

Unit Goals

As mentioned earlier, Wisconsin's deer herd is managed by setting overwinter population goals for each deer management unit in the state. By law the DNR must manage the deer herd to be at goal. Throughout Wisconsin, overwinter population goals currently range from 10 to 35 deer per square mile of deer range (Figure 6). In a unit which has only one third of its area in deer range, a goal of 30 deer per square mile of deer range would actually represent 10 deer per square mile of land area.

The two main factors that come into play in setting unit goals are **biological carrying capacity**, which is the maximum number of deer that can survive on the land under average habitat and weather conditions, and **social carrying capacity**, which is the number of deer that people will tolerate. If we could set unit goals based only on biological factors, our job would be fairly easy. But the need to also balance the positive and negative impacts of deer on humans and the environment makes the process of setting goals much more complicated. The biological and social factors and how they interact are discussed in more detail later.

When wildlife managers say there are "25 deer per square mile" in a unit, they mean "per square mile of deer range."

The two main factors that come into play in setting overwinter population goals are **biological carrying capacity**, which is the maximum number of deer that can survive on the land, and **social carrying capacity**, which is the number of deer that people can tolerate.

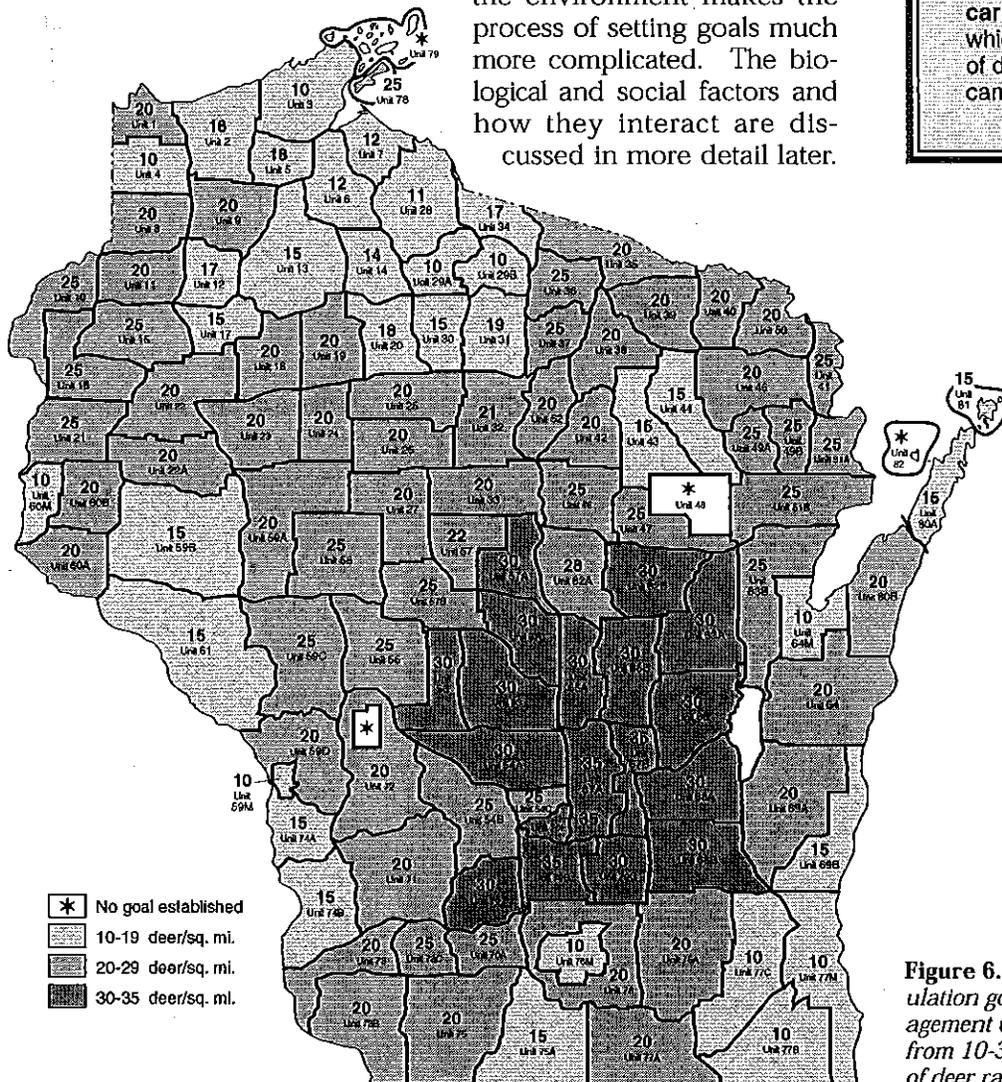


Figure 6. Current overwinter population goals for each deer management unit. These goals range from 10-35 deer per square mile of deer range.

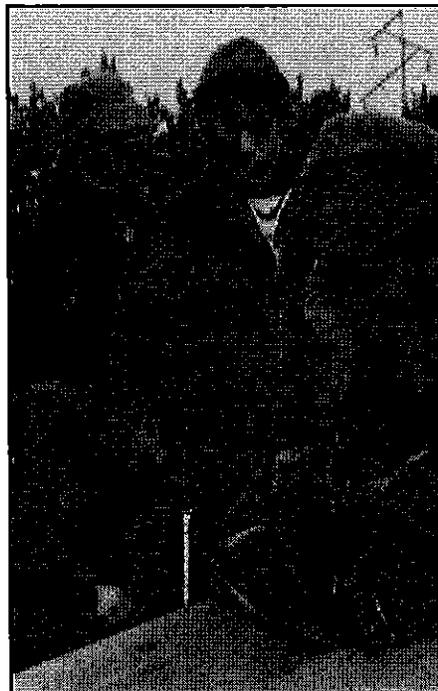
Population Monitoring

Wildlife managers monitor deer populations and determine whether they are above, at, or below the overwinter population goal. They use a combination of information to derive population estimates for each deer management unit. These estimates are expressed as an average number of deer per square mile of deer range, even though not every square mile within a deer management unit has an equal number of deer. Some areas in a deer management unit have more deer than others.

Below we'll discuss the different types of information that are used in population monitoring: harvest registration, deer aging, hunting season stability, and summer observations of the number of fawns produced per doe. This information is combined to estimate population size at the end of the hunting season. Based on the post-hunt population estimate, winter weather, and history of herd growth for each deer management unit, fall population predictions are made.

Harvest Registration and Aging

Mandatory registration of every deer harvested during the hunting season began in 1953 and is the backbone of the state's deer monitoring system. When hunters register their deer, valuable information is collected on the date and place of harvest and the sex of the deer. Wildlife biologists also check the ages of deer at some registration stations around the state. About 22,500 deer were aged in 1996 and about 18,000 were aged in 1997, when there was a lower harvest. In 1997, aging was conducted at 89 locations throughout the state and involved more than 151 agers.



The ages of deer are determined by examining their teeth.

Hunting Season Stability

The nine-day gun deer season traditionally begins the Saturday before Thanksgiving. With uniform seasons, hunting patterns usually change little from year to year. The proportion of the adult buck population taken by hunters is therefore relatively uniform from one year to the next. Under such stable conditions, managers have found that buck harvest trends closely track deer population trends, and population estimates are more accurate. In recent years, deer management has become more challenging due to changes in hunting practices and

PHOTO: H. LIBBY

hunter desires. Many hunters have developed an interest in the sex- and age-structure of the herd and selectively harvest specific types of deer, which may impact the accuracy of estimated deer numbers that rely on consistency in hunter activity. Current research is evaluating the effect of more selective harvests on the accuracy of population estimates.

Summer Deer Observation

Each July, August, and September, DNR employees and volunteers across the state keep records of the number of does, fawns, and bucks they see. The ratio of fawns to does provides an index to current reproductive rates and is an essential component in the formula used to estimate herd size. It also gives managers an opportunity to assess the impact of the past winter on current reproduction.

Population Modeling

Information from harvest registration and aging, along with other data, is used in a mathematical population model called the Sex-Age-Kill (SAK) formula. Population estimates for most deer management units in the state are calculated using the SAK formula. Information on the age composition of the buck harvest and the number of hunters in the field on opening weekend are used to estimate the percentage of adult bucks killed during the legal hunt. The SAK formula combines this estimate with information on the size of the buck harvest to estimate the size of the pre-hunt adult buck population. The adult buck population is then expanded to the entire population using estimates of the number of does per buck and the number of fawns per doe in the pre-hunt population. The overwinter deer population for each deer management unit is determined by subtracting the harvest from the pre-hunt population estimate.

Harvest Planning

Based on the information from population monitoring, fall population predictions are made and the number of deer that can be harvested are determined for each deer management unit. The objective throughout this process is to keep the population as near to the goal for each deer management unit as possible.

Winter Weather

Harvest plans in northern Wisconsin vary from year to year, in part depending on winter weather. Deer have both physiological and behavioral adaptations that allow them to endure Wisconsin winters—provided the deep snow and extremely cold temperatures do not persist too long. In very severe winters, losses of deer in northern Wisconsin can be dramatic (as much as 30% of the herd). Even in mild winters, some deer die. In the south, winter weather rarely impacts deer survival. To keep tabs on winter weather conditions, the DNR maintains a Winter Severity Index (WSI) at about 35 locations across northern Wisconsin.

The WSI was developed in the early 1970's. It is calculated by adding the number of days with 18 inches or more of snow on the

Based on the information from population monitoring, fall population predictions are made and the number of deer that can be harvested are determined for each deer management unit. The objective throughout this process is to keep the population as near to the goal for each deer management unit as possible.



Winter weather can have a big impact on deer populations in the northern forest.

ground to the number of days when minimum temperatures were 0°F or below between December 1 and April 30. If you think of it as adding up points, a day when both conditions occurred would get two points. At the end of the winter all the points are added up, resulting in the WSI number for the whole winter. A winter with an index of less than 50 is considered mild, 50 to 80 is moderate, and over 80 is severe (Figure 7).

When these WSI numbers are high in northern Wisconsin, deer survival over winter is lower, the number of surviving fawns born per doe in summer is lower, and adult buck harvests the following fall are generally lower. These impacts are predictable enough that managers can use the WSI to calculate useful estimates of how the herd will be affected by winter weather in the north. The WSI is especially important for predicting fall herd status and establishing harvest recommendations in the forested regions of the north.

The 30-year average WSI in northern Wisconsin is 67. The most severe sequence of winters occurred between 1964-65 and 1971-72, when five out of eight winters were in the severe category and northern herds declined by more than half (Figure 8). The mildest sequence of winters occurred between 1987 and 1995, when only one winter had a WSI above 50. Weather records indicate that the 1980's was the mildest decade on record, and Northern States Power Company has indicated that the 1986-87 winter was the mildest winter in 114 preceding years. Northern

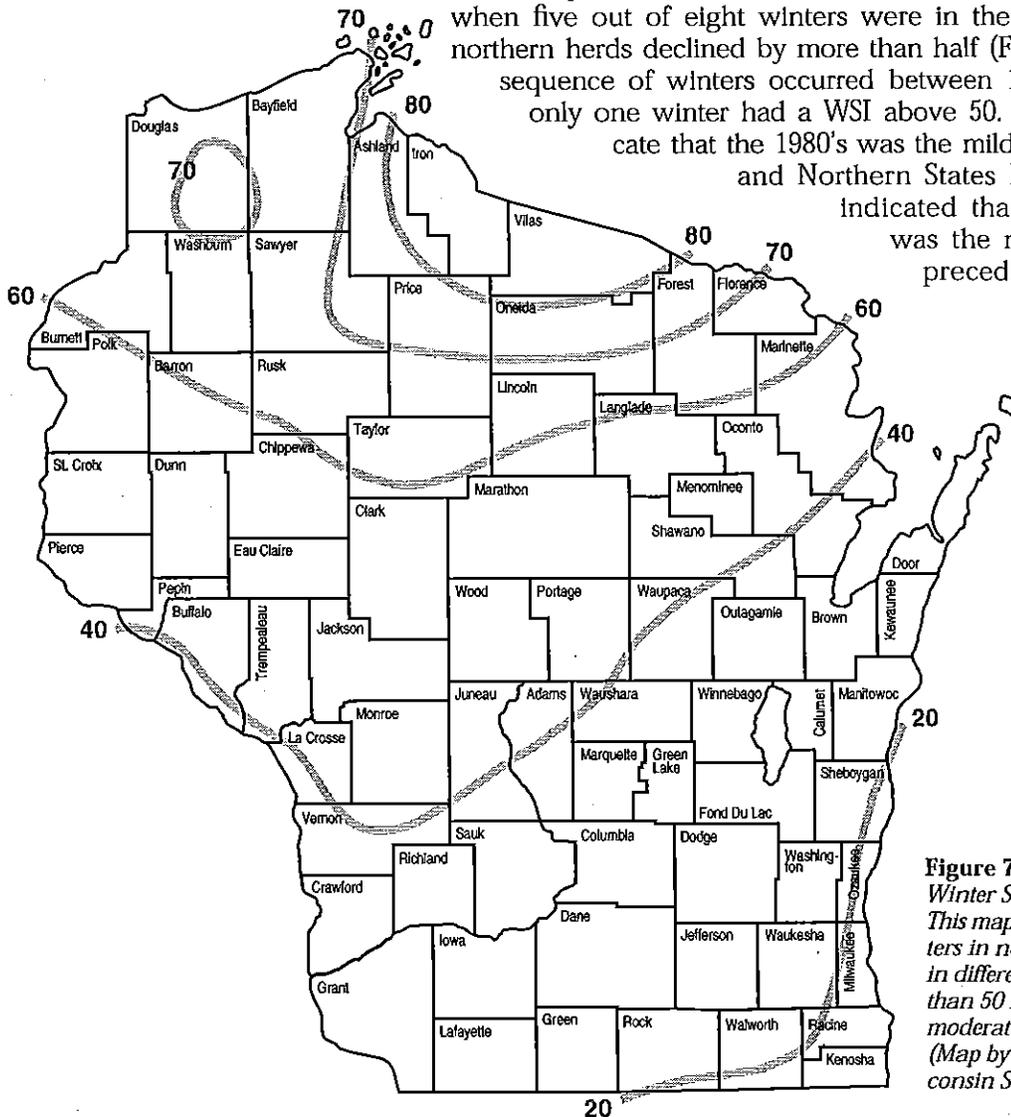


Figure 7. Average regional Winter Severity Indices, 1961-1990. This map shows that severity of winters in northern Wisconsin varies in different areas. An index of less than 50 is considered mild, 50-80 is moderate, and over 80 is severe. (Map by Pam Naber Knox, Wisconsin State Climatologist.)

deer populations responded by increasing at spectacular rates and set new expectations in the minds of many hunters. The mild winters continued until two consecutive severe winters occurred beginning in 1995. In 1995-96 the WSI reached a record high of 127, followed by a WSI of 116 in 1996-97. These severe winters decreased the deer populations in the north by approximately 35%. Such short-term weather patterns are unpredictable. It is important to consider the long-term patterns of winter severity over the past 30 years in the goal-setting process.

Fall Population Prediction

The overwinter population estimate is the starting point for predicting the herd status for the following fall. The prediction of fall population size is what harvest plans are based on. To make our best possible prediction, we depend upon past records on productivity and growth rates for the herd. In northern units, herd growth can be greatly affected by winter weather. Therefore, the history of each deer management unit is extremely important for providing the perspective needed to accurately predict future herd status before planning harvests each year.

Fortunately, most units in forested zones have unbroken histories extending back to 1959. This record incorporates a wide variety of experience with winters of varying severity and patterns of occurrence. It also spans a variety of harvest intensities and hunting conditions. Great differences in environmental conditions (hunting weather and winter severity) make the unit history especially important in forested zones.

It is important to consider the long-term patterns of winter severity over the past 30 years in the goal-setting process.

The history of each deer management unit is extremely important for providing the perspective to accurately predict future herd status.

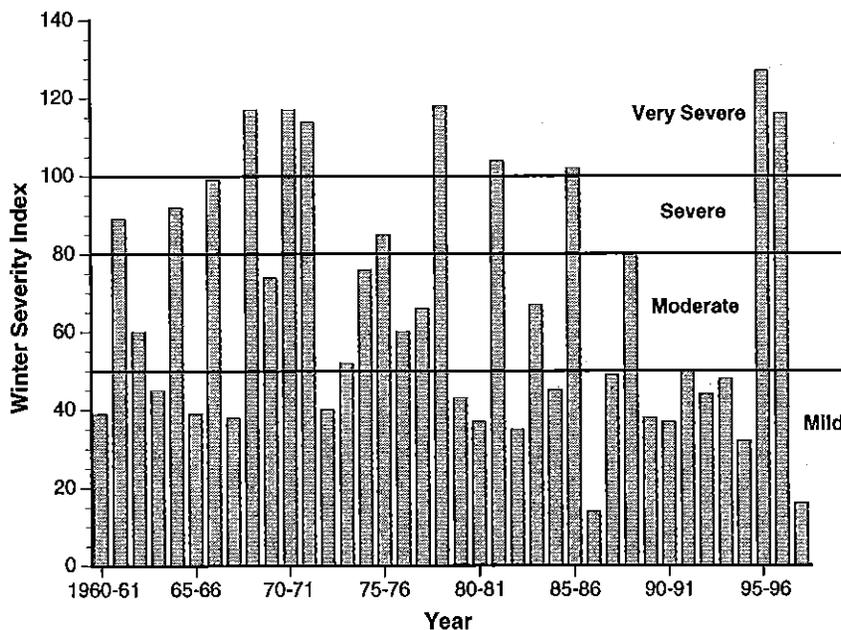


Figure 8. Winter Severity Indices for northern Wisconsin, 1960-1998. Note the sequence of severe winters from the mid-1960's through the early 1970's when deer populations declined. Populations increased during the mild winters of the late 1980's and early 1990's, but the two consecutive severe winters of 1995-1997 again caused a population decline.

Normally, winters are less severe and weather has less impact on hunting in the farmland region than in the northern forest. But harvest prescriptions must be very precise in the farmlands because of the great reproductive potential of the herd in this region. Again, long-term unit histories are very important to the development of precise harvest prescriptions.

Quota Setting

Because it is difficult at a distance to tell buck fawns from either adult does or doe fawns, they are included in a group called "antlerless deer." To manage at goal, we focus on the harvest of this group of deer. Most of the adult and yearling bucks can be harvested with little affect on the future size of the deer herd. Managers are most concerned about the harvest of does, because does bear the next generation of deer. Therefore, wildlife biologists from both the DNR and the Wisconsin Ojibwa tribes participate in an agreed-upon process to determine how many antlerless deer should be taken in each deer management unit to achieve the population goal for that unit. This figure is referred to as the **total harvest quota**. For units in the Ceded Territory, the Ojibwa tribes are responsible for informing the DNR of the number of antlerless deer out of the total quota they wish to harvest in the following season. This is known as the **tribal declaration** or **tribal quota**. The remaining antlerless deer harvest is taken by nontribal hunters and is known as the **state quota**.

Typically, about two thirds of the quota harvest is composed of adult does. In very simple terms, if the herd size is low or "below goal" (perhaps due to a severe winter), then managers set a low (or possibly zero) quota for antlerless deer to be taken in the fall. If the fall herd size is high or "above goal," managers prescribe more liberal harvests of antlerless deer. When "at goal," the state-wide gun and bow harvest should include an antlerless harvest of

Unit histories are extremely important for accurately predicting fall herd status each year.

To manage a herd to be at the over-winter population goal, we set harvest quotas for "antlerless deer" so that enough does will be harvested to control herd growth.

It's difficult to tell buck fawns from does at a distance, so for quota-setting, both are included in a group called "antlerless deer."



DNR PHOTO

about 160,000, with a total harvest of about 290,000 deer. There has never been, and may never be, an absolutely perfect quota prescription. Managers work with estimates and predictions, taking errors into account the next year.

GOAL-SETTING IN DETAIL

With the overview of the basics of deer management in mind, let's take a closer look at what actually goes into setting overwinter population goals.

Biological Carrying Capacity

The physical condition of deer is primarily influenced by the balance between energy obtained from food and the energy required to survive. Because the land can only produce a limited amount of food, the more deer that live in an area, the less food is available for each individual deer, which quickly leads to decreased physical condition. Decreased physical condition in deer shows up as reduced body weight, antlers with fewer points and smaller beams, reduced fawn production, and lower rates of population increase. In extreme instances of high populations, there is not enough nutritious food in summer for deer to lay on sufficient fat reserves and not enough winter browse to maintain them through the winter. The maximum number of deer that a given unit of land can support over a prolonged period of time is termed its **maximum biological carrying capacity**. Habitat quality (food and cover) and climate determine long-term carrying capacity. However, annual weather can profoundly affect carrying capacity in the short term. Because we cannot predict seasonal or annual weather, goal-setting requires looking at average carrying capacity over the long term.

Carrying capacity varies greatly across the geographic areas of Wisconsin. In Wisconsin farmlands, there is abundant food in the form of agricultural crops, and the winters are milder and shorter. Over 100 deer per square mile of deer range could be sustained in much of this region, if the public was willing to tolerate the resulting high damage to crops and landscaping, hazardous driving conditions, and extensive damage to vegetation in the remaining natural communities.

In contrast, the northern forest region produces substantially less nutritious foods, and the winters are harsher. Also within the northern forest region there is great local variation in production of food for deer. For example, forests growing on sandy soils tend to be dominated by oaks, aspen, and jack pine. These tree species allow more sunlight to reach the forest floor, so more of the shrubs and herbs favored by deer can grow. These habitats could support up to a maximum of 40-45 deer per square mile. Forests on loamy soils tend to be dominated by maple, basswood, and fir. Less nutritious foliage grows in the deep shade under these trees. These forests could support fewer deer, often fewer than 15 deer

The physical condition of deer is primarily influenced by the balance between energy obtained from food and the energy required to survive.

The maximum number of deer that a given unit of land can support over a prolonged period of time is its **biological carrying capacity**. Carrying capacity varies greatly across geographic regions in Wisconsin and over time.

A herd at maximum biological carrying capacity is not a pretty picture. Deer are in miserable condition and habitat is harmed. Physical condition of all deer is much better at intermediate population levels.

Carrying capacity varies greatly across the geographic areas of Wisconsin. In the farmlands, there is abundant food in the form of agricultural crops and the winters are milder and shorter. In contrast, the forested northern part of the state produces substantially less nutritious foods, and the winters are harsher. In fact, due to changes in the northern forests, biological carrying capacity for deer is decreasing in the north.



PHOTO: D. TVEDET

Occasional starvation of deer is normal near the northern limit of white-tail range. Starvation can be minimized in severe winters if deer herds are maintained well below maximum carrying capacity.

per square mile of deer range given average weather. In any of these locations, herds held at maximum biological carrying capacity would mean a miserable existence for deer.

Carrying capacity also varies over time. In areas of the forest that have been recently disturbed by fire, wind storms, or logging, sunlight is able to reach the forest floor. This promotes the growth of nutritious forage. As these forests mature and gradually grow shadier, the amount and nutritional quality of understory plants diminishes. Across much of northern Wisconsin, extensive areas were logged and burned during the late 1800's and early 1900's. The seedlings and saplings of maples, aspen, and other trees that regenerated during the 1930's and after provided an abundance of deer forage. Upland conifers had been much reduced by logging and fires. Peak deer populations in the northern forest were reached in the early 1940's. At that time and for the next few decades, winter range conditions were seen as the main constraint on northern deer populations, and deliberate efforts were focused on improving browse production in and around deer yards. (Deer population goals had not yet been established.)

Today, forest stands across the north are much different. Maples have long since grown out of the reach of deer, and sun-loving tree species are naturally giving way to shade-tolerant species. Winter survival habitat (conifer thermal cover) has remained about the same or may be increasing as a result of pine planting, fire protection, and natural growth of balsam fir and white pine. But non-winter habitat (aspen, oak, and openings), which supports herd production, is declining as a result of natural succession (long-lived, shade-tolerant trees replacing shorter-lived, sun-loving trees) and forest management practices (Figure 9). Aspen is being lost and openings are closing. Because of these changes, biological carrying capacity for deer is decreasing in the north. The expansion of corn production on the southern fringe of the northern forest, and the practice of baiting and feeding deer, have partially off-set this trend in some areas, perhaps to the detriment of natural plant communities.

This variation of carrying capacity over space and time is also related to the duration and severity of winter weather in different parts of the state and during different periods of history. Deer in southern Wisconsin rarely suffer as a result of winter severity. Those living in the northern forest region are often confronted with the extreme energy demands of coping with deep snow and below-zero temperatures for prolonged periods. Within the northern forest, deer living inland from the Great Lakes usually must deal with greater snow depths than deer living elsewhere. Since 1960-61, winter severity indices for northern Wisconsin have varied from a low of 14 to a high of 127 (see Figure 8). (Remember, an index of less than 50 is considered mild, between 50 and 80 is moderate, and greater than 80 is severe.) The 30-year average is 67. Over-winter population goals must be established with long-term climate in mind because short-term weather patterns are not predictable.

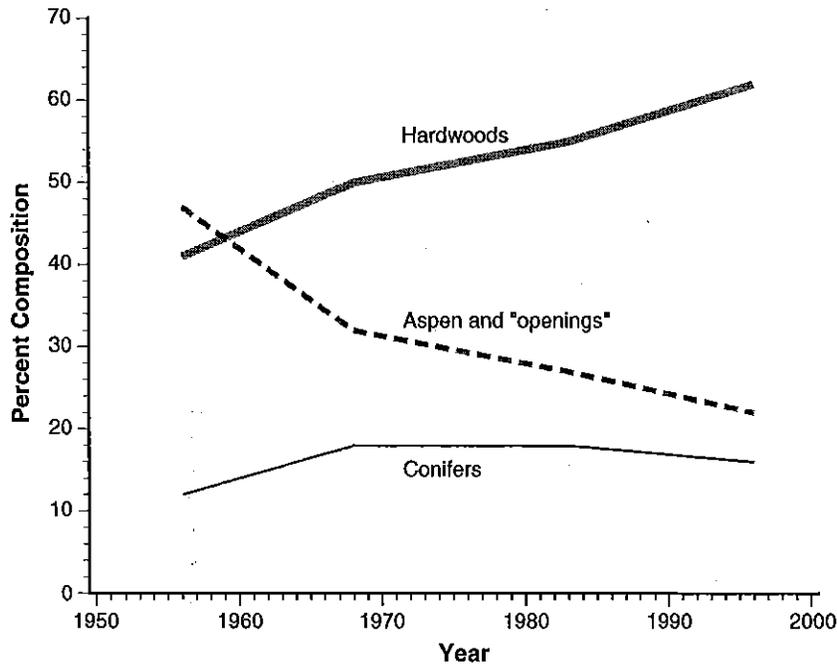


Figure 9. Statewide forest composition trends, 1956-1996. Local deer carrying capacity is strongly related to the proportion of the forest that is in aspen and "openings" (meaning grass, upland brush, and clear-cut). Carrying capacity in forested regions continues to decline. The presence of agricultural crops for food is a more important factor for deer carrying capacity in the farmland regions.

Severe winters are a reflection of climate and seem to occur in northern Wisconsin on average about once every 3+ years. Winter deer losses are normal at this latitude since it is near the northern limit of white-tail range (ending in southern Canada). Some losses will occur irrespective of deer population size, but losses will be minimized if herds are maintained well below maximum carrying capacity.

Social Carrying Capacity

In some areas of the state, the deer population is limited less by biological carrying capacity than by people's tolerance of deer-damaged crops; car-deer collisions; damage to commercial forests, orchards, and ornamental plantings; damage to natural plant and animal communities; and public health problems. This limit is sometimes referred to as **social carrying capacity**. In the farmlands, where agricultural crops provide prime deer forage, the deer management units could carry 80 to 100 (or more!) deer per square mile—but impacts, such as increased car collisions and damage to vegetation and natural plant communities, would be unacceptable to many people.

Agricultural Damage

High populations of deer are responsible for 90% of the wildlife crop damage reported in Wisconsin. The Wisconsin Department of Agriculture, Trade and Consumer Protection estimated agricultural damage caused by deer in 1984 at \$37 million. Wisconsin's deer population is even higher now. In 1993 the U.S. Department of Agriculture conducted random damage appraisals in 14 eastern

In some areas of the state, the deer population is limited less by biological carrying capacity than by people's tolerance of deer-damaged crops, car-deer collisions, and damage to other vegetation.

states to determine deer damage to corn crops. Wisconsin was found to have the most severe damage among the states sampled, with corn damage alone estimated at \$15 million.

Conflicts have occurred between farmers (traditional crop farmers, Christmas tree farmers, orchard growers, cranberry growers, and many other agriculturists), who are trying to protect their crops, and a public that wants abundant deer for viewing and hunting. Shooting permits for deer causing agricultural damage have been a focal point for this conflict. In deer management units where populations are over goal, or where overwinter goals are 30 to 35 deer per square mile of deer range, there is high demand for deer-damage shooting permits. Since 1987, 4,473 deer-damage shooting permits have been issued by DNR and 38,789 deer have been killed under these permits (Figure 10).

The DNR's responsibility for the management of the state's deer includes working with **all** stakeholders in the deer resource. DNR has a long history of providing assistance to growers with deer damage to crops in order to promote a tolerant coexistence with wildlife. Wisconsin has had a deer-damage assistance program for agriculturists since 1931; the most recent program to serve this purpose is the Wildlife Damage Abatement and Claims Program (WDACP). The

primary purpose of this program is to provide prevention measures to reduce deer damage to crops.

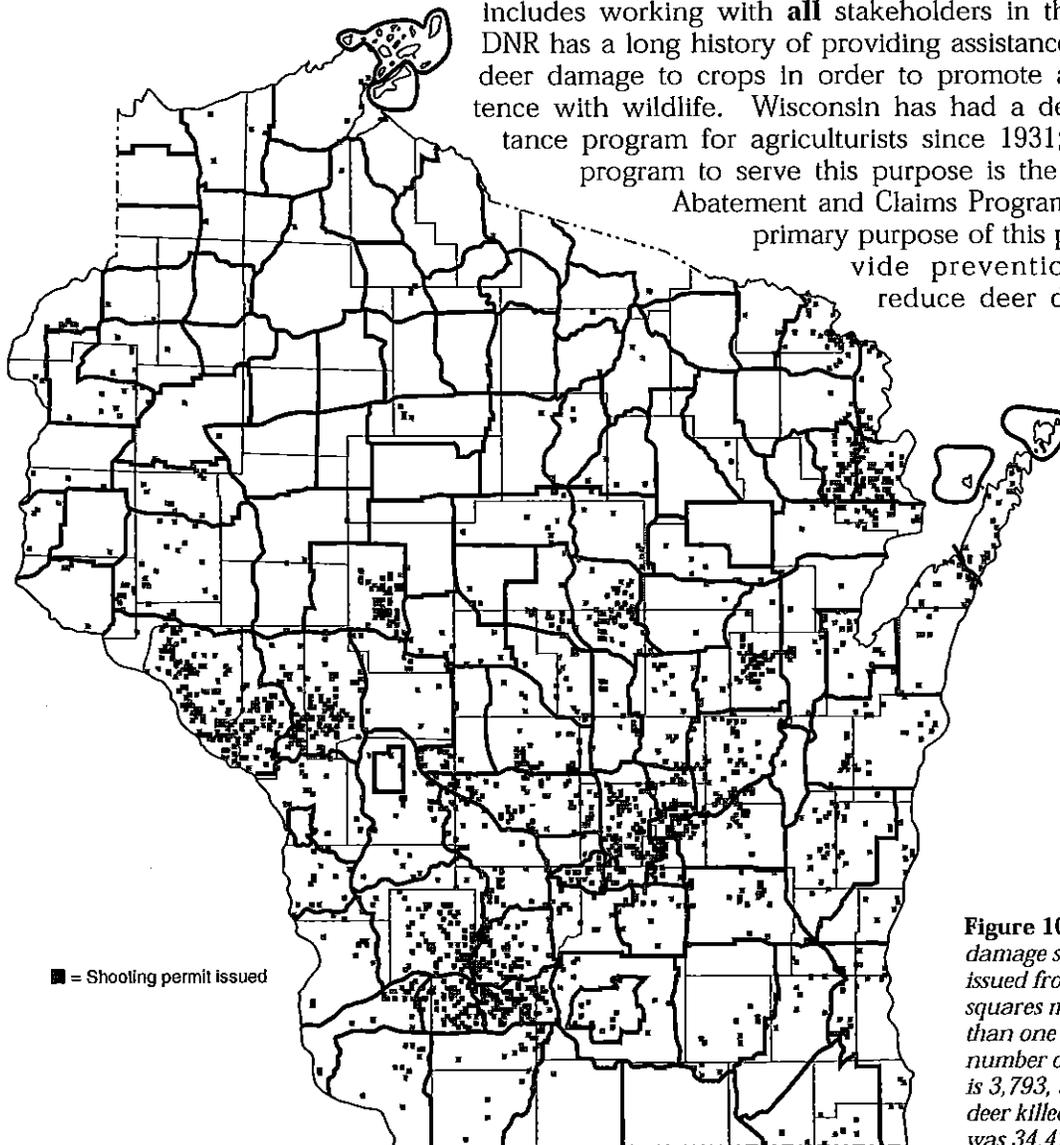


Figure 10. Locations of deer-damage shooting permits issued from 1990-1997. Single squares may represent more than one landowner. The number of permits represented is 3,793, and the number of deer killed under these permits was 34,474.

The program also provides compensation for damage appraised by a county specialist (Figure 11).

Since the WDACP began in 1984, over \$19 million of hunters' money, \$1.5 million of Wisconsin taxpayer dollars, and \$2.5 million of federal funding have been spent on deer damage. Program expenditures for compensation of claims have more than doubled from 1993 to 1997, and abatement costs are again on the increase. These expenditures have included building 613 miles of permanent deer fences, 505 miles of temporary deer fences, and application of 16,466 gallons of deer repellent. At existing population levels, demand for deer-damage control will continue to increase, meaning increased demand for shooting permits, prevention assistance, and compensation—and greater conflict among Wisconsin citizens.



PHOTO: L. STOWELL

This photo shows deer damage to an alfalfa field. Appraisers use enclosure fences to calculate how much crop is lost to deer damage.

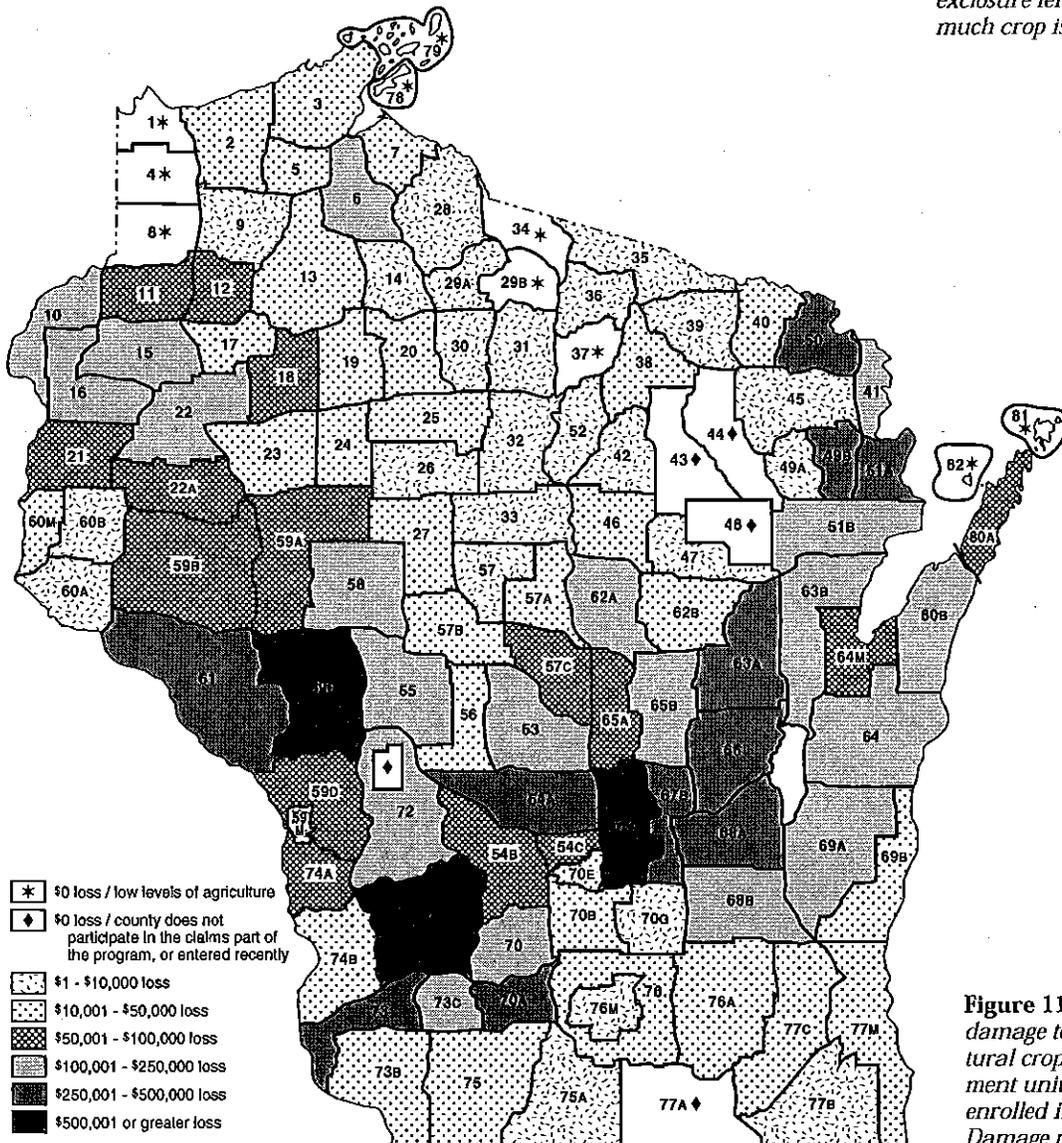


Figure 11. Total appraised damage to Wisconsin agricultural crops, by deer management unit, in those counties enrolled in the DNR Wildlife Damage program, 1990-1996.

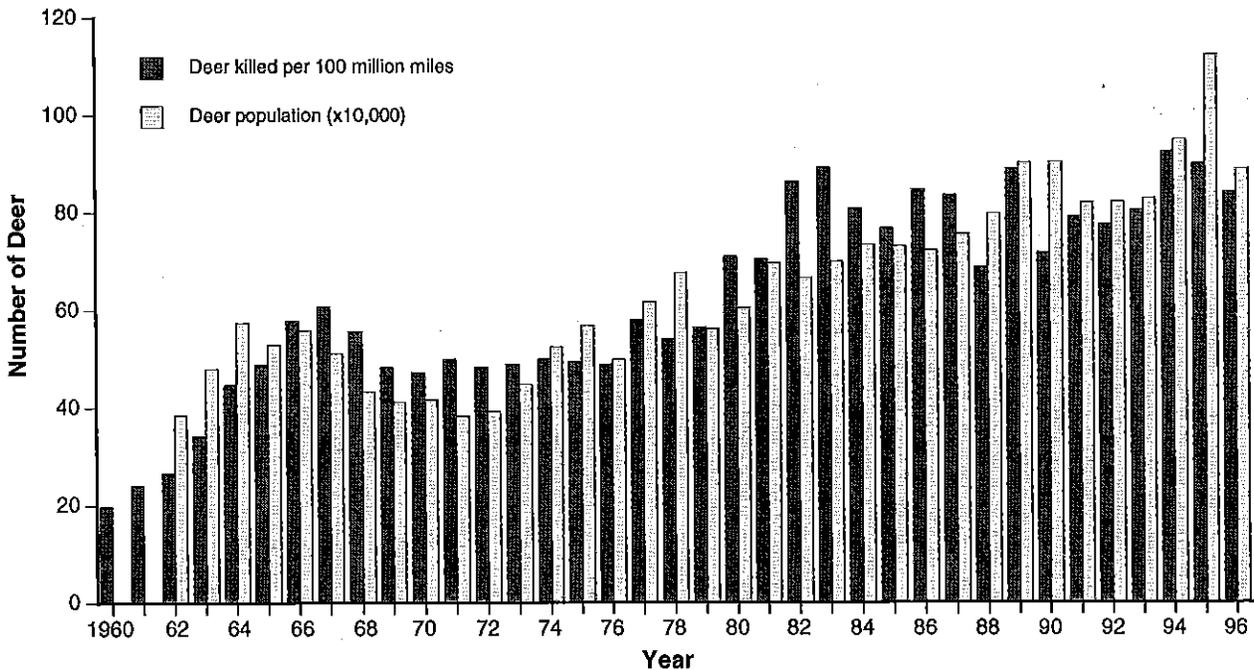
Deer-Vehicle Accidents

Research during the late 1960's and early 1970's demonstrated that the number of deer-vehicle accidents is determined by both the density of deer and the volume of traffic. When increases in traffic volume were accounted for, the number of deer-vehicle accidents closely paralleled the number of bucks harvested per 100 square miles. Changes in buck harvest density is a good measure of changes in the total deer population. Many Midwestern states use roadkill frequency as an index to deer population changes.

Further research during the 1970's estimated that 18,200 deer were killed by vehicles each year during 1976-78. Accident victims suffered an estimated \$7.4 million per year in property damage during this period. Since that time, the reported number of vehicle-killed deer has more than doubled, to a high of 46,443 during 1994-95 (Figure 12). In 1997, there were more than 44,000 reported vehicle-killed deer. Combined property damage and personal injury resulting from deer-vehicle accidents was recently estimated at over \$100 million per year (Wisconsin Insurance Alliance).

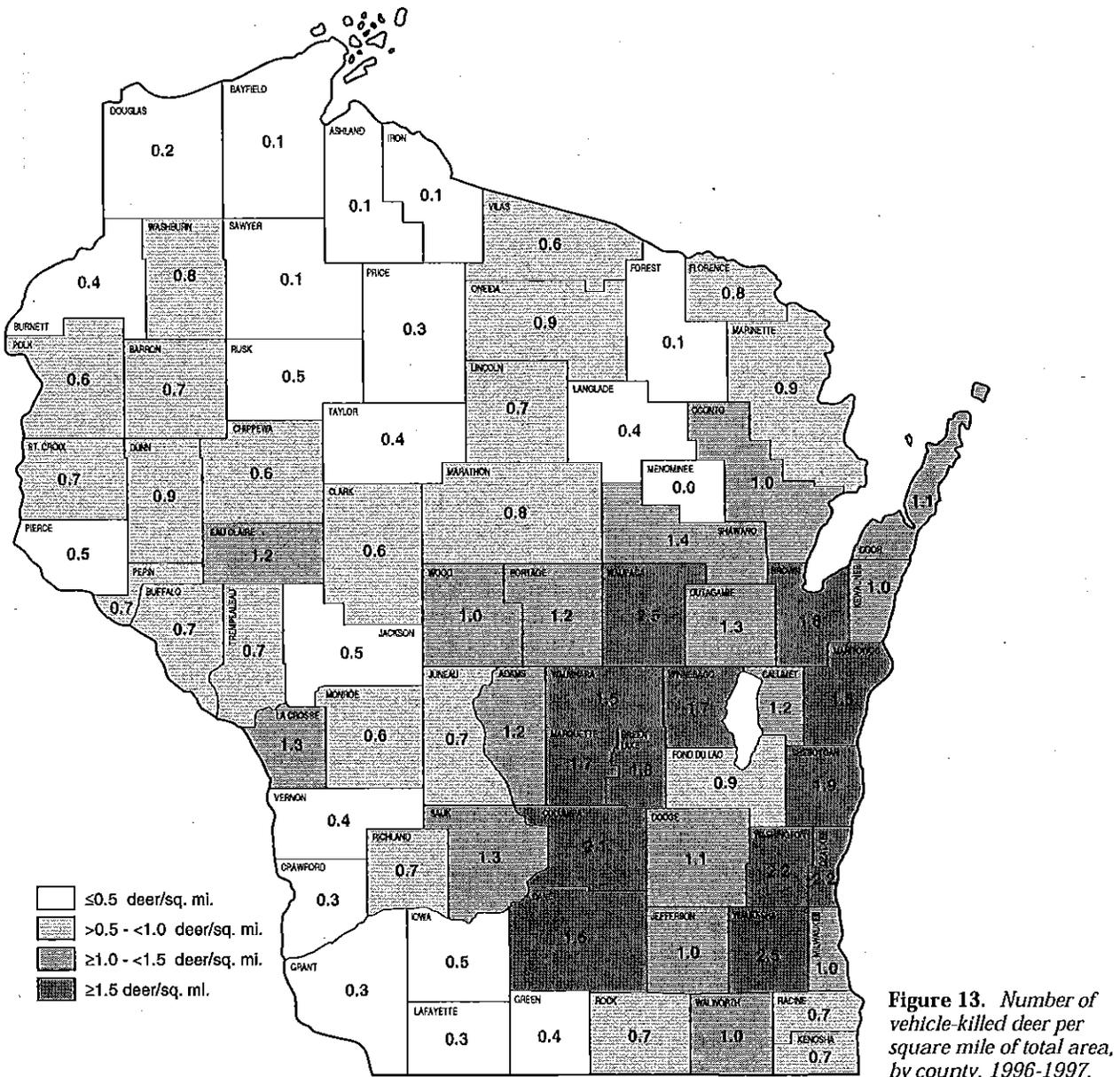
During 1996-97 the density of vehicle-killed deer (number of deer killed per square mile of total land area) was highest in Ozaukee, Washington and Waukesha counties (Figure 13). This is likely due, in part, to the large volume of commuter traffic in these highly suburbanized counties. High commuter traffic likely also contributes to the high frequency of road-killed deer in Dane County and between Sheboygan and Brown counties. A third area of high deer-vehicle accidents is a region of six counties in central Wisconsin extending from Waupaca County south to Columbia County. This region has the highest overwinter population goals in

Figure 12. Number of vehicle-killed deer per miles driven, compared with statewide deer populations in Wisconsin, 1960-1997. Both deer populations and deer collisions have increased more than two-fold in 35 years.



the state—30 to 35 deer per square mile of deer range. Undoubtedly, the high deer populations in this region are a principal cause of high rates of deer-vehicle collisions.

Low roadkill densities in some counties are the result of low traffic volumes, so don't necessarily indicate that past deer goals have been acceptably low. But high roadkill rates in other counties may suggest deer populations are uncomfortably high. Risk of deer-vehicle crashes has not been reduced by vehicle-mounted whistles, roadside reflectors, or fencing. The only known way to efficiently reduce deer crash hazards, without reducing traffic, is by reducing deer populations.



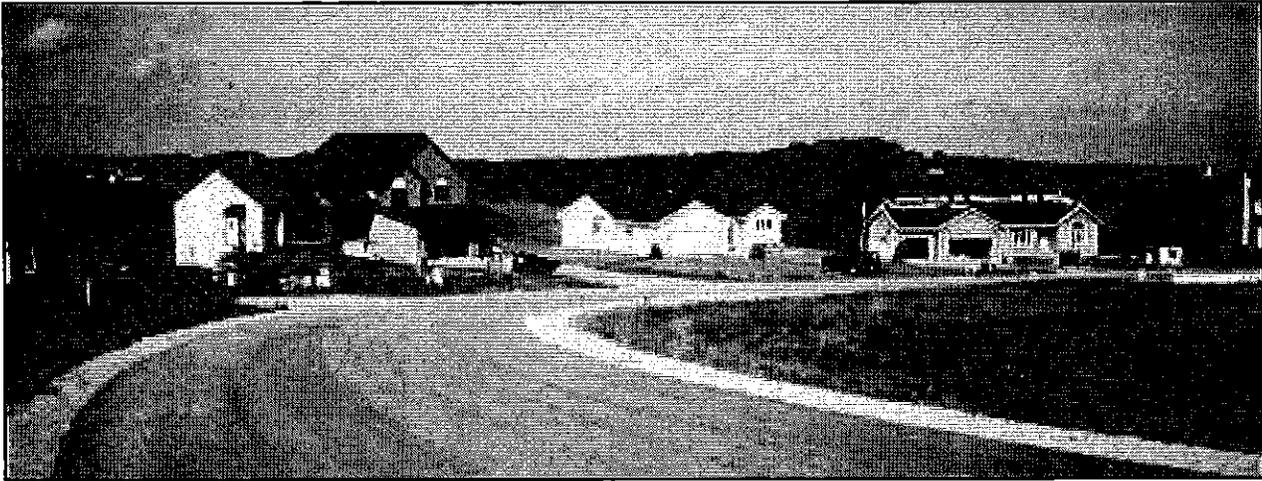


PHOTO: K. WALLENFANG

Rural development can benefit deer by providing a relatively danger-free life, protected from hunting, with easy access to gardens and ornamental shrubs for food. Deer densities may increase under these conditions, and nuisance situations often result.



PHOTO: M. WERNER

Forestry and Ornamental Plant Damage

Large numbers of deer can affect valuable trees, shrubs, and flowers of forest owners and homeowners. Some foresters have encountered problems regenerating preferred tree species following logging operations due to deer browsing on the seedlings. A few industrial forest owners have even considered selling their land and buying other lands where deer herds have less of an impact on their "bottom line." Some Christmas tree farmers have resorted to high-priced electric fencing to protect their crops. Landowners trying to establish stands of trees have sometimes resorted to expensive tree tubes to help seedlings survive where large deer herds exist. Pine and oak, important to wildlife as well as timber production, are among the most problematic species. While the same number of deer will have different impacts in different areas, some foresters in the central and northern regions have reported substantial problems where deer populations exceeded 20-25 per square mile of deer range.

Homeowners in both rural and suburban settings often complain about deer eating their prized landscaping plants as well as their gardens. Deer will browse trees and shrubs planted for windbreaks, screens between neighbors, backyard wildlife habitat, and scenic beauty. They will often bite off flowers, if not whole plants, in annual and perennial gardens.

Public Health Problems

Deer live with natural environmental stress factors such as food shortages, weather extremes, overcrowding, and nutritional and reproductive demands. Any one of these stressors, but more likely a combination of them, can push deer into a less than healthy state. Disease occurs when deer are in this less than healthy state.

Deer can carry diseases that may infect people. Diseases deer carry usually only cause sickness in people, and are usually passed from deer to people through contact with deer fecal droppings. These diseases include virulent *E. coli*, and cryptosporidium. Deer may aid in the spread of Lyme disease to people because they carry the tick which harbors the Lyme disease-causing bacteria. However, many other mammals, especially small rodents, also carry this tick.

Deer can carry diseases that may infect domestic and captive exotic livestock and cause death or sickness in these animals. The chance of disease transmission increases when the deer population is high and in close proximity to livestock. Deer and livestock may pass diseases between populations, including epizootic hemorrhagic disease; bovine virus diarrhea; chronic wasting disease; lung, stomach, or brain worms; and bacterial diseases including brucellosis, tuberculosis, salmonellosis, and *E. coli* infections. Ongoing research will tell us which diseases Wisconsin deer carry and which are of major concern for people and livestock.

Deer can carry diseases that may infect people and domestic and captive exotic livestock.

DEALING WITH DEER IN URBAN AREAS

Managing urban deer populations has become a challenge in Wisconsin. White-tails thrive in the urban "fringe" areas where food and shelter are plentiful and hunting pressure is low or absent. Deer are common in habitat corridors along rivers and streams, parkways, nature centers, the edges of airports and golf courses, and in many residential areas. Although some deer provide much enjoyment for the people who view or hunt them, too many deer in urban areas is a problem that has required special management strategies. Recreational feeding often worsens problems of too many deer.

In areas where the discharge of firearms or bows is allowed, the regular deer hunting season is still the primary tool for managing deer populations. To increase the effectiveness of the hunting season near urban areas, three "metro" deer management units were established in 1992 that provide liberal bag limits for antlerless deer and in some cases a longer gun or bow season. Currently, there are five metro deer units surrounding the Milwaukee, Madison, La Crosse, Green Bay and western St. Croix County metropolitan areas (see Figure 3).

In some areas where regular hunting is banned by local ordinances, other control methods are being used. Two communities trap and re-locate deer, but most communities starting new programs are opting for "sharpshooting," using archery hunters within the expanded metro deer season framework. Deer removed under sharpshooting permits are generally donated to charitable organizations, and revenue gained from the sale of live deer is returned to the state's fish and wildlife account. Contraception of deer is being studied in several states, but is not yet considered a practical or acceptable method for free-ranging deer in most areas.

The DNR has recently added expertise in urban wildlife management and administers a new matching grant program to help fund urban wildlife damage abatement and control. Communities will be able to apply for up to \$5,000 in matching funds for projects to plan wildlife damage abatement measures and/or to engage in wildlife control efforts.

Effects of Deer on Other Animals and Plants

The effects of deer on other animals and plants is an area of concern that has recently received a great deal of research attention. These effects may vary considerably, depending on the number of deer, the part of the state, and a variety of other factors. Where deer numbers are very high, the evidence is obvious. Small fenced areas (deer exclosures) around the state have long shown that high deer populations or local deer concentrations can greatly reduce the variety and abundance of plants growing in a forest. The extreme situation is an un hunted deer population, which causes a forest to look like a park where only trees with branches out of the deer's reach can survive. However, there is growing evidence of negative ecological impacts with smaller numbers of deer, particularly where deer carrying capacity is low. While not all research results apply to all landscapes in all areas of Wisconsin, studies show the following effects or trends:

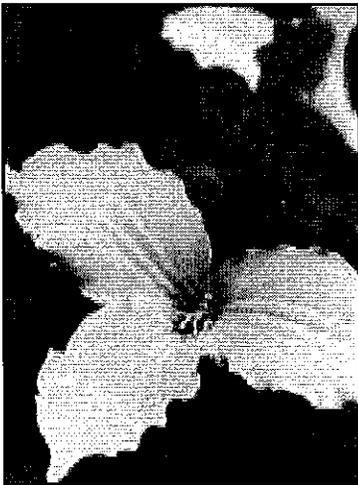


PHOTO: R. QUEEN

High deer populations affect the vigor, reproduction, and abundance of plants like this trillium.

High deer numbers reduce habitat for other animals such as this shrub-nesting hooded warbler.

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- ☛☛ Herbaceous plants may be reduced in abundance and diversity as deer numbers rise above 12-15 per square mile. A common example is the Trillium. Examples of vulnerable rare species include the Indian cucumber, showy lady's-slipper, and white-fringed orchid.
- ☛☛ Tree and shrub species composition can change with reduced regeneration as deer numbers rise above 20-25 per square mile. Pines, white cedar, hemlock, oaks, and Canada yew are examples of vulnerable trees and shrubs.
- ☛☛ Large numbers of deer may affect rare insects that are dependent on one or a few plant species that are also preferred for food by deer. A potential example is the federally endangered Karner Blue Butterfly that depends on wild lupine for its larval stage.
- ☛☛ Small mammals dependent on forest floor vegetation may be reduced as deer numbers exceed 25 per square mile. An example of a potentially affected small mammal is the red-backed vole.
- ☛☛ The number and diversity of the bird population may be reduced as deer populations rise from 15 to over 35 per square mile due to impacts on ground level vegetation, the shrub layer, and tree species composition. An example of a vulnerable bird is the shrub-nesting hooded warbler.
- ☛☛ Moose may not be able to inhabit otherwise suitable habitat if deer numbers exceed 12-15 per square mile due to a brainworm that is harmlessly carried by healthy deer, but often fatal to moose.
- ☛☛ The number of wolves that can be supported in a suitable landscape generally increases with the size of the deer population, a primary prey species.

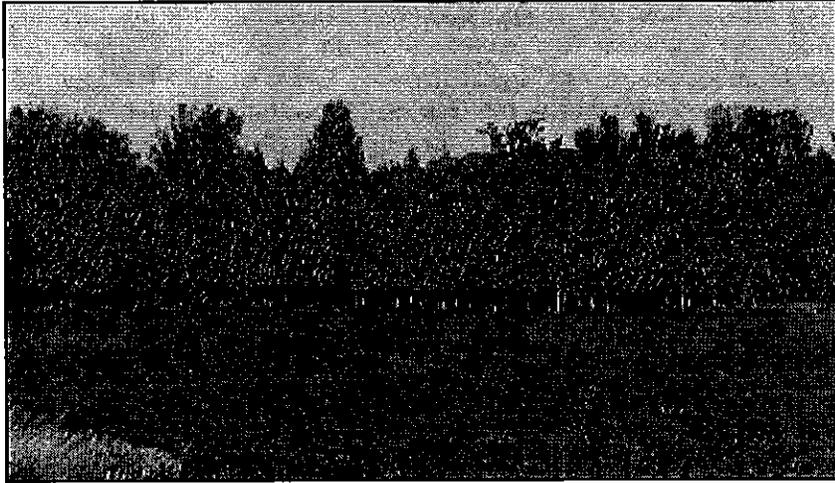


PHOTO: K. MCCAFFERY

This "browse line" was created by hungry deer. Deer damage can prevent regeneration of some types of trees.

How Biological and Social Carrying Capacity and Ecological Impacts Affect Overwinter Population Goals

Both biological and social carrying capacity, as well as ecological impacts, affect the decision-making process when overwinter population goals for each unit are reviewed. Many Wisconsin citizens want lots of deer in the state—to see them and to hunt them—and wildlife managers and researchers are committed to enhancing that opportunity. But large deer populations also collide with the property and priorities of many other people, as well as with other animals and plants. With increased public interest in the impacts of deer on the natural community (and more research providing information on the problems) this aspect of deer management has recently gained increasing consideration when we establish deer population goals. Wildlife management personnel are sensitive to these diverse issues and strive to strike a balance among the many interests. Setting unit goals is a process that must include both the scientific and social aspects of the picture.

Recruitment is an important biological concept in understanding how we determine deer management goals. Recruitment is the number of fawns born in spring that survive to the hunting season. To maintain a population at a particular goal, a number of deer equal to the annual recruitment must be removed by harvest and other non-harvest losses (such as poaching, accidents with cars and farm equipment, predation, disease, and starvation). If harvest and non-harvest losses are less than recruitment, the population will increase. If harvest and non-harvest losses are more than recruitment, the population will decrease.

Recruitment is a tricky concept to understand because it's not a constant—it varies not only with habitat and weather, but also with the size of the population. Here's how it works: as deer populations increase and there's less food available per deer, the percentage

Reviewing and setting overwinter population goals for each deer management unit is a process that must include both the scientific and social aspects of the picture.



DNR PHOTO

The greatest number of fawns (and thus the largest sustainable harvest) are produced when the population is at an intermediate level.

of yearling does that bear fawns decreases and the number of older does that bear two fawns decreases. So when the population is at maximum biological carrying capacity, the number of does in the population is highest, but the number of fawns produced by each doe is lowest. Because of this dynamic relationship between population size and rate of reproduction, it turns out that the greatest number of fawns (and thus the largest sustainable harvest) are produced when the population is at an intermediate level. As population density increases beyond this point, total fawn production decreases. Also, at higher population densities, fewer fawns survive the winter because their small size makes it harder for them to reach the woody browse that adult does and bucks eat when other food gets scarce.

The result of lower recruitment and poor overwinter survival is that few deer are available for harvest when populations are held at densities near maximum biological carrying capacity. This is true for both antlered bucks and antlerless deer. In contrast, when deer populations are held at intermediate densities, larger harvests are possible. In fact, large antlerless harvests are required to hold deer populations at intermediate densities because of the large production of fawns. Physical condition of all deer is much better at intermediate rather than high population levels.

Here's an example. In the northern forest, where maximum biological carrying capacity averages 30 deer per square mile of deer range, the largest allowable harvest is reached when the overwinter population density is kept at about 15 deer per square mile, or about 50% of maximum carrying capacity (Figure 14). At this density, approximately 3.4 antlered bucks and 3.4 antlerless deer could be harvested per square mile each year without reducing the size of the population for the following year. If this same deer population was held at 27 deer per square mile (about 90% of maximum carrying capacity), then only 1.2 antlered bucks per square mile could be harvested on a sustained basis. If overwinter population goals are set at or near maximum carrying capacity, then the herd will be in poorer nutritional condition, antler development will be poor on bucks of all ages, deer will enter winter with low fat reserves, and they will be especially vulnerable to winter severity. A greater percentage of the herd will die during severe winters than in herds held at lower densities. Survival of newborn fawns will be low. It will take longer for these herds to return to goal level following periodic severe winters.

Currently, overwinter population goals for most units in the north are set at approximately 65-70% of the estimated maximum biological carrying capacity. At this level, densities are high enough so there is a good chance of seeing deer and sustainable harvests can be relatively high while still leaving a population level that will remain at goal. Populations at this level tend to be self-regulating—if they are reduced in one year either by over-harvest or severe winter there will be more fawns born in subsequent years and the population will rapidly return to goal levels. Likewise, if the population is under-harvested and allowed to

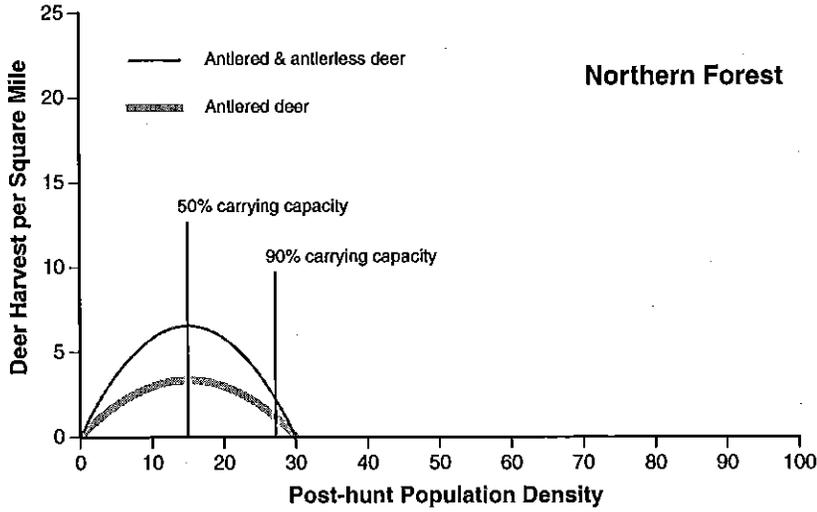


Figure 14. Sustainable harvest for a maximum biological carrying capacity of 30 deer per square mile. This carrying capacity is typical of the northern forest region. Note that the largest number of deer can be harvested when the population is at about 50% of carrying capacity.

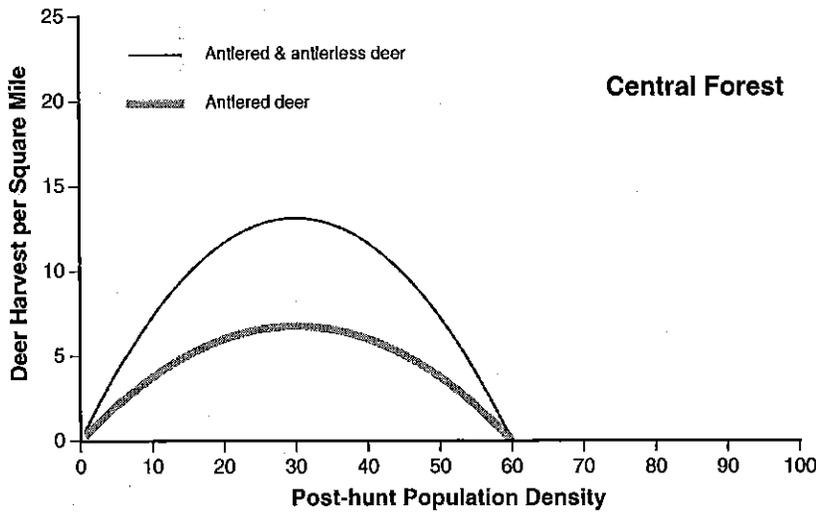


Figure 15. Sustainable harvest for a maximum biological carrying capacity of 60 deer per square mile of deer range. This carrying capacity is typical of the central forest region.

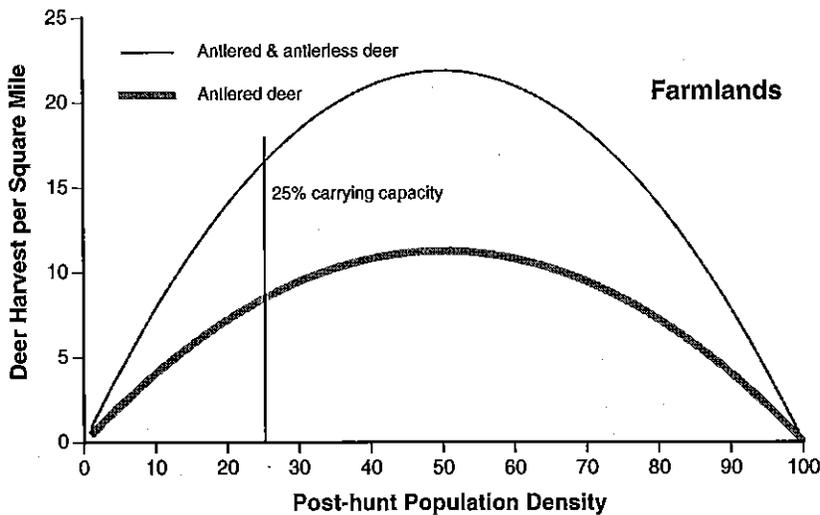


Figure 16. Sustainable harvest for a maximum biological carrying capacity of 100 deer per square mile of deer range. This carrying capacity is typical of the farmland region. Because of conflicts between deer and people in this part of the state, overwinter population goals are generally set well below 50% of carrying capacity.



In the farmlands, it has become increasingly difficult to keep harvest levels high enough to hold the population at goal. During the last decade, many farmland units have had a greater supply of deer than what hunters would (or could) harvest. If the population goals were increased further, the problem would get even worse.



DNR PHOTOS

grow, fewer fawns will be added to the large population, and it is relatively easy to correct the under-harvest in subsequent years to return the population to goal levels.

In the central part of the state, conditions for deer are quite different than in the northern forest and the farmlands. The winters in this region are much more moderate than in the north, but—although there is agricultural interest in the central forest area—the food base for deer is not nearly as rich as it is in the farmlands. Social carrying capacity starts to play a greater role in this region, with higher rates of agricultural damage and deer-vehicle accidents. Maximum biological carrying capacity for most units in the central part of the state is about 50-60 deer per square mile of deer range (Figure 15). Overwinter population goals in this area are currently 55-60% of carrying capacity.

In the farmlands, there is an abundance of food for deer. Maximum biological carrying capacity in this region may be as high as 100 deer per square mile of deer range—and much higher in some units (Figure 16). The management challenge here is different than other areas of the state. Large harvests of antlerless deer are required to hold the population at levels that meet social carrying capacity. Overwinter population goals for most units are less than 50% of maximum biological carrying capacity, but with such a large carrying capacity, that's still a huge number of deer. Because the population is kept well below carrying capacity, the reproduction rate stays very high every year. As overwinter population goals have increased during the last decade, total annual recruitment has increased, and it has become increasingly difficult to keep harvest levels of antlerless deer high enough to hold the population at goal. During the last decade, many farmland units have had a greater supply of deer than what hunters would (or could) harvest. If the overwinter population goals were increased further, the problem would get even worse. This is the ultimate challenge in balancing the realities of biological carrying capacity with the realities of social carrying capacity.

Adding further complexity to the goal-setting process are the ecological implications of potential deer population goals. The impacts depend on the plant and animal communities in question, the abundance of alternative foods such as agricultural crops, whether or not deer in the area congregate in dense groups in winter, the impacts of winter feeding on deer distribution, and winter weather conditions. For example, a population density of 15 deer per square mile might have few negative consequences for other animals and plants in the farmland region, where there is an abundance of alternative foods, biological carrying capacity is high, and deer remain well-distributed in winter. In contrast, 15 deer per square mile may have significant ecological consequences in the northern forest region, where biological carrying capacity is low, few alternative foods are available, and deer migrate to concentration areas in winter. Some have even suggested that northern deer goals be set below 50% of biological carrying capacity to maximize the diversity and abundance of other animals and plants.



REGIONAL POPULATION TRENDS

Northern Forest

The northern forest contains about 15,000 square miles of deer range. Deer populations reached their all-time peak abundance in the early 1940's following the extensive logging and fires of prior decades, which greatly increased growth of herbs and shrubs. Populations were also high in the late 1940's and late 1950's. More recently, populations peaked in 1964 when surveys indicated a region-wide population of about 400,000 deer (Figure 17). The population then declined to fewer than 200,000 following a series of severe winters. Five out of eight winters from 1964-65 through 1971-72 were severe, ending with back-to-back severe winters in 1970-71 and 1971-72. Populations recovered to goals with periodic impacts of severe winters between 1972-73 and 1985-86. The winter of 1986-87 was the mildest winter on record and was followed by a sequence of mild winters during the late 1980's and early 1990's. The deer herd responded with rapid growth. In 1992, poor recruitment and impaired hunting conditions, combined with an unexpected decline in buck harvest, caused a loss of public confidence and support for the management program among the leadership of the sportsmen's Conservation Congress. Consequently, antlerless gun quotas in 1993 were reduced to zero in many northern units despite a mild 1992-93 winter. The deer herd again "exploded" with back-to-back mild winters, and reached a "modern" high post-hunt population of 500,000. A liberal 1995 harvest and a record severe 1995-96 winter resulted in a significant herd correction. A second severe winter in 1996-97 caused conservative antlerless quotas in 1997. However, the effect of the second severe winter was not as great as expected, so herds remained about 20% above goals following the 1997 hunt.

Unit overwinter population goals were initially established in 1962. Despite several reviews and three decades of additional experience, the goals and boundaries have undergone only minor changes. During the mid-1980's, northern deer management was carefully reviewed by the courts and the Chippewa tribe as part of treaty litigation. At that time an independent expert calculated the maximum biological carrying capacity for northern Wisconsin to be about 400,000 deer, with recommended overwinter population goals of about 65-70% of maximum carrying capacity. Our most recent goals total about 270,000 deer, or 70% of maximum carrying capacity.

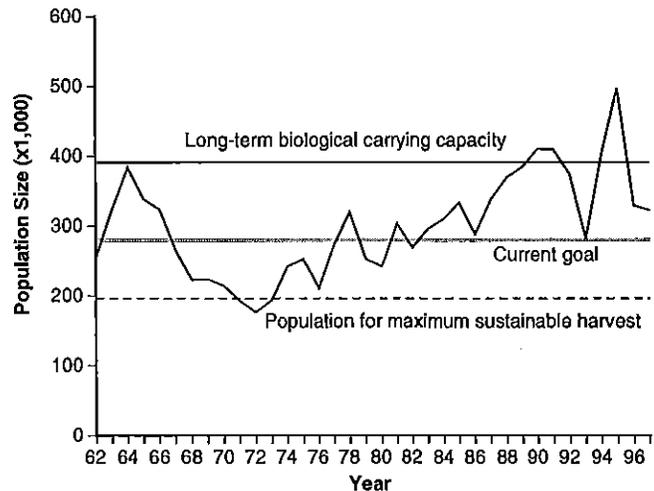


Figure 17. Northern Wisconsin forest January deer population estimates, 1962-1997, compared with the current overwinter population goal, maximum biological carrying capacity, and population level for highest sustainable harvest. Compare this graph with Figure 8—note that when the winters are severe populations fall, and when winters are mild, populations bounce back.



PHOTO: R. QUEEN



Central Forest

The central forest contains about 2,300 square miles of deer range. Overwinter density goals in the central forest have traditionally been higher than in the northern forest because of the longer growing season. Severe winters occur only about half as often here as in the northern forest. However, severe northern winters from 1964-65 through 1971-72 clearly impacted the central forest deer population, as did the winter of 1978-79. The fall blizzards of 1991 also set in motion conditions that caused a major loss of deer in much of the central forest (Figure 18). Reproductive data (recruitment rates) and intensive studies at the Sandhill Wildlife Area (in Unit 56, Wood County) suggest that maximum biological carrying capacity for this region may average about 55 deer per square mile, or about 125,000 deer. The current goals allow an annual harvest very near the long-term sustainable maximum.

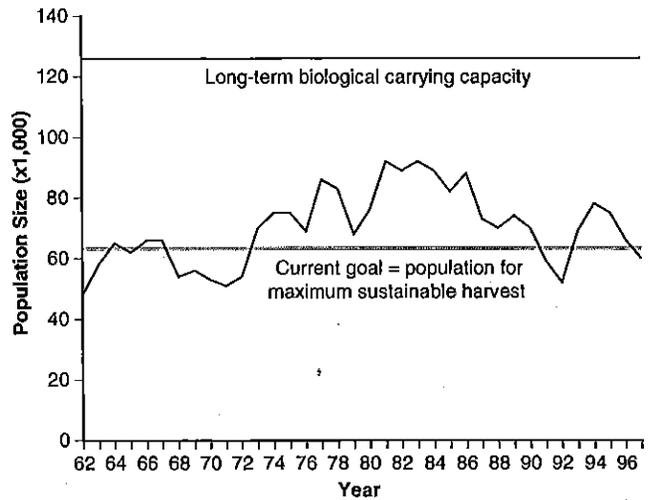


Figure 18. Central Wisconsin forest January deer population estimates, 1962-1997, compared with the current overwinter population goal, maximum biological carrying capacity, and population level for highest sustainable harvest.



PHOTO: R. QUEEN



Farmlands

The most recent deer range inventory measured about 17,000 square miles of deer range in the farmlands of Wisconsin, or about half the deer range in the state. Maximum biological carrying capacity for deer here is very high (100+ per square mile), with intermixed farms and woodlots providing prime deer habitat. However, the maximum number of deer that could be produced in this region is well beyond what people would tolerate.

Overwinter population goals were initially established in 1962, at a time of few deer and few conflicts with people. Since that time, overwinter goals have doubled but deer populations in this large area have increased more than five-fold (Figure 19). As goals have been gradually adjusted upward, herds have grown and agricultural damage has increased. Deer populations exceeded goal levels during the early 1980's and again in the late 1980's. Populations were reduced to near-goal in the early 1990's, but conservative quotas in 1993 allowed the population to greatly exceed goal. Recent high harvests are bringing the population nearer to goal. Current overwinter population goals in the farmland units of the state average about 22 deer per square mile of deer range. Human tolerance seems to have been exceeded in much of the farmland. In recent years, crop damage complaints have become more numerous, and nearly \$3.5 million has been spent on damage abatement. Deer-vehicle crashes and damage to oak and pine have also become major concerns.

Relatively high overwinter population goals, highly productive deer, urban sprawl, and shrinking hunter access have caused great difficulty in maintaining herds at goals in many units. For some people, the current abundance of deer has cheapened their value for hunting and viewing. Lower goals and fewer deer numbers may restore their charm and mystery.

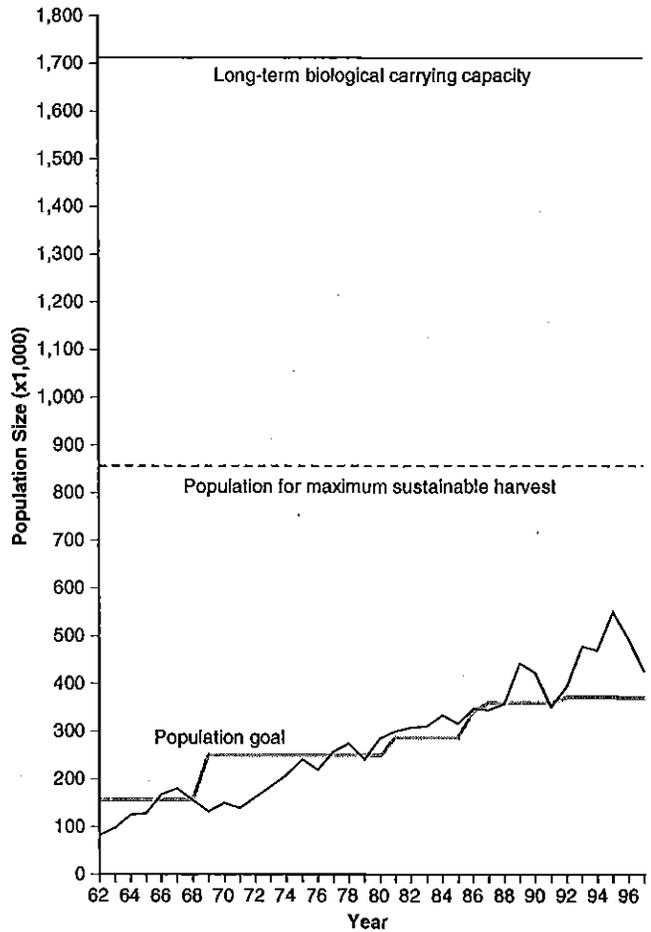


Figure 19. Wisconsin farmland January deer population estimates, 1962-1997, compared with the historical overwinter population goal, maximum biological carrying capacity, and population level for highest sustainable harvest.

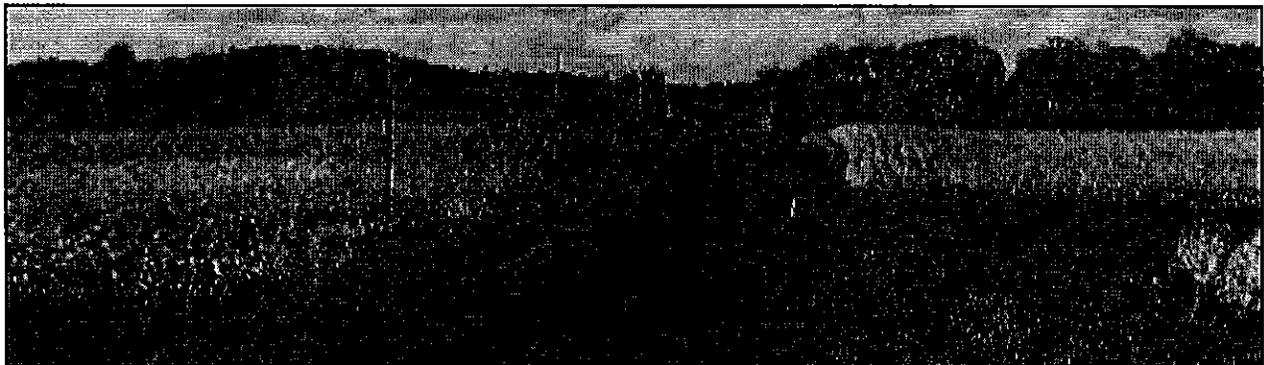


PHOTO: A RUSCH

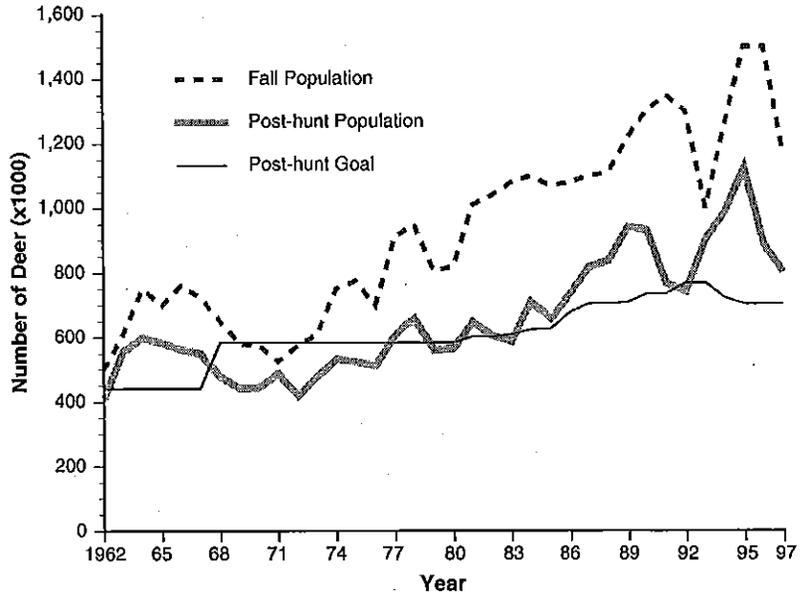
SUMMARY

1. The white-tailed deer is a very important part of the Wisconsin landscape. The popularity of deer in this state combined with the size of the herd translates into a wide variety of both positive and negative impacts on our economy and our way of life.
2. The economic value of deer in Wisconsin is a major factor in our recreational economy. In addition to direct expenditures, there are many deer-related benefits to Wisconsin citizens and communities. Deer are also very important to Wisconsin's native people, including the Chippewa, who have treaty rights to deer harvests.
3. Deer are also associated with some significant problems, including crop damage, deer-vehicle collisions, commercial timber damage, ornamental plant damage, and health and safety issues. These negative impacts translate into what we call **social carrying capacity**, which is the limit to which the human population will tolerate the problems associated with deer.
4. Deer can have major impacts on the natural communities in which they live. Deer grazing and browsing can affect the composition and structure of the plant community and consequently the animals depending on this vegetation for habitat.
5. **Deer management units** are areas of similar land use bounded by major roads or rivers, which give managers a framework for gathering data. Managers record deer harvests and other important information for each unit every year; over time, a history of the unit evolves. The unit history is an essential tool for managers, especially for predicting herd status each fall. Changing unit boundaries breaks the unit history and greatly diminishes the usefulness of unit data.
6. **Deer range** is usable deer habitat, including all permanent cover at least ten acres or more in size and includes borders of agricultural fields next to permanent cover. The amount of deer range varies greatly among deer management units. By using deer range instead of overall area, we have a standard basis for comparing deer densities and their impacts among deer management units.
7. Wisconsin's deer herd is managed by setting **unit overwinter population goals** for each deer management unit in the state. The two main factors that come into play in setting unit goals are **biological carrying capacity**, which is the maximum number of deer that can survive on the land, and **social carrying capacity**, which is the number of deer that people can tolerate. The need to balance the positive and negative impacts of deer on humans makes the process of setting overwinter population goals much more complicated. With increasing research and interest in the effects of deer on other animals and plants, ecological impacts are a growing consideration in this process.

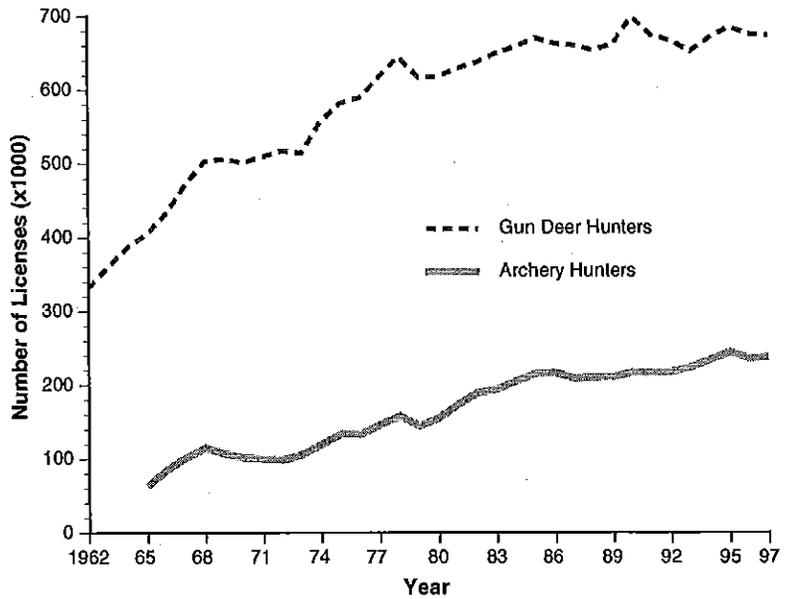
8. Deer managers monitor deer populations in each unit and determine whether they are above, at, or below goal. These population estimates are based on harvest registration, deer aging, hunting season stability, and summer observations of the ratio of fawns per doe.
- **Harvest registration** provides information on the number of deer harvested, the date and location of harvest, and the sex and age of harvested deer.
 - With **uniform hunting seasons**, managers have found that buck harvest trends closely track deer population trends and population data is more easily interpreted.
 - **Ages of harvested deer** are important because they provide the basis for determining mortality rates (how fast deer die), recruitment rates (how fast deer are added to the population), and adult sex ratios (how many bucks to how many does).
 - The **ratio of fawns to does** provides an index to current reproductive rates.
 - The **Sex-Age-Kill** formula is a mathematical model that combines harvest, age, and fawn-to-doe ratio data to estimate the size of the deer population.
9. Because **winter weather** is a key factor in herd survival and fawn production in northern Wisconsin, the Department of Natural Resources determines a Winter Severity Index each year. The index allows winter weather to be factored into a formula for predicting survival and reproduction, and it provides a long-term picture of how deer populations are affected by multiple years of severe or mild weather. It is important to consider long-term patterns (30+ years) of winter severity in the goal-setting process because short-term patterns are unpredictable.
10. Harvest quotas are based on **fall population predictions**. The overwinter deer population for each deer management unit is calculated based on data from the harvest of the previous fall. This estimate is the starting point for predicting the herd status for the following fall. The history of herd responses to varying winter severity, antlerless harvest levels, and hunting conditions in each deer management unit is extremely important for providing the perspective needed to accurately predict future herd status. *When unit boundaries are changed, we lose that essential historical perspective.*
11. To manage a herd to be at goal, we set harvest **quotas** for "antlerless deer" so that enough does will be harvested to control herd growth.
- (continued on next page)*

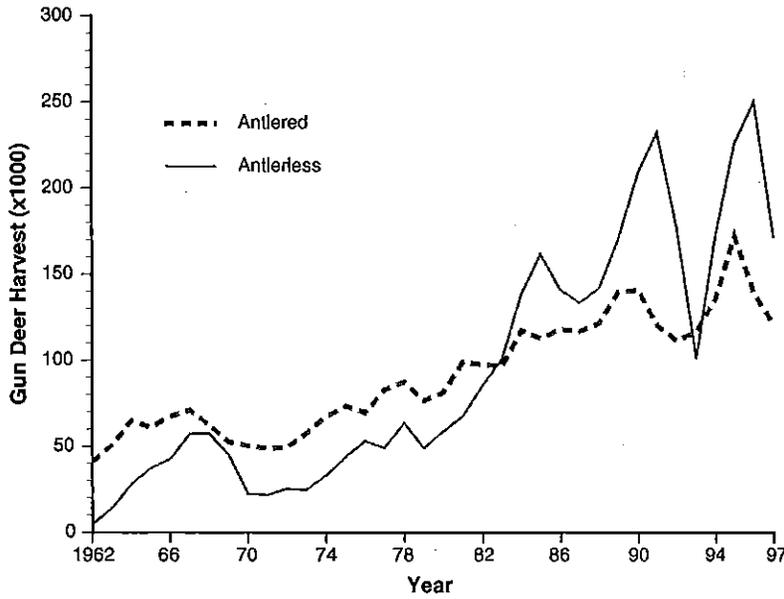
APPENDIX. Historical Trends in Deer Management

Population Goals and Estimates.
Statewide fall and overwinter deer populations and overwinter population goals, 1962-1997.

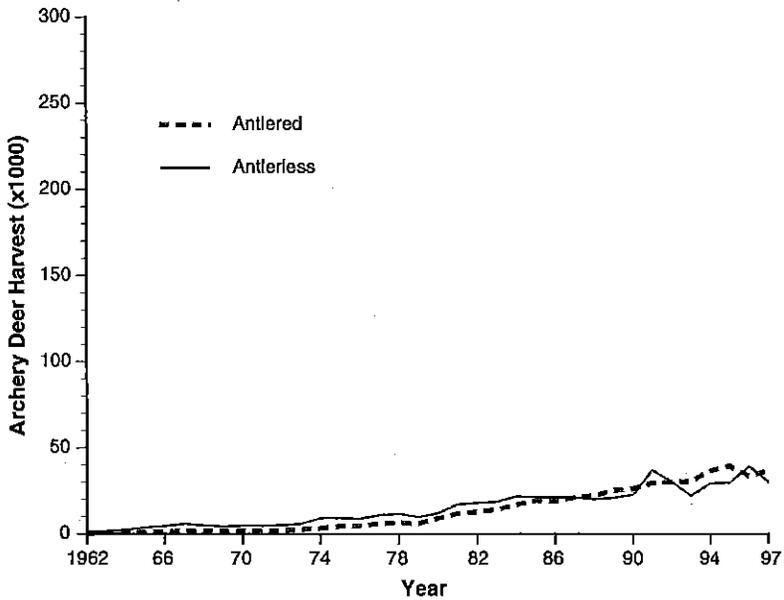


License Sales. Number of archery and firearm licenses sold, 1962-1997.





Gun Harvest. Number of antlerless and antlered deer killed during gun season, 1962-1997.



Archery Harvest. Number of antlerless and antlered deer killed during archery season, 1962-1997.



NOTES

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OUR MISSION:

To protect and enhance our Natural Resources –
our air, land and water;
our wildlife, fish and forests.

To provide a clean environment
and a full range of outdoor opportunities.

To insure the right of all Wisconsin citizens
to use and enjoy these resources in
their work and leisure.

And in cooperation with all our citizens
to consider the future
and those who will follow us.



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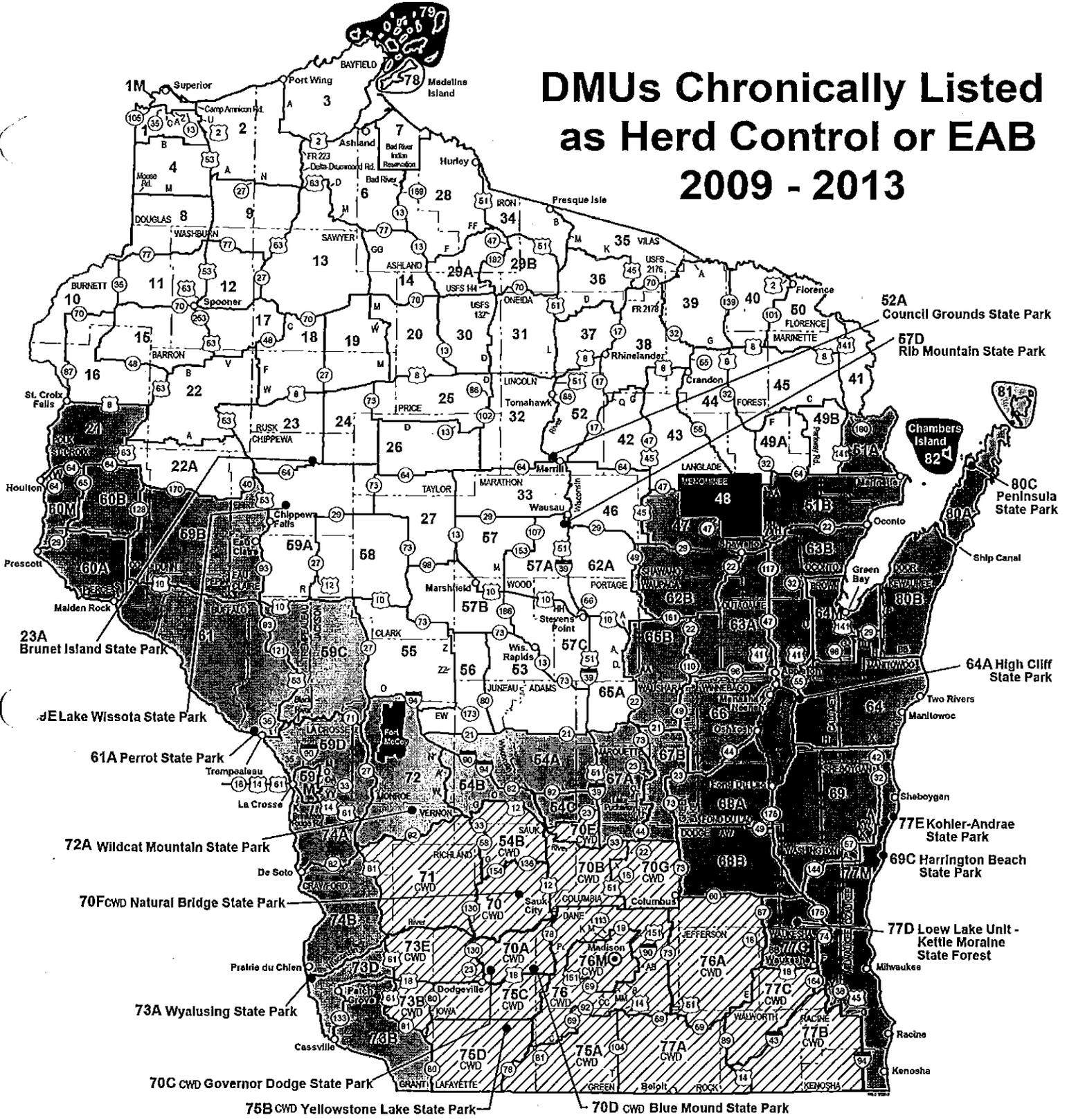


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1998
Wisconsin Department of Natural Resources
Bureau of Wildlife Management and Bureau of Integrated Science Services

PUBL-SS-931-98

DMUs Chronically Listed as Herd Control or EAB 2009 - 2013



Key

- Regular Unit
- Herd Control Unit or EAB
- CWD Unit

DMUs that have been classified as a Herd Control or Earn a Buck unit for five or more years are considered to be "chronically" above management goals.

- Unit 48 firearm season is for tribal members only - season set by Menominee Tribe

Fewer, Larger Units

DMU size is a tradeoff between capturing spatial variation in deer abundance and achieving sample sizes large enough to precisely estimate SAK inputs. Deer abundance varies at small spatial scales, thus there will always be substantial within-DMU variation in deer, regardless of their size. There is apparent spatial autocorrelation in some, if not all SAK inputs, which supports aggregation and could provide guidance for how to aggregate. The graph below (Figure 6.22 from the Red Book) shows the relationship between sample size and precision of the percentage of yearlings in the harvest. There is clearly a strong relationship, with diminishing returns once sample sizes reach about 200-300 deer.

The tradeoffs appear to heavily favor aggregating DMUs.

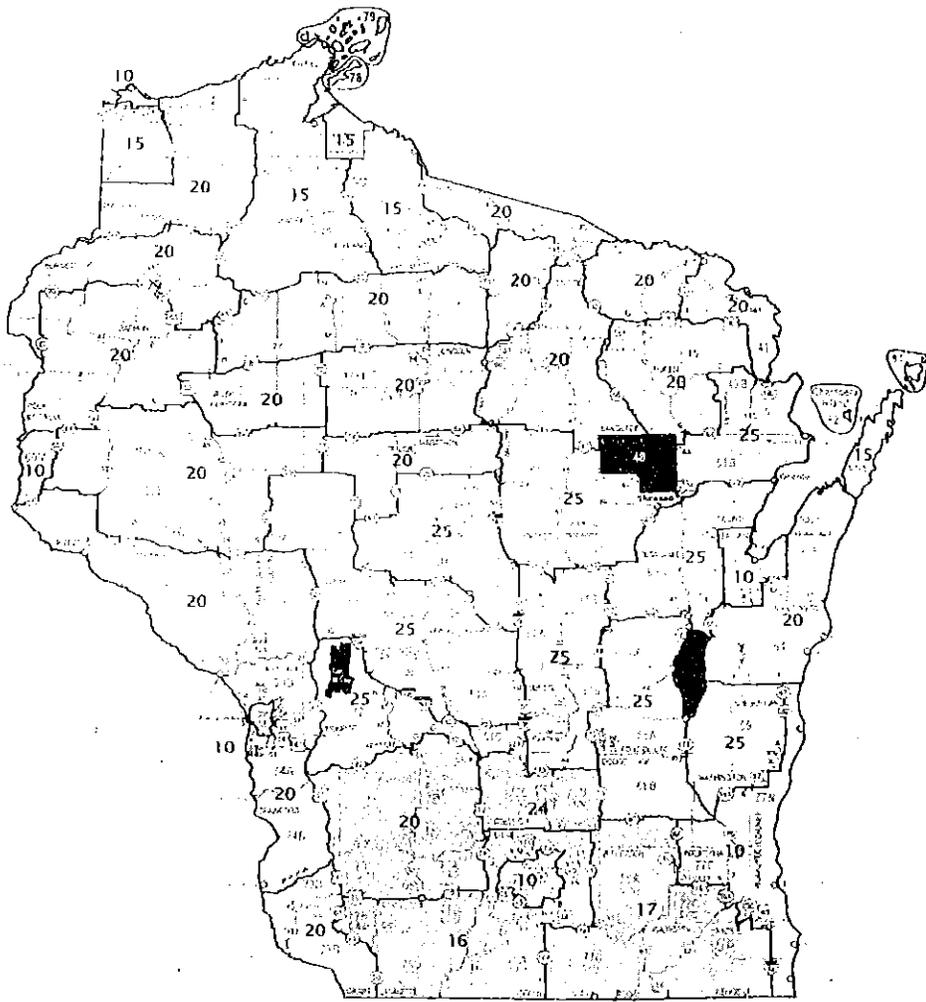
The SAK review panel recommended combining units. In 2009's deer unit review the Department proposed combining units. See attached map.

<http://dmureview.editme.com/>

The stakeholder panel recommended a 3 year study where we would calculate SAK estimates for existing units and combined units. (I didn't volunteer to run 2 sets of books). See panel report:

<http://dmureview.editme.com/files/PublicStartPage/2009%20DMU%20Stakeholder%20Panel%20Report%20May%2019%202009%20PM.pdf>

DMU Aggregation and Goal Concept with Split CWD Management Zone



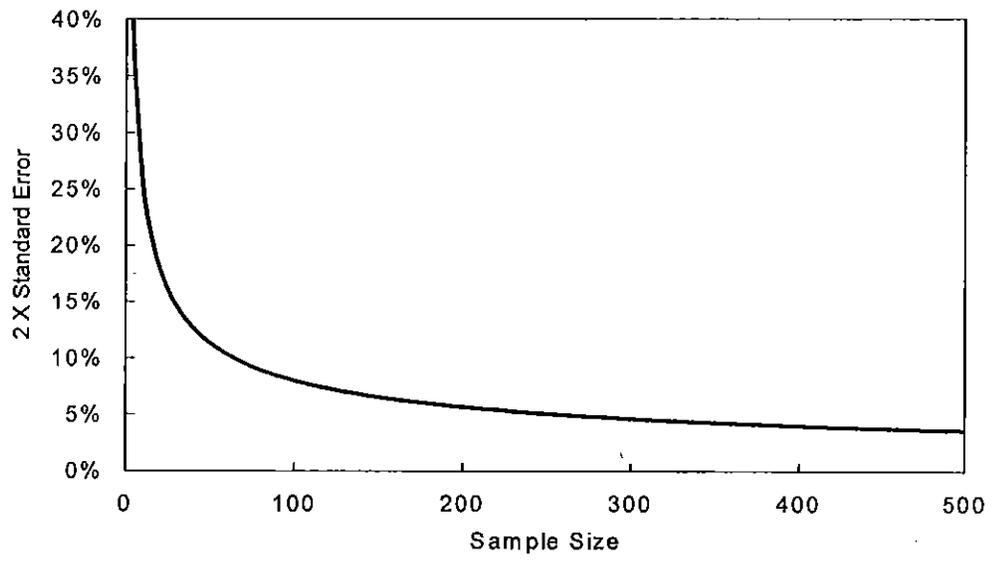


Figure 6.22. Effect of sample size on precision of estimates of percentage of yearlings.



2009

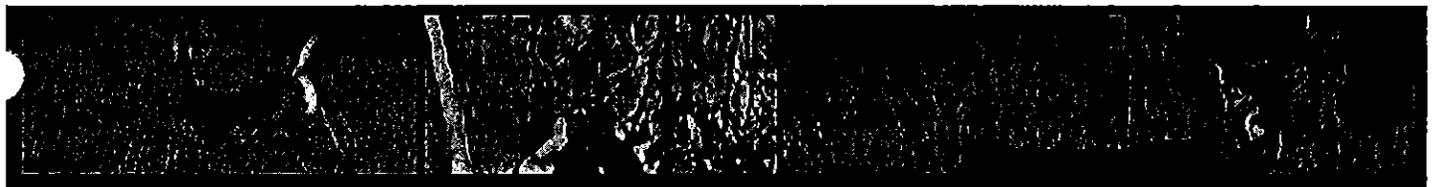
Deer Management Unit

Public Stakeholder Advisory Panel Report

May 18, 2009

- Quality Deer Management Association
- Safari Club International
- UW - Madison Forest and Wildlife Ecology
- UW- Parkside Biological Sciences
- Wisconsin Bear Hunters Association
- Wisconsin Bow Hunters Association
- Wisconsin Conservation Congress
- Wisconsin County Forests Association
- Wisconsin Deer Hunters Association
- Wisconsin DNR
- Wisconsin Farm Bureau Federation
- Wisconsin Muzzleloaders
- Wisconsin Wildlife Federation
- Wisconsin Wild Turkey Federation
- Wisconsin Woodland Owners Association

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2009 Public Stakeholder DMU Review Panel Report

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2009 Public Stakeholder DMU Review Panel Report

I. Introduction

This report is the volunteer Public Stakeholder Deer Management Unit Review Panel's input to the Wisconsin Department of Natural Resources Deer Committee which will then develop recommendations to the Secretary of the Department that give due consideration to these Stakeholder Panel's recommendations.

This report will also be provided to the Secretary and the Natural Resources Board.

The scope of the Public Stakeholder DMU Review Panel's work did not include providing input on the following topics:

- CWD zones overwinter goals or boundaries
- Earn-a-Buck or other deer management methods
- Sex-Age-Kill (SAK) modeling audit or comments

The Public Stakeholder DMU Review Panel was able to reach consensus on DMU boundaries and goals along with general recommendations. The Public Stakeholder DMU Review Panel's boundary and goal input is detailed in Section III on page 5 with their general recommendations outlined in Section IV beginning on page 6.

Panel members were also provided the opportunity to attach a one page summary of their stakeholder group's background and perspective to this report. These begin on page 13.

While these stakeholder panel attachments include more specific language than the points of consensus agreed to by the entire Stakeholder Panel, none of these Stakeholder attachments represent a statement of dissent or minority report. The points of consensus achieved by the Stakeholder Panel were defined during meetings and confirmed individually with each Stakeholder Panel member in the exact language appearing on page 5 of this report.

A copy of this report along with numerous other related materials was posted to www.widmu.org and is planned to be available there until December 31, 2010.



II. Public Stakeholder Advisory Panel

Role

The role of the Public Stakeholder Advisory Panel (Stakeholder Panel) was to provide useful and balanced input to the Department of Natural Resources' Deer Advisory Committee's review of Deer Management Unit (DMU) overwinter goals and boundaries.

Stakeholder Panel members succeeded in this regard by reaching consensus on a number of DMU overwinter goal and boundary change concepts based on their review of current biological, social, and economic impacts of deer as well as public comments.

The volunteer Stakeholder Panel was assembled with members invited from the diverse stakeholder communities interested in the management of Wisconsin's deer herd. The Stakeholder Panel volunteer members represented the following categories of interests:

- Hunting
- Land Ownership
- Agriculture
- Forestry
- Ecology
- General Public

The diverse nature of the Stakeholder Panel was intended to add value by facilitating consideration of all viewpoints prior to decision making by the Deer Advisory Committee (Deer Committee) and the Natural Resources Board (NRB).

Website

In addition to this report, the Stakeholder Panel initiated the creation of a website used for panel collaboration between meetings, sharing information with the public, and gathering public stakeholder input. A copy of this report along with other Panel information and discussions will remain available online at www.widmu.org until December 31, 2010 or longer if deemed useful.

Criteria Used

The Stakeholder Panel found the social, economic, management capability, and ecological criteria defined during the *Deer 2000 and Beyond* initiative helpful as a starting point for reviewing DMUs.

Consensus Approach

To maximize the impact of the Stakeholder Panel's input on DMU overwinter goal and boundary decision making, the panel members worked to identify points of consensus supported by all panel members. The resulting input described on the next page is the result of meetings, open-minded sharing of perspectives, and agreements to consider the interests of other stakeholder communities. Because the panel's overwinter goal input only includes points of consensus, few individual DMU changes are mentioned. Consensus was reached by agreeing to a range of overwinter goals.

Panel members were given the opportunity to attach a page at the end of this report to describe their stakeholder community's specific input and perspective. These are also available at www.widmu.org.



III. Public Stakeholder Panel Input

DMU Boundary Input

The Public Stakeholder DMU Review Panel (Panel) supports the concept of conducting a study during the next 3 years to identify the benefits of consolidating existing DMUs.

The study would be a comparison of the precision gained from unit consolidation relative to the 2009 DMU structure. The Panel recommends that potential boundary adjustments consider the impact on the integrity of the study.

DMU Overwinter Goal Input

The Panel developed a regional approach for providing input on overwinter unit goal changes. Note: CWD units were outside of the Panel's scope of consideration and discussions.

Southern, Eastern, and Western Farmland Regions (Excluding CWD units)

The Panel's overwinter goal input for units in the Southern, Eastern, and Western Farmland Regions is defined below:

- In units currently with overwinter unit goals of 30 deer per square mile of deer range, the Panel was unable to reach consensus on recommending goal changes.
- In units 80A and 81, the Panel did reach consensus in support of leaving these unchanged with an overwinter unit goal of 15 deer per square mile of deer range.
- In all other units in the Southern, Eastern and Western Farmland Regions, the Panel reached consensus to support recommending overwinter unit goals being set within the range of 20 to 25 deer per square mile of deer range.
However, the Panel's consensus fell short of recommending specific increases or decreases in overwinter goals in these units.

Northern Forest Region

The Panel's consensus on units in the Northern Forest Region is defined below:

- For units currently at or below overwinter goals of 21 deer per square mile of deer range, maintaining those overwinter goals would be acceptable.
- For units currently at 25 deer per square mile of deer range, the Panel's consensus fell short of being able to recommend making changes to overwinter goals.
However, the Panel found consensus by stating it would be acceptable if the DNR Deer Committee recommended lowering these overwinter unit goals from 25 to 20 deer per square mile of deer range.
- Consensus was reached to allow an overwinter goal reduction in unit 3 to 15 deer per square mile of deer range.

Central Forest Region

Panel consensus was reached to support maintaining current overwinter goals in the Central Forest Region.

Metro Units

The Panel reached consensus to recommend the evaluation of metro unit overwinter goals by the Deer Committee.



IV. Public Stakeholder Panel General Recommendations

The Public Stakeholder Panel also developed the following general recommendations.

Communication and Education Recommendations

The Stakeholder Panel was in agreement that the overall process would benefit from improved communication with the general public and stakeholder communities. Recommendations developed by the Stakeholder Panel to help with this effort are described below:

Increase Public Awareness of Stakeholder Panel Activity

The use of a Stakeholder Panel website and online public input forms should allow future Panels to increase the level of public participation in the review process. Towards this end, any effort to help increase public awareness of the Stakeholder Panel's existence and role will benefit the overall process. Specifically, the following are recommended:

- Provide a link to www.widmu.org on the DNR website until the 2010 deer hunting season.
- Continue including mention of the Panel and website in deer related press releases.
- Encourage DNR field staff to share the Panel's website and activities in local meetings, public correspondence, and conversations.

Continue Building Communication Channels

The Stakeholder Panel supports DNR initiatives to improve communication of DMU management processes with both hunter and non-hunter communities to increase understanding and participation in the review process. Specific recommendations include:

- Continue including Stakeholder Panel representation from hunter, non-hunter, forestry, landowner, wildlife preservation, biology, and other interested stakeholder communities.
- Continue including Stakeholder Panel members from across the state to help provide an informed and balanced geographical cross-section of public interests.
- Continue ensuring Stakeholder Panel members demonstrate the ability and commitment to solicit input from their respective stakeholder communities. In particular, the Stakeholder Panel understands the growing importance of communicating via email and websites.

Education Initiatives

The Stakeholder Panel members strongly support efforts to educate hunters and non-hunters on the methodologies and science used to manage Wisconsin's deer herd. The Stakeholder Panel benefited from both expert and stakeholder panel member presentations on these topics. Recommendations to improve public education on deer management include:

- Encourage presenters and stakeholders to tailor their information for a wider audience with a more general understanding of mathematical and scientific modeling principles.
- Periodically email useful DNR deer website links to stakeholder groups in Wisconsin for inclusion on stakeholder websites and newsletters.
- Develop a simplified presentation of the sex-age-kill (SAK) model and how it relates to managing sustainable deer herds in Wisconsin.
- Include link on the online DNR licensing page to educational sites on deer management.



Public Stakeholder Panel Process Recommendations

The Stakeholder Panel discussed and developed recommendations for future Stakeholder Panels to consider during their review process.

Stakeholder Panel Member Presentations

During the current review process, time was scheduled for presentations from the biologist and forestry communities. Future Panels should discuss allotting time for other stakeholders (i.e. landowners, hunters, farmers) to prepare and present information useful to the discussion of DMU overwinter goal and boundary changes.

Given the limited amount of meeting time available, presenters should be encouraged to provide advance copies of presentation materials and stay within the time allotted.

Online and Paper Public Input Collection

The Stakeholder Panel benefited from efforts to collect public input using both online and paper forms. Improvements could be made by having future Stakeholder Panels deliberate the pros and cons of public surveys; develop the survey questions earlier in the Panel meeting process; and begin the data collection in January or February prior to the herd status meetings.

The data collected prior to the herd status meetings would also assist biologists with tailoring their presentations to address the public concerns and questions identified by the surveys.

Deer Herd Status Meeting Recommendations

Stakeholder Panel members attended 11 of the herd status meetings held around State in March 2009. Based on Panel member observations of the various meeting formats used, the recommended format is having the biologist presentation followed by a structured question and answer period.

Including a brief review of deer biology covering typical home range, dispersal, food requirements, and habitat requirements would also be beneficial.

Stakeholder Panel Hurdles

During the review process, the Stakeholder Panel acknowledged the following hurdles in the consensus building process. Future Panels should continue efforts to minimize or eliminate these hurdles where possible.

- Perception of DNR Motives and Overwinter Goals
- Trust Level Between Different Stakeholder Communities
- Public Understanding and Education on Deer Population and Management Models
- Questions on the Reliability of the SAK Model
- Regional Differences in Deer Population, Behavior, Habitat, and Hunting Practices
- The Counter-Intuitive Nature of Certain Aspects of Deer Herd Management
- Mutually Exclusive Outcomes Desired By Different Stakeholder Communities

Overall, the assembling of a diverse Stakeholder Panel was seen as a positive step towards reducing misunderstandings, misperceptions, and distrust between the various Stakeholder communities.

DMU Change Criteria Recommendations

The Stakeholder Panel attempted to consider a variety of criteria when developing input on DMU overwinter goal and boundary changes. The criteria developed during the Deer 2000 and Beyond initiative was found to be helpful and provided a starting point for discussing overwinter goal and boundary changes.

Based on these discussions, the Stakeholder Panel recommends further improvements in the criteria used for measuring deer impact and managing deer herds in Wisconsin.

- The Panel recommends that separate forestry and agricultural indicators be measured and considered during DMU overwinter goal and boundary reviews.
 - Indicators of agricultural impact should be independent of farmer enrollment in crop damage programs to ensure an unbiased estimate of agricultural impact due to deer. If such data does not already exist, then methods of defining and collecting this data should be developed.
 - The Panel recommends developing better ecological indicators of deer impact on tree regeneration and biodiversity. These silvicultural* indicators would be in addition to agricultural damage indicators that would focus on crop damage rather than forest regeneration. Indicators should be based on sound scientific (experimental) data and be collected on a regular basis to represent an unbiased monitoring of browse levels (forestry) and demography of indicator species (size and fecundity measures of herbaceous understory species that have been experimentally demonstrated to reflect deer impacts).
- * Silviculture is the science of controlling the establishment, growth, composition, health, and quality of forests.
- Future Stakeholder Panels should consider reviewing and comparing the methods used by other States to manage their deer herds.
 - Car-deer collision data is useful for identifying trends in deer herd size. It would be useful to have that data set available during future Stakeholder Panel reviews.



V. Public Stakeholder Panel Process

The 2009 Stakeholder Panel process involved meetings, phone conferences, online collaboration, and attendance at local herd status meetings in March 2009.

Online Collaboration

Online collaboration on the Panel's website was an ongoing effort with Panel members reporting input gathered from their stakeholder communities, sharing perspectives, and discussing information obtained on current biological, social, and economic impacts of deer in Wisconsin.

Online Surveys

To facilitate the Panel's consensus building between meetings, online surveys were used to poll Panel members and gather their input on overwinter goals and general recommendations. This method greatly aided the Panel with drafting specific language that encompassed the wide range of viewpoints of the various stakeholder communities. As a result of this approach, fewer meetings were required to reach consensus.

Meeting Schedule

The volunteer Stakeholder panel met a total of three times and had two conference calls scheduled. Members of the Panel also planned to attend the May 19, 2009 Deer Committee meeting to deliver this report.

A final meeting or conference call is planned in September 2009 to review public input at official public hearings held in early September and advise the department as to whether the panel believes that overwinter goals or boundaries presented at the hearings should be modified. The date and format of that final meeting are to be determined.

The Stakeholder Panel's meeting schedule is shown below.

January 17, 2009	Saturday 8:00 AM – 4:00 PM	Stevens Points, Wisconsin
February 21, 2009	Saturday 8:00 AM – 4:00 PM	Stevens Points, Wisconsin
April 9, 2009	Thursday 7:00 PM – 8:00 PM	Teleconference
April 25, 2009	Saturday 8:00 AM – 4:00 PM	Stevens Points, Wisconsin
June 4, 2009	Thursday 7:00 PM – 8:00 PM	<i>Tentative</i> - Teleconference
September 2009	TBD	

Assisting the Stakeholder Panel was an outside facilitator provided by the DNR to support the Panel with meeting activities, online collaboration, and reporting.

It was anticipated that DMU overwinter goal and boundary changes would be in administrative code by early 2010 and used to set deer harvest quotas and deer season structures for the 2010 hunting seasons.



Meeting Formats and Overview

Meeting agendas, expert presentations, and handouts were posted to the Panel's website www.widmu.org. The description below provides a high level overview of the meetings.

January 17, 2009 Meeting

Held to review the role of the advisory panel and listen to presentations on the ecological, social and economic factors to be considered in developing DMU overwinter goal and boundary recommendations. Panel members discussed their views of deer numbers at this meeting while focusing on discussing the review and decision making process ahead. The panel developed a list of information requests to help with their review process. At this meeting, the Panel initiated the approach of using a website to stay connected between meetings and share information.

February 21, 2009 Meeting

After a review of the Panel's website and an update from the Deer Committee, the Panel focused on developing proposals for public discussion at local herd status public meetings scheduled for March. The outcome of the Panel's discussions was to propose the boundary concept of studying consolidation. No specific overwinter goal concepts emerged to gain the Panel's consensus. The Panel decided to assist gathering public input by creating online versions of the public input surveys to be handed out at deer herd status meetings in March. As part of this effort, the Panel reviewed and assisted with drafting the questions for both surveys.

April 9, 2009 Phone Conference

A brief 30 minute phone conference meeting was held to update Panel members on public input gathered via online surveys and to approve the use of online surveys to poll Panel members on possible points of consensus.

April 25, 2009 Meeting

The Panel reviewed public input, agreed to support the study of the consolidation concept, and outlined points of consensus on overwinter goals by focusing on regions rather than specific DMUs. The Panel agreed to finalize the points of consensus using online surveys, emails, and if necessary a phone conference.

June 4, 2009 Phone Conference

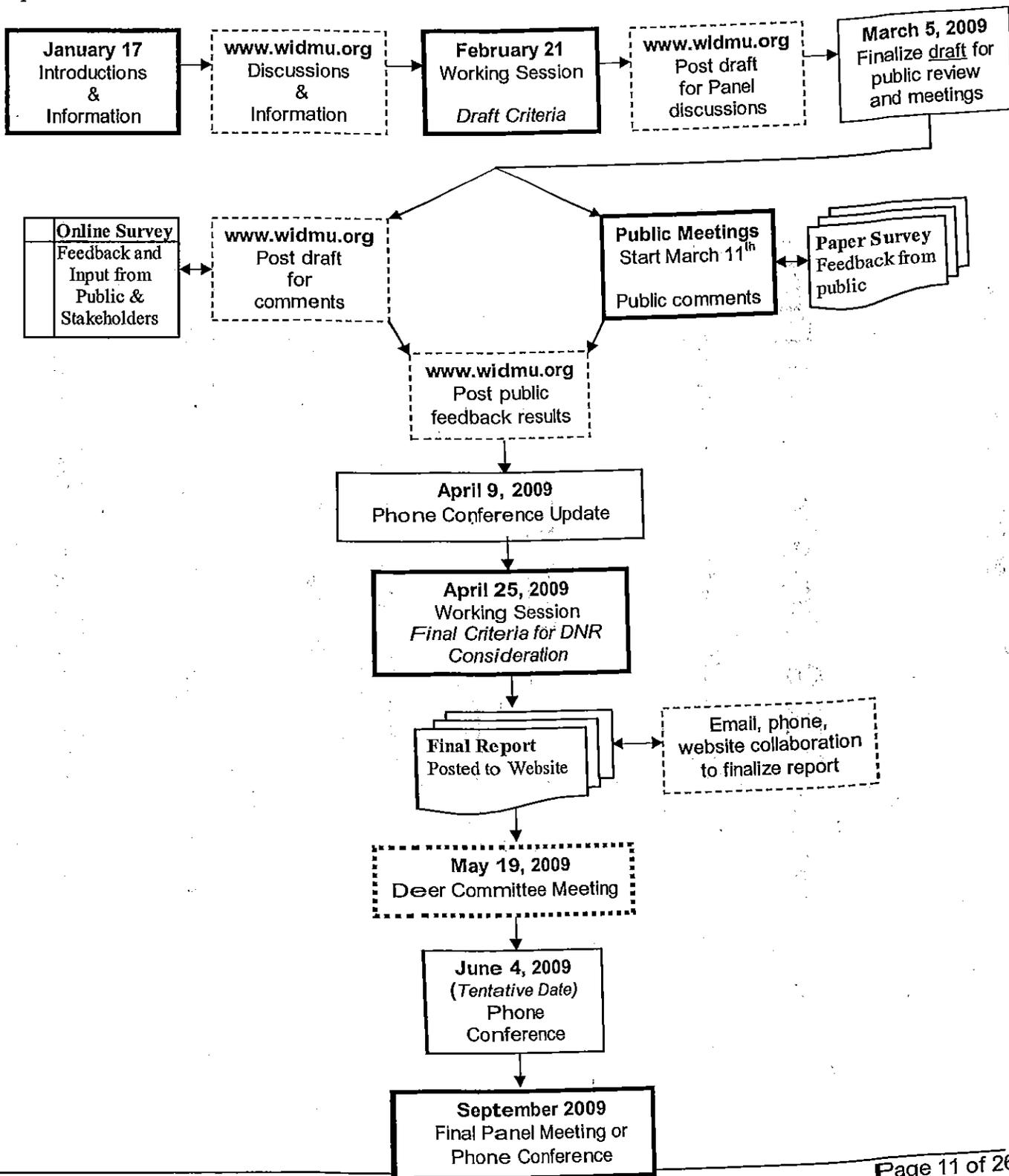
A brief 30 minute phone conference was planned to confirm the Panel being represented at the Deer Committee's May 19, 2009 meeting. The call would also be used to confirm panel members' commitment to reconvene in September to review final recommendations and address any open items requiring attention prior to reconvening in September.

September 2009 Meeting

A Saturday meeting or conference call was planned to review public input at official public hearings held earlier in September and advise the department as to whether the panel believes that overwinter goals or boundaries presented at the hearings should be modified.

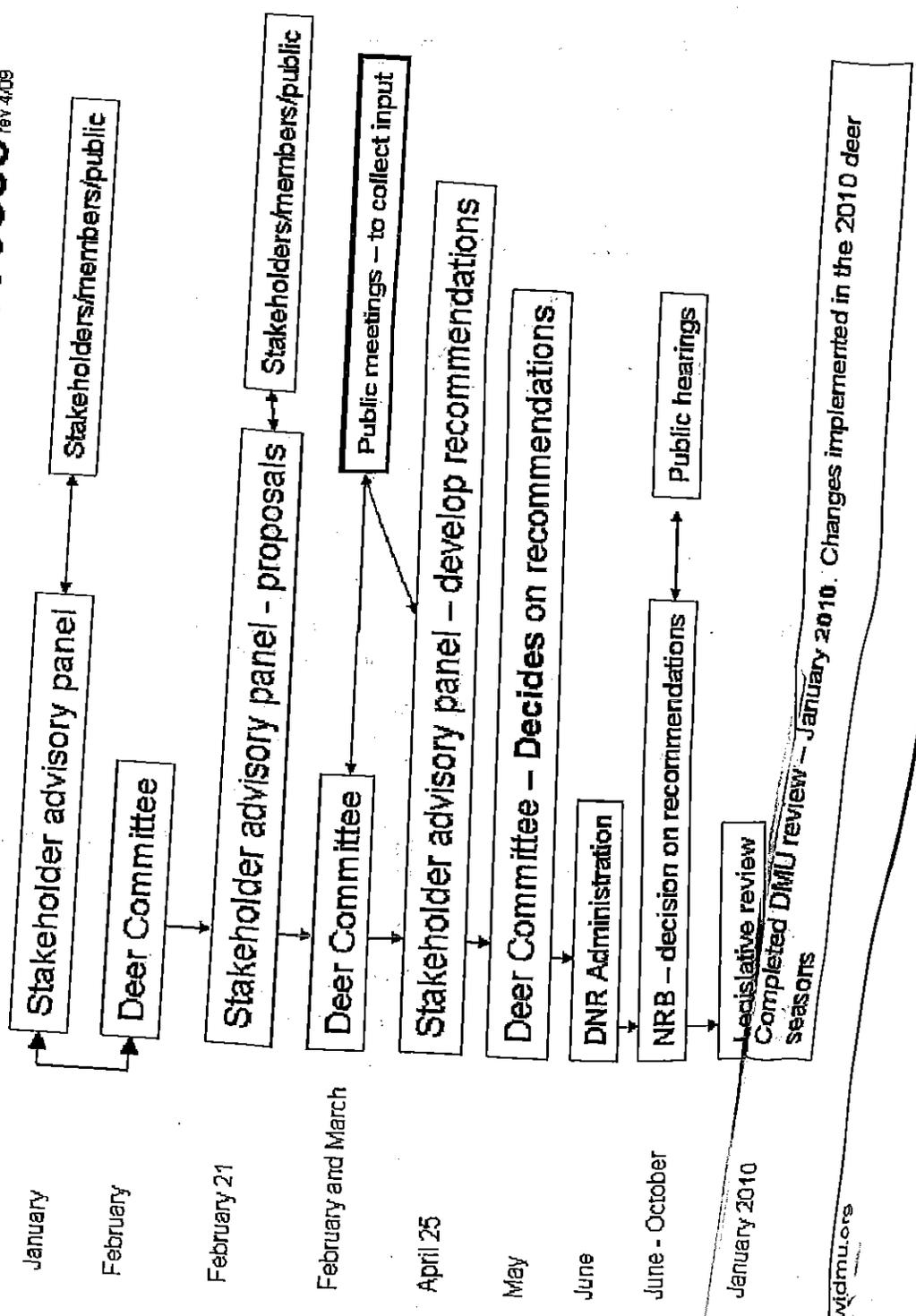
Stakeholder Process Diagram

The block diagram below describes the Stakeholder Panel's activities during 2009. There was an extended period of gathering public input and attending deer herd status meetings during March and April.



Overall DMU Review Timelines

DMU Review 2009 Timeline and Process rev. 4/09



www.widmule.org



VI. Stakeholder Panel Perspectives

The remaining pages were contributed by individual Stakeholder Panel members.

While some of these perspectives and input are more specific and detailed than the Panel's consensus, careful reading of both will reveal that although Panel members worked to reach points of consensus with other stakeholder groups, they did not compromise their own community's key interests.

None of these Stakeholder attachments represent a statement of dissent or a minority report. The points of consensus achieved by the Stakeholder Panel were defined during meetings and confirmed individually with each Stakeholder Panel member in the exact language appearing on page 5 of this report.

The purpose of this final section of attachments was to give each Panel member the opportunity to provide a short overview of their experience on the Panel and also to detail their stakeholder community's perspectives and input on DMU overwinter goal and boundary changes.

These attachments will provide valuable insight for future Stakeholder Panel members seeking to understand the perspectives of other stakeholder groups. Visits to the websites listed on each page will provide additional information.

If Panel members were unable to complete this by the original submission date, it was agreed that their overview could be added to the report posted at www.widmu.org. Readers are encouraged to verify they have the latest and most complete copy of this report by downloading a copy from the Panel's website.

These pages were added in alphabetical order using the organization name or description.

Biology / Ecology / Forestry Stakeholder Groups

(Note: Three panel members representing biology, ecology, and forestry elected to submit a combined summary to provide readers with a single document integrating the views of all three scientific stakeholder communities. The panel members chose to limit their combined summary to two pages instead of the three pages individually allotted.)

UWM-Madison Forest and Wildlife Ecology

www.forestandwildlifeecology.wisc.edu

UWM-Parkside Biological Sciences Department

www.uwp.edu/departments/biological.sciences

WDNR-Division of Forestry

www.dnr.wi.gov/forestry

Overview of Group or Community

Together we represent an informal coalition of professional foresters and ecologists interested in the long-term viability and biodiversity of Wisconsin's forests. Many of us are also active deer hunters and we affirm the importance of Wisconsin's deer hunting traditions.

While we recognize the ecological, economic, and cultural importance of whitetail deer, we are concerned that chronic and nearly uniform over abundance of this keystone herbivore over the past few decades threatens the long-term health of those resources. We believe that there is clear and compelling scientific evidence that high deer numbers have contributed to the widespread failure to regenerate numerous economically and ecologically important tree species such as oak and hemlock and began shifting understory composition towards dominance of grasses, sedges and ferns. These changes have likely had significant cascading impacts on non-game wildlife, particularly shrub nesting birds.

Our goal must be a sustainable deer population management that balances the benefits of a robust deer population against the costs that overabundant deer exert on other ecosystem services.

Lessons Learned from the Stakeholder Panel Process

We view our inclusion on the Stakeholder Panel as an earnest effort by the Wisconsin Department of Natural Resources (WDNR) to look beyond the hunting community for input on deer management. This is a positive sign the WDNR recognizes deer management impacts hunters and non-hunters alike and that sustained large deer populations can significantly and negatively impact sustainable forestry and a wide range of biodiversity.

We were impressed by the collegiality and generally respectful tone of the meetings and felt that the format was a good way of bringing diverse opinions together for open debate.

However, we were surprised by the lack of quality, unbiased data with which to measure deer impacts on agriculture, forestry and ecological integrity. We view this as a serious barrier to making sound, science based decisions as to ecologically sustainable population goals. Obtaining such data should be a priority.

Stakeholder Group Specific Input

Ecologists value healthy ecological communities with species diversity and emphasize the long-term viability of native populations and sustainable use of natural resources. We recognize our dependence on ecosystem services to provide us with a wide variety of needs and believe management goals should be based on sound science and reliable data.

At present, the preponderance of data suggests that deer densities are too high throughout much of the state and this is causing regeneration failure of important tree species and widespread potentially irreversible ecological damage. In addition, many units in the northern forests are converting from early successional to late successional forests, further reducing carrying capacity and magnifying impacts. These problems are likely compounded by chronic high deer densities of the past decades which inhibits habitat recovery when



population goals are finally reached. We feel that the most severe negative impacts on forest regeneration and biodiversity are due to herds being chronically above goal.

We are encouraged to see the WDNR success at finally bringing deer populations near goal in many DMUs, and are eager to see if habitats recover in these units.

However, we encourage the deer committee to reduce goals in Northern Forest units from 25 to 20 deer/square mile of deer range. Given the extent of browse damage in unit 3 as reported by the WCFA, we support reducing the goal in that unit to 15 or lower. We also support the consensus reached for the southern farmland units but again would encourage the deer committee to consider the lower end of the range in consideration of forestry, agriculture and ecological benefits.

Stakeholder Group Specific Recommendations

More work is needed to educate hunters as to the methods used to estimate herd populations, set population goals and, most importantly to the deer impacts on the environment and habitat quality.

Better information needs to be gathered as to what deer densities are ecologically sustainable across the wide range of habitats that support deer. Consistent, unbiased monitoring tools for measuring deer impacts need to be developed and monitored on a regular basis.

More work is also needed to increase participation of non-hunters into both the stakeholder groups and public opinion surveys.

Though different stakeholder groups had diverging viewpoints and interests, we all shared the goal of having a healthy deer herd living in balance with its environment. Bringing diverse interest together in an effort to increase understanding and reach consensus on a way forward is of critical importance and we look forward to continuing participation in this process.



Quality Deer Management Association

www.QDMA.com

Overview of Group or Community

The QDMA is an international nonprofit wildlife conservation organization dedicated to ethical hunting, sound deer management and preservation of the deer-hunting heritage. The QDMA's mission is to promote sustainable, high-quality white-tailed deer populations, wildlife habitats, and ethical hunting experiences through education, research, and management in partnership with hunters, landowners, natural resource professionals, and the public.

Among QDMA's 53,000 members are more than 3,000 of the nation's leading wildlife and forestry professionals. As such, QDMA is widely regarded as the most respected whitetail organization in the United States. Wisconsin is home to over 2,000 QDMA members, 8 local Branches and a State Chapter. These Branches conduct numerous educational events annually, and Wisconsin QDMA members help manage over a quarter million acres for white-tailed deer and other wildlife species.

The QDMA's ongoing commitment to education and stewardship was formally recognized in 2001 when it became the only whitetail organization ever to be awarded the prestigious "Group Achievement Award" from The Wildlife Society – the parent body of nearly 10,000 wildlife professionals in North America.

Lessons Learned from the Stakeholder Panel Process

QDMA's primary focus has always been on education, research, and on-the-ground management. The QDMA has a long history of working with Wisconsin sportsmen and women, as well as the Department of Natural Resources (DNR). We welcomed the opportunity to participate in reviewing the Wisconsin DNR's deer management plan as part of our continued involvement in the State's wildlife agencies' programs.

This Panel review process brought together many different perspectives and interests for the DNR to consider.

Stakeholder Group Specific Input

The QDMA's biological staff routinely works with state wildlife agencies on their deer management programs. As a result, hundreds of thousands of hunters and millions of acres of public and private lands are managed under quality deer management guidelines. The QDMA has also actively partnered with numerous federal and state wildlife agencies, forest products companies, conservation organization, and other groups to improve white-tailed deer and habitat management programs.

Based on our experience and background, we support the Panel's consensus while continuing to promote quality deer management guidelines that encourage sustainable, high-quality white-tailed deer populations, wildlife habitats, and ethical hunting experiences. The balance between these is not easy to achieve and we believe more work is needed to develop consistent measurements of deer population, habitat condition, and hunter experiences.

Stakeholder Group Specific Recommendations

Preserving our deer-hunting heritage is a priority for QDMA. Each year QDMA conducts numerous events for youth and women as well as supporting numerous worthy organizations like Farmers and Hunters Feeding the Hungry, the Paralyzed Veterans Association, and the Catch-A-Dream Foundation.

As part of our recommendations, we encourage DNR efforts that provide educational programs, publications, and other opportunities for hunters and non-hunters to learn about deer management practices.



Safari Club International

www.scifirstforhunters.org

Overview of Group or Community

Safari Club International's (SCI) mission is to be the leader in protecting the freedom to hunt and in promoting wildlife conservation worldwide. With approximately 190 chapters in 19 countries, SCI is recognized as a world leader in wildlife conservation and education programs. Six chapters are found within Wisconsin's borders, and members frequently contribute to the conservation and management of Wisconsin's natural resources.

In addition to protecting the freedom to hunt, the SCI also supports through its SCI Foundation (SCIF) conservation initiatives, wildlife education, and humanitarian programs worldwide. Both the SCI and SCIF have earned the Charity Navigator 4-Star rating meaning that they exceed industry standards and outperform most charities in its cause. More than \$47 million has been spent on Foundation programs since 1980.

Lessons Learned from the Stakeholder Panel Process

Wisconsin DNR has clearly made a great investment to be transparent in the deer management process and has engaged a diversity of stakeholders throughout the state. The use of technology provided by the DNR contributed greatly to our success as a panel. Sharing this information helps educate stakeholders and the general public resulting in better decisions for future hunters and all wildlife enthusiasts.

Stakeholder Group Specific Input

SCI comments and contributions were based on the scientific data available and public input gathered from herd status meetings and the Panel's online surveys. To emphasize the commitment to science, SCIF's Director of Conservation was selected to represent organization views to the panel.

SCI supports the concept of the studying the consolidation of DMUs during the next three years. Given the level of debate on SAK estimators, keeping boundaries consistent for research purposes during the study period is justified. Since the panel process did not review scientific data on individual DMU boundary change requests, SCI does not support recommending specific changes to DMU boundaries. However, we do recognize that local public input, local biologists, and law enforcement personnel may provide decision makers with the best knowledge on where boundary adjustments could be improved for communication and enforcement purposes. However, any changes made need to consider the impact on the comparison study. The SCI supports the panel's consensus on goals and would like to see final Deer Committee recommendations based on scientific data and guided by public input.

Stakeholder Group Specific Recommendations

The panel started its group effort by identifying specific criteria that the DNR should consider when establishing white tail deer population goals. This is an important step and more work should be done to come to define and agree on a standard set of criteria and measurements. Throughout panel discussions questions were raised on the exact definition and measurement method used for each social-economic criterion. Answering these questions over the next few years will yield more productive stakeholder review processes in the future.

While there has been a good discussion about population goals and related issues, we would recommend continuing with the existing population goals and continuing to work on the myriad of management issues that affect achievement of those goals (from either direction). The DNR has many management tools in its toolbox, and we support the use of those tools when appropriate. The recent scientific article on SAK population estimators needs to be fully evaluated in the context of the Wisconsin DNR application of the model. SCI strongly recommends initiation of research specifically addressing the non-harvest mortality of both fawns and adult deer to improve our current understanding of the role of predators, winter weather and habitat changes on deer population trends and carrying capacity (represented in SAK in the BRR and lambda).

Wisconsin Bear Hunter's Association

www.wbha.us.com

Overview of Group or Community

For over 40 years the WBHA has been at the forefront of protecting the rights of sportsmen and sportswomen in Wisconsin as well promoting youth hunting, conservation, and sound wildlife management. Each year the WBHA gives out scholarships to college bound high school graduates, sponsors highway and public forest cleanups throughout the state, supports a number of charitable causes through our foundation, and supports outdoor opportunities for dying and disabled youth.

Lessons Learned from the Stakeholder Panel Process

The WBHA actively works to ensure that future generations have the opportunity to enjoy Wisconsin's great outdoors. By working with the DNR and other conservation minded organizations, we see ourselves helping promote and protect opportunities for young people to participate in hunting, fishing, and trapping. Our view is that by getting young people to enjoy the outdoors, they will become more interested in learning the proper wildlife management practices critical to guarding our precious resources.

The Stakeholder Panel was a great opportunity to continue this effort by sharing our hunter viewpoints on deer herd management in Wisconsin while dispelling misconceptions regarding the impact of Wisconsin's bear population on the deer herd. The panel discussions were a good reminder of the range of viewpoints on deer hunting. By working together, hunting and other outdoor traditions will continue to drive Wisconsin's tourism industry which in 2008 generated over \$13 billion dollars, supported 310,000 jobs, and provided over \$2 billion in tax revenue.

The consensus found by the panel shows that common ground can be found in the midst of differing opinions. We hope to see this type of stakeholder involvement continued in the future.

Stakeholder Group Specific Input

As avid hunters of big game including white tail deer, the WBHA supports increasing the overwinter goals in deer management units that are below their carrying capacity.

When setting overwinter goals, we would like to see changes in how deer range (habitat) in farmland units is defined or see over winter goals in farmland units increased. Frequently, less than 50% of the land in farmland units is considered to be deer range. Because over winter goals are set for the number of deer per square mile of deer range and not the total number of square miles in a unit, the actual density of deer spread out across an entire DMU is significantly less than the over winter goal.

As a simple example, for a farmland unit with a total 100 square miles, if the over winter goal is set to 25 and only 20% (20 square miles) of the unit is defined as deer range, then the over winter goal equates to $25 \times 20 = 500$ deer for the entire unit. Thus, if the herd spreads out across the entire unit as is likely during hunting season, then 500 deer across 100 square miles works out to 5 deer per square mile – not 25 deer per square mile. This is one reason that hunter expectations of seeing 25 deer per square mile are unfulfilled. By either increasing goals in farmland units or defining a greater percentage of farmland units as deer habitat this issue can be resolved.

The WBHA believes that stakeholder input to deer management in Wisconsin is critical and the current three year review process should not be extended.



Wisconsin Bow Hunter Association

www.wisconsinbowhunters.org

Overview of Group or Community

Wisconsin Bowhunters Association is the Nations oldest State Bowhunting organization (68 years) with approximately 7,000 members.

Lessons Learned from the Stakeholder Panel Process

WBH's mission is to foster and promote the sport of hunting with the bow and arrow; and to promote to that end, the education, social relationships, good sportsmanship and good fellowship of and among our members.

While WBH is an advocate for all Bowhunters, the keystone species for most of our members is the Whitetail deer. As such, issues like overwinter goals and DMU boundaries or anything that affects deer and deer hunting is very important to WBH and our members. We are committed to working with all stakeholders in making sound deer management decisions and realize that our idea for deer population goals can differ from other stakeholders who may view deer as a nuisance animal.

Stakeholder Group Specific Input

WBH advocates increasing overwinter goals while factoring in social and biological concerns. The importance of deer to this state and its history, traditions, and economy are very clear and all management decisions need to be weighed accordingly. Hunters play a vital role in whitetail management beyond keeping deer numbers in check. Today's deer hunters are resource managers in their own right since every time we release an arrow or pull the trigger, we are making management decisions on a local level as more hunter/landowners actively manage their properties to attract and hold deer.

Hunters are very knowledgeable about local deer populations and harvest deer in accordance with the balance they view as important. The farmland regions of the state are a good example of where increasing overwinter goals and harvest potential are a good idea. In the Northern region, increased predator effects mean more deer being removed from the landscape on a year round basis leaving fewer deer for hunters. Adjusting goals to address predation is imperative.

The many DMU goal and boundary meetings held around the state as well as the online survey collected a great deal of data. That coupled with the many citizen resolutions at the spring Conservation Congress hearings clearly suggests that there is a desire to increase overwinter goals.

Stakeholder Group Specific Recommendations

Setting population goals is important but reaching those goals is the task of the hunting community. DNR sets harvest quotas based on the difference between estimated populations and goal populations. This means that accurate estimates are critical to sound management.

It is imperative that real and accurate indicators of the deer population not only be used but also be constantly updated and verified against other indicators of herd size so that a realistic season structure is set based on the most accurate estimates available. If reaching goal is important, it should not matter on which side of the goal the population is. Currently a large portion of the North is below prescribed goals meaning improvements need to be made in estimating to avoid below goal situations otherwise setting goals becomes a meaningless exercise.

DMU reviews are set in the administrative code to take place every 3 years. That time frame should not be extended.



Wisconsin Conservation Congress

<http://dnr.wi.gov/org/nrboard/congress/>

Overview of Group or Community

The Wisconsin Conservation Congress (WCC) is the only "advisory body" in the State where citizens elect delegates to represent their interests in natural resources by working with the Natural Resources Board (NRB) and the Wisconsin Department of Natural Resources (WDNR).

The State Conservation Commission (the predecessor of the Natural Resources Board) created the Conservation Congress in 1934 to provide Wisconsin citizens a venue for contributing input and exchanging concerns on conservation issues. Legislation was signed in 1972 legally recognizing the WCC (Statute 15.348) to provide citizens with a liaison between the NRB and the WDNR.

Our Mission includes working with citizens, organizations, and educators on matters related to the management and enjoyment of Wisconsin's natural resources. The WCC also considers citizen submitted resolutions on matters pertaining to the management of natural resources including deer herd management.

Lessons Learned from the Stakeholder Panel Process

The Public Stakeholder Deer Review Panel was well rounded providing different perspectives on the management of Wisconsin's deer herd. While inherent in the consensus building process is the inability for every stakeholder member to get everything their group desired, the panel process was well run and provided opportunities for different perspectives to be heard.

The panel's final consensus reflects the willingness of panel members to consider other viewpoints without compromising their stakeholder group's interests. As a result, the final consensus reached by the panel was unable to include all of the specific goal and boundary changes submitted through the WCC's written resolution process. The WCC values this opportunity to provide more specific input based on approved WCC resolutions.

Stakeholder Group Specific Input

The WCC supports the Panel's final consensus while continuing to consider more specific input detailed in written resolutions submitted by citizens.

In the case of this current review, unit change resolutions submitted for units 77M, 47 and 70E appear to reflect considerable thought and the WCC supports having these specific requests reviewed by the Deer Committee. While any changes to boundaries should weigh the impact on the study of unit consolidation over the next three years, the WCC strongly believes that input from local citizens, local biologists, and other local stakeholders must be objectively included during the Deer Committee's review process.

This local input ensures that deer management decisions will account for significant differences between units falling within the same category of land use, ownership, type of deer habitat, or geographic location. Although a 'one size fits all' approach to unit goal and boundary changes is a sound starting point for building general consensus, the Deer Committee's final goal and boundary change recommendations should reflect a unit level review of objective data when local input indicates strong interest in making changes.

Stakeholder Group Specific Recommendations

Addressing public concerns regarding the accuracy of deer population estimates, the methods of scientifically measuring deer herd social, economic, and environmental impacts, and the overall public input process needs to be a top WDNR priority for future panels to provide more specific goal and boundary input. Current and future reviews must examine local unit differences within the 5 regions (Northern/Central Forest, Western, Southern, Eastern Farmland). To help in this regard, stakeholder panel member selection and/or the panel's gathering of public input should represent the variety of units found within the 5 regions.



Wisconsin County Forest Association

www.wisconsincountyforests.com

Overview of Group or Community

The Wisconsin County Forest Association (WCFA) is comprised of 29 county members responsible for managing nearly 2.4 million acres of public forest land for timber, recreation, and wildlife. The majority of county forest acreage is in the northern half of the state, with a few small holdings as far south as Vernon County. In addition to producing timber resources, Wisconsin's county forests provide recreational opportunities for a wide variety of users. These users include but are not limited to hunters, birders, hikers, bikers, ATVers, snowmobilers, horseback riders and campers.

Lessons Learned from the Stakeholder Panel Process

Since the vast majority of the land under county forest management is deer range, the association was pleased to be invited to participate in this review of deer management unit goals and boundaries.

Even though most county foresters are deer hunters and talk with other deer hunters regularly, it is important for the WCFA to hear what hunters have to say since many of them hunt on county forest lands. We understand that deer hunters are the ones who actually have the ability to harvest deer from the forest and that we need to work together with them to manage the deer herd. We make an effort to take the opinions of our user groups into consideration when making decisions regarding the management of county forest lands. Unfortunately, these decisions sometimes seem to be weighted to one group and disregard the concerns of another.

Managing the county forests can be a balancing act between what users desire and what the resource can support. In trying to find that balance, we use available science to decide what is best for the land and resource first. County forests attempt to provide opportunities for as many user groups as possible, but conflicts can arise. We realize that we cannot provide everything that every group desires and often, the best balance is when many groups get something but none get everything.

Stakeholder Group Specific Input

In the case of this review, the Wisconsin County Forest Association supports studying the concept of combining Deer Management Units and would support an actual combination if it becomes an option in the future.

Most county foresters are deer hunters and enjoy seeing deer, but we have all seen what damage can be done when there are too many deer. In the past several years many county forests have reported difficulty regenerating tree species such as oak, maple, hemlock and pines due to over-browsing by deer. Not only are these species valuable for timber products, but they provide good deer habitat as well. Foresters and hunters alike want good quality habitat, but with too many deer, tree and plant regeneration, future quality of the habitat, and timber production will be in jeopardy. Allowing deer populations to remain at levels that have been shown to cause negative impacts will result in long term habitat degradation and eventually reduced deer productivity. We must all weigh our current desires with the impacts they may have on the resources of future. Our goal must be a sustainable deer population that is in balance with the available habitat. In some areas of Wisconsin, that means lower deer numbers.

The WCFA supports the points of consensus reached by this stakeholder group. Generally speaking, we feel that the negative impacts on the county forests are due primarily to herds being above goal and support maintaining the current goals in most of the Northern and Central Forest units. We would support the deer committee if they chose to reduce goals in Northern Forest units from 25 to 20 deer/square mile of deer range. Due to the extent of browse damage in unit 3, we would also support reducing the goal to 15. The WCFA supports the consensus reached for the southern farmland units but would like the deer committee to strongly consider forest health and productivity in these units as well.

Wisconsin Deer Hunters Association

www.wideerhunters.org

Overview of Group or Community

The Wisconsin Deer Hunters Association (WDHA) was founded on the belief that all deer hunting related issues should be based science-based wildlife management principles and not personal or political agendas. We also believe in maintaining a healthy deer herd because we believe that what's best for the deer herd is what's best for the deer hunter.

Lessons Learned from the Stakeholder Panel Process

The WDHA's role on the panel was to ensure that the critical balance between the desires of deer hunters and the need to maintain healthy deer habitat was met. It became obvious there is a critical need to collect real data to determine where this balance lies. The currently process of setting goals involves discussions without any factual basis for knowing what the number should be. We also learned that higher goals do not always mean seeing more deer or reducing the need for controversial herd control seasons. In fact higher goals can be counter productive to hunting and the deer herd if habitat is destroyed or conflicts arise with other stakeholders.

Stakeholder Group Specific Input

The WDHA believes there is insufficient data to recommend changes to the deer population goals at this time. Hopefully our recommendation to develop methods to collect actual data on agricultural, forestry and habitat (biodiversity) impacts will be available for the next 3 year review. Setting goals without objectively measuring deer impacts (or lack of) is impossible.

The WDHA also recognizes that accurate population estimates are critical and supports all efforts to improve the process. However we realize the relationship between deer population and the number of deer seen is lost as a direct result of deer baiting and feeding. While DNR management chose to exclude this from discussion it is important to understand that until hunters start seeing deer we will never reach consensus on population goals. It is disappointing that organizations very critical of DNR deer population methods continue supporting deer baiting while ceaselessly complaining about the lack of deer - even in years past with much higher populations. The real problem is we are not seeing deer, which will never be resolved until baiting and feeding are eliminated and deer resume their normal activities and are more distributed on the landscape.

The WDHA questions the purpose of having hunting groups not directly representing deer hunting on the committee. There was never a concern about deer goals on turkey or bear populations. Yet these non-deer groups exert political influence on deer hunting issues that prevent the elimination of deer baiting and feeding that a majority of deer hunters support. In our view this became another opportunity to push personal agendas without regard to what is best for the future of deer hunting, nor does this allow any real agreement on deer population goals.

Stakeholder Group Specific Recommendations

Our recommendations are to develop real measures of agricultural, forestry and habitat damages that can be tracked over time to set future deer population goals. We also support education efforts on the basic principles of wildlife management. We believe the simplest task to help resolve some of the major issues is to ban deer baiting and feeding statewide so hunters begin seeing more deer regardless of the population. Right now we are raising a generation who think deer hunting is walking 100 yards in the woods, dumping a pile of corn and then blaming the DNR when they don't see any deer. Until this cycle is broken there will never be enough deer in the eyes of many hunters who will never believe population estimates and demand higher goals, even to the detriment of the deer herd, other stakeholders and the future of the sport.



Wisconsin Muzzle Loading Association

www.wiscmla.org

Overview of Group or Community

The Wisconsin Muzzle Loading Association (WMLA) was formed in 1982 to promote the sport of muzzle loading in Wisconsin. The WMLA was the key player in getting the separate muzzle loader season established and we continue to represent the interests of Muzzle Loading Hunters, Shooters, and Collectors.

In addition to our commitment to the enjoyment of hunting, WMLA supports historical reenactments that provide invaluable learning experiences to younger generations; competitive shooting programs for all styles of muzzle loaders from flintlocks to in-lines to shotguns; and other related activities for men, women, and children through rendezvous across the state.

The WMLA also offers scholarships to both secondary and post-secondary students. These scholarships are awarded to college students who are pursuing degrees or high school or middle school students participating in summer programs. The programs must be related to the fields of history, outdoor recreation, natural resources management, reenactment, or shooting related sports.

Lessons Learned from the Stakeholder Panel Process

Being invited to participate on the Stakeholder Panel was taken as a serious commitment to help carry on the tradition of hunting for future generations. During the meetings and between meeting discussions, there was a lot of information delivered that required examination and consideration. It became apparent that the same information could be viewed from different perspectives making it important to identify the science and facts.

Stakeholder Group Specific Input

Muzzle loaders value their ability to enjoy hunting in the ways of past generations to help preserve this heritage for future generations. For this reason, we support higher over winter goals that consider other factors including deer impact on biological/environmental aspects of Wisconsin's landscape.

Our WMLA members, like other hunting groups in Wisconsin, experienced poor results in 2008 and would like to see more deer during future seasons.

Stakeholder Group Specific Recommendations

More work is needed to educate both hunters and the general public on deer management practices and the methods used to measure herd populations and deer impacts on the environment.

While all panel members had strong viewpoints, all were in support of seeing deer in a healthy environment. If we can continue to work together, everyone will benefit. For this reason, we look forward to being invited to participate again on the panel for the next review in 3 years.



Wisconsin Wildlife Federation

www.wiwf.org

Overview of Group or Community

The Wisconsin Wildlife Federation (WWF) has a dual mission to engage in conservation education and to advocate for sound conservation policy. Our educational efforts are largely focused on youth education. We operate the MacKenzie Environmental Center in Poynette, grant scholarships for future resource professionals at the University of Wisconsin-Stevens Point, provide wildlife educational trunks to schools for K-12 education, send kids to summer conservation camps and implement the National Wildlife Federation's Schoolyard and Backyard Habitat programs.

Lessons Learned from the Stakeholder Panel Process

The WWF is very active in promoting strong conservation policies before the Wisconsin Legislature and the Department of Natural Resources. These conservation policies include the protection of fish and wildlife habitat, the protection of public access to lands and water for outdoor recreation, assuring the right to hunt, fish and trap and the pursuit of other outdoor recreational activities and the furtherance of conservation education with an emphasis on youth education.

Participating on this and other DNR review panels is considered an important part of WWF's commitment to preserving Wisconsin's wildlife and environment. Bringing stakeholders together is important to ensure our hunting and fishing heritage is strengthened and passed on to the next generation.

Stakeholder Group Specific Input

We strongly believe that conservation policies should be scientifically, professionally and factually based, not politically based. Because of this, we support improvements to deer herd population estimates and measuring as accurately as possible deer impact on agriculture, forestry, and other social-economic factors.

In general, the WWF supports increasing over winter goals but recognizes the need to balance these within a long-term conservation strategy that ensures our forests, farmlands, and wetlands are protected for other wildlife.



Wisconsin Woodland Owners Association Inc.

www.wisconsinwoodlands.org

Overview of Group or Community

The Wisconsin Woodland Owners Association (WWOA) is comprised of 14 chapters across the state, representing over 2,200 landowner members that own more than 300,000 acres of private forested land in Wisconsin. WWOA chapters host events allowing members to meet neighboring woodland owners, learn more about local forest issues and management techniques, and work with DNR and consulting foresters. An important part of WWOA's mission is to provide educational opportunities for members, their families, and the public to learn more about sustainable forest management of Wisconsin's forests.

Lessons Learned from the Stakeholder Panel Process

WWOA participated on the Deer Stakeholder Review Panel because we consider managing private forest land a responsibility of membership. WWOA felt this was a very worthwhile investment of time and effort.

Private woodland owners have an invested stake in the management of forested land to maintain the quality and value of their properties. Many woodland owners enjoy seeing and/or hunting deer on their land. This is just one part of carrying on traditions which in some families have been passed down for generations. Woodland owners also take pride in being good stewards of their land for other wildlife, native flowers and vegetation, and healthy maturing forests.

Stakeholder Group Specific Input

During panel discussions, the WWOA position seemed at times to be a middle ground between hunter interests and biologist/agriculture/forestry interests. This made sense because woodland owners constantly must balance the benefits of deer on their land with the long-term impact deer have on forest regeneration, understory, and other wildlife. Because most woodland owners hunt their land, managing to lower deer herd populations negatively impacts their enjoyment and tradition of deer hunting. At the same time, over-population negatively impacts regeneration of forests and reduces the density of the understory needed to support the other types of wildlife and vegetation enjoyed by landowners. Add in timber and wildlife diseases, extreme seasonal storm damage, and other natural impacts, managing woodland properties including deer herd management is a complex task.

WWOA supported studying the consolidation concept of DMU boundaries to verify the benefits of using fewer DMU's to estimate deer herd size. WWOA would like to review study results before fully endorsing any proposed consolidation of DMU boundaries because this will directly impact woodland owners. WWOA supports deer management by professional resource managers that will result in natural forest regeneration and keep forests healthy. WWOA will support the panel's decision to agree to support the Deer Committee if valid scientific reasons to recommend reducing overwinter deer herd goals in the Northern Forest region are found. As these forests mature, their ability to support large deer herd populations diminishes as less sunlight reaches the forest floor resulting in less vegetation for deer to eat. There seemed to be panel recognition that the deer impact on forest regeneration needs to be considered in setting overwinter deer herd goals.

Stakeholder Group Specific Recommendations

Earn-a-buck (EAB) and the Sex-Age-Kill (SAK) were not in the Panel's charter to discuss but came up occasionally. It appears that more hunter and public education is needed on SAK and how programs like EAB affect SAK estimates. There still seems to be considerable distrust of SAK estimates that needs to be resolved for future panels to develop more specific overwinter goal recommendations.



Wisconsin State Chapter of the National Wild Turkey Federation (WSC-NWTF)

www.nwtf-wi.org

Overview of Group or Community

The WSC-NWTF has over 120 Local Chapters across the state and approximately 13,000 adult members. Our primary mission is the conservation of the wild turkey and the preservation of our hunting traditions. We support not only wildlife through conservation but conservation through hunting. We believe that hunters are true conservationists.

Lessons Learned from the Stakeholder Panel Process

The WSC-NWTF presence on the committee brought a diverse group together to work at formulating a three year DMU plan. While the groups all had different reasons for their involvement ours was to represent our membership that is also affected by these decisions. Together we can accomplish our goals while protecting Wisconsin's rich hunting traditions.

Although we focus mainly on the wild turkey, we have always been involved in all facets of hunting as a management tool. We realize that all may not see the issues exactly the same but we share a commitment by all to effectively manage wildlife in Wisconsin and across the nation.

Stakeholder Group Specific Input

The WSC-NWTF encourages increasing the over winter goals. In order to do so we must use all available data within our means and that data must be credible and socially acceptable to the hunting public. Hunters are the best management tool at keeping the deer herd within goal and we must foster a role that hunters and landowners collectively make management decisions on the deer herd in their area.

We understand that a one size fits all strategy across the state will not work and we need to address a variety of issues such as accurate and reliable herd estimates, available habitat, hunter harvest, predation and winter kill. Hunters can also provide a unique perspective to local herd estimates due to their vast knowledge of the landscape. This must all be balanced with the biological and social science when setting herd estimates.

We continue to see willingness from the hunting community to be very involved in the process. The online survey mined much information and it is clear the hunting public wants to be involved in the discussion of DMU goals and boundaries. Engaging the hunting community as equal partners in the discussion will help bridge the gap between managing hunters and managing the herd. It is clear that hunters do not like to be managed, but would rather manage the herd.

Stakeholder Group Specific Recommendations

Without the hunting communities support, getting to the population goals is all but impossible. To do that we need an accurate and reliable herd estimate that the hunting public can trust. Without accurate and reliable estimates the goal can not be defined, or be achieved. In order to reach the goal we need hunter support, accurate pre-hunt estimates, and reasonable herd goals. Currently administrative rule mandates the department perform a DMU review every three years and we support it and would ask for no extension.

Chapter 2

DEER MANAGEMENT REGIONS OF WISCONSIN

The state is divided into 5 major regions—Northern Forest, Central Forest, Western Farmland, Eastern Farmland, and Southern Farmland (*Figure 2.1*). These regions reflect latitudinal gradients of climate and habitat differences that affect deer productivity and survival.

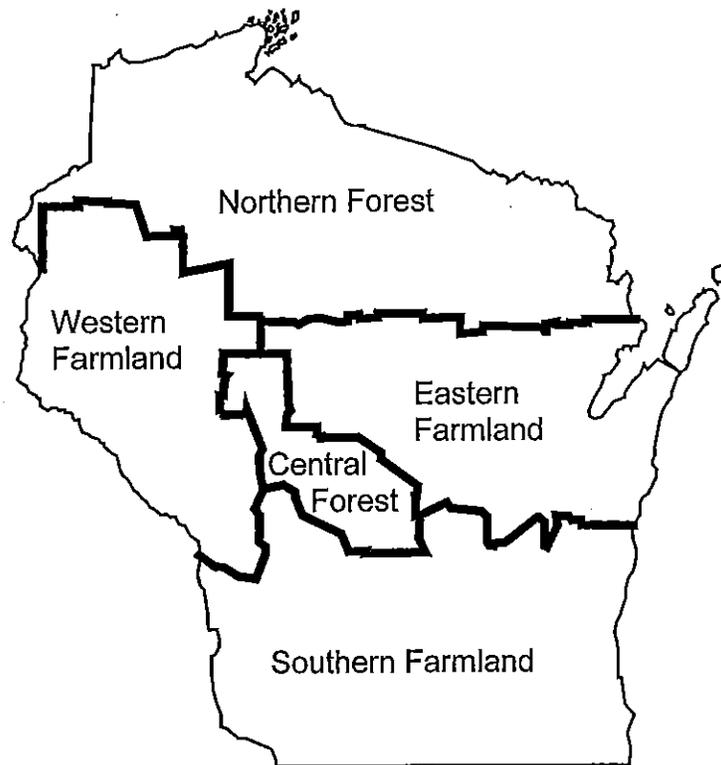


Figure 2.1. Deer management regions of Wisconsin.

NORTHERN FOREST

Physical Description

This region contains about 15,000 mi² of deer range and lies above 45° latitude (Cornell to Marinette) in the east and 46° (Grantsburg to Spooner) in the west. Severe winters, causing significant direct mortality of deer, occurred on average about once every 3 years during 1960-99. Most deer management units within this region are more than 80% forested mainly by northern hardwoods, aspen, balsam fir, pines, and swamp conifers. The primary land use is forestry. Topography is moderately rolling with elevations ranging from about 600 feet at Lake Superior to 1,950 feet at Timm's Hill in Taylor

County (Wisconsin's highest elevation). Soils include stony glacial till, pitted outwash sands, and peat. Deer habitat quality is declining with the maturing of the forest since the lumbering era in the late 1800's and early 1900's. The maturing forest is resulting in the loss of openings and aspen to other longer-lived and shade-tolerant forest types. The degree to which the decline in natural habitat carrying capacity is being offset by recent increases in deer baiting and feeding in the region is unknown.

Deer Population Trends

Deer population goals in the Northern Forest currently average about 70% of maximum (or K) carrying capacity (Chapter 4). Goals in the Northern Forest have not changed much since initially established (*Figure 2.2*). However, deer population trends have been very dynamic, driven primarily by winter weather. The rather precipitous decline in numbers from 1965-72 was caused by a sequence of severe winters where 5 out of 8 winters were in the severe category. Herd recovery thereafter was marked by periodic severe winters until the late-1980s when we entered a sequence of mild winters from 1987 until 1995. The herd decline in 1992 was caused in part by high harvests and reduced recruitment following an untimely sequence of blizzards on Halloween and the opening weekend of the 1991 firearm season. These blizzards seemingly stopped the rut and set the stage for direct winter mortality in some DMUs. The sudden change in herd status caused organized resistance to antlerless quotas in 1993, and the herd again soared to unsustainably high numbers. Liberal harvests in 1995 and 1996 and back-to-back severe winters in 1995-96 and 1996-97 reduced the northern herd to within 20% of goals by January 1998. Following these severe winters the population quickly rebounded.

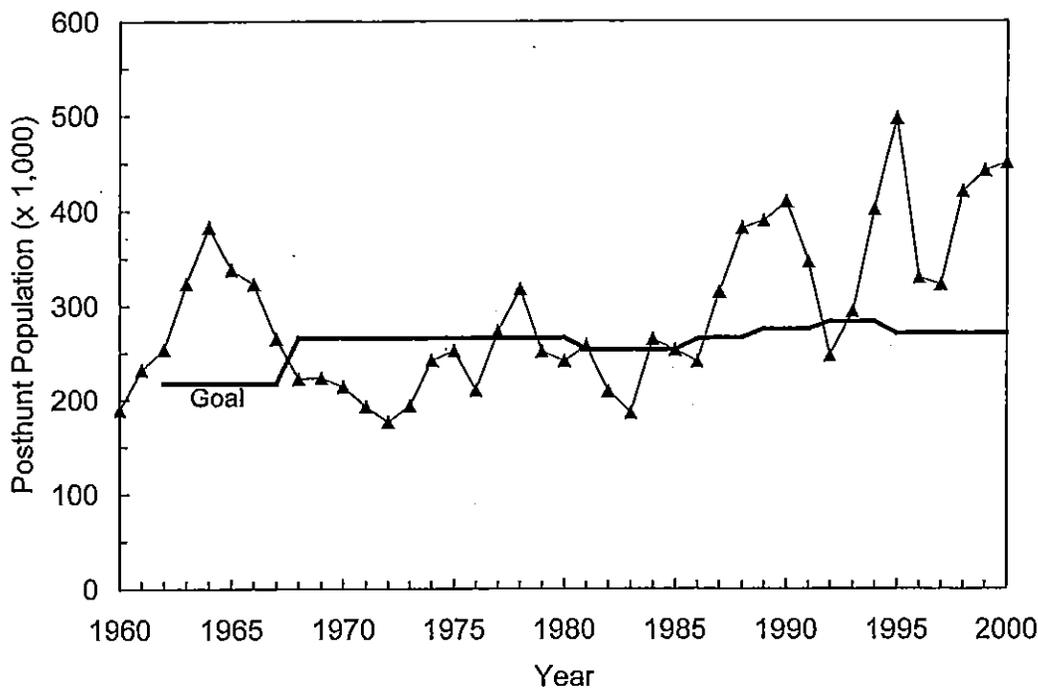


Figure 2.2. Trends in the posthunt deer population and population goal in the Northern Forest, 1960-2000.

CENTRAL FOREST

Physical Description

This region contains about 2,300 mi² of deer range and is located between 44° and 45° latitude. Severe winters occur on average about once every 6 years. The land is mostly forested with oaks, pines, and aspen interspersed with open marshes. Topography is level to gently rolling, with elevations ranging mostly between 900 and 1,000 ft. Much of the area was formerly Glacial Lake Wisconsin. Occasional outlier mounds or buttes of sandstone rise 200 to 350 ft. above local elevations. Soils are mainly sands, sandy loams, and shallow peats. Forestry and cranberry production are important, as well as dairy and muck farming on the perimeter of the region.

Deer Population Trends

Of all regions, population goals have been the most stable in the Central Forest (Figure 2.3). Current goals are estimated to be about 55-60% of carrying capacity (K). Populations were depressed slightly below goals during the period of severe winters in the late 1960s and early 1970s, but have been modestly above goals most years since. Winter impacts are less frequent here than in the Northern Forest, but are still apparent in the population trend. Population declines in the early and mid 1990s correspond with similar declines in the Northern Forest. Following each of these declines, the population rapidly grew above goal.

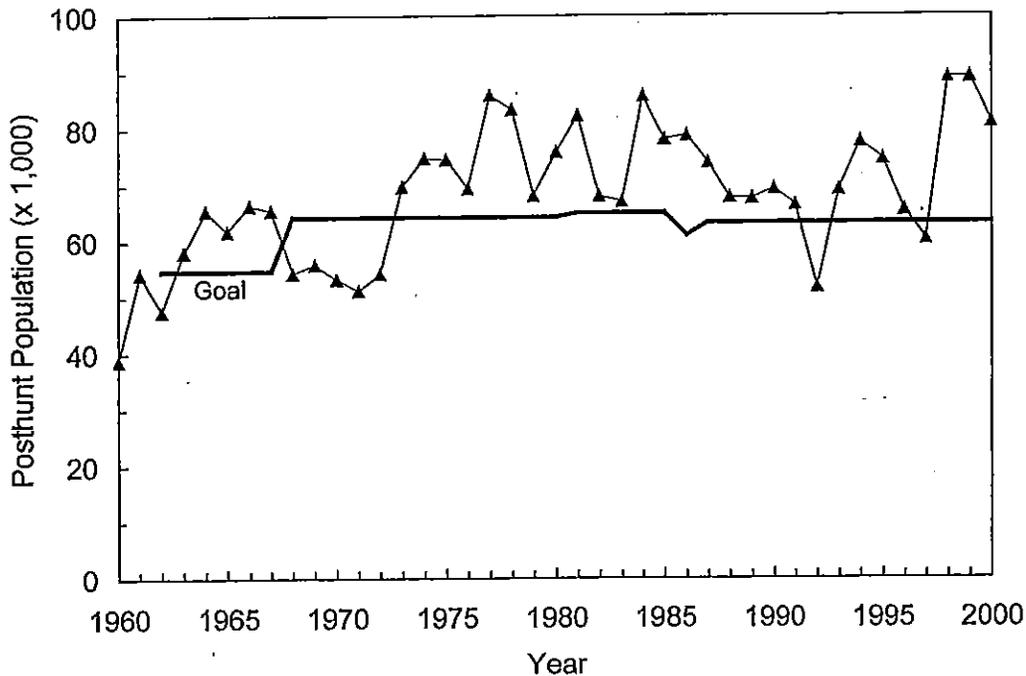


Figure 2.3. Trends in the posthunt deer population and population goal in the Central Forest, 1960-2000.

EASTERN AND WESTERN FARMLAND

Physical Description

These regions lie generally above 44° latitude (roughly LaCrosse to Manitowoc) and south of the Northern Forest. Significant winter losses of deer occur here infrequently (once every 10 to 15 years). Forests and woodlots of central hardwoods, pines, and wetlands make up most of the permanent deer cover. From 10% to 50% of most DMUs are forested with about 5,000 mi² of deer range in the West and 5,400 mi² in the East. Farming is the primary land use. Soils are predominately loams and topography varies from gently rolling in the east to steep coulees (350 to 700 ft. relief) in the “unglaciated” portions of the West.

Deer Population Trends

The goals in these farmland regions have increased greatly since 1962 (*Figures 2.4, 2.5*). Goals were initially set when deer were relatively scarce in the farmland. Goals have been gradually revised upward in response to hunter demands and claims that farmer complaints of agricultural damage by deer were few. The large increase in the regional population goal shown in 1986 was due mainly to an increase in the deer range estimate rather than upward revisions in DMU density goals. Current goals average about 20-40% of estimated carrying capacity (K). Population changes in the Western Farmland (*Figure 2.4*) were quite dynamic from year-to-year, due in part to variations in any-deer/buck-only seasons which differed by county, DMU, and year, particularly during the early part of the period shown. Populations in the Eastern Farmland (*Figure 2.5*) increased more uniformly during the past 35+ years. The herd reduction following 1967 was imposed because of increased farmer complaints of deer damage to crops. Crop damage and farmer complaints have been frequent again as herds have been at high levels for more than a decade. Herds were successfully reduced in the mid 1990s with the use of special T-Zone (temporary) hunts, especially in the Eastern Farmland (*Chapter 1, Evolution of Antlerless Harvest Management*), but populations have since bounced back.



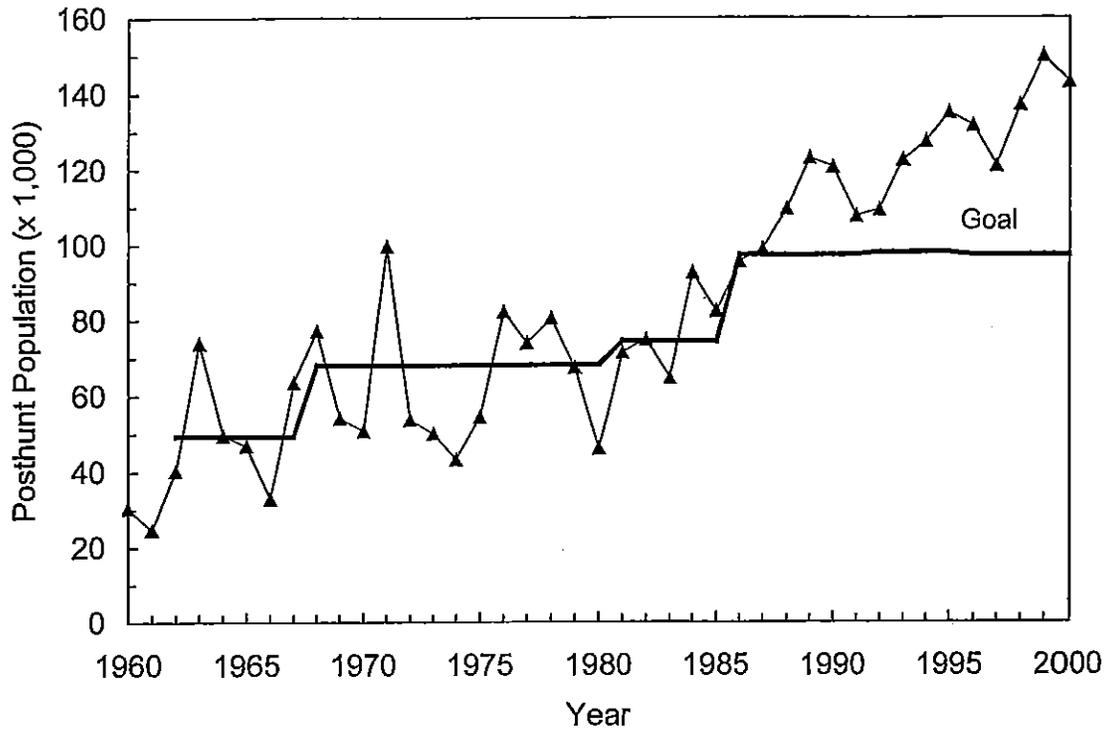


Figure 2.4. Trends in the posthunt deer population and population goal in the Western Farmland, 1960-2000.

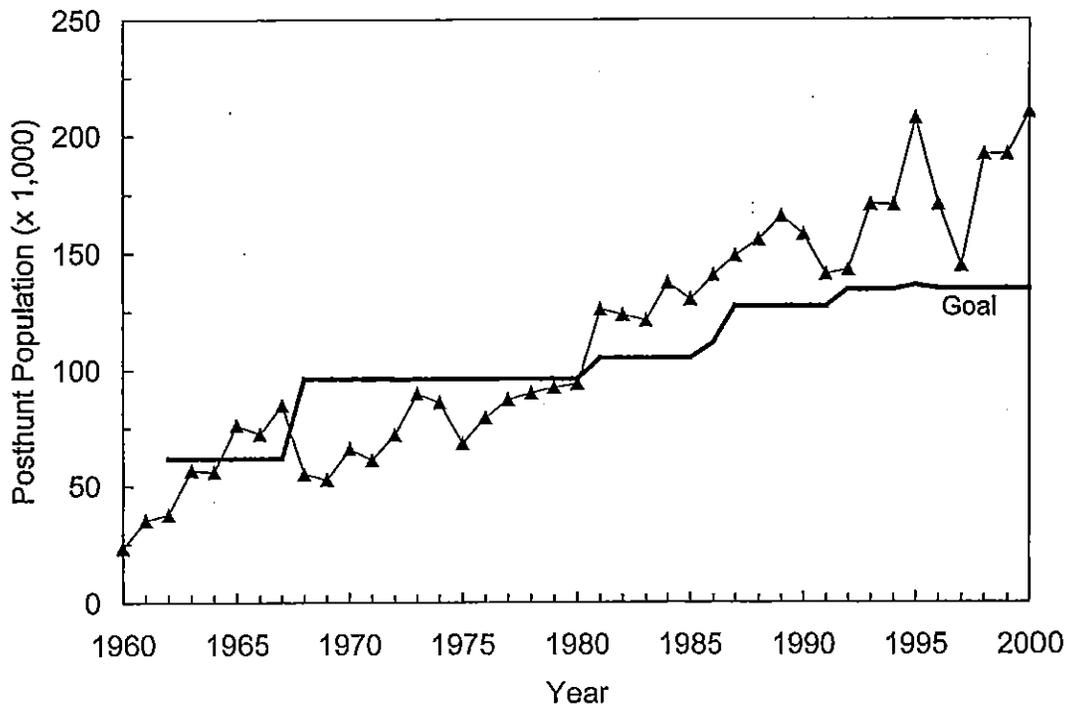


Figure 2.5. Trends in the posthunt deer population and population goal in the Eastern Farmland, 1960-2000.

SOUTHERN FARMLAND

Physical Description

This region is between 42°30' (Illinois state line) and 44° latitude. Significant direct winter losses here are rare. Woodlots of mainly central hardwoods, wetlands, and pines cover 5 to 50% of the land composing 6,400 mi² of deer range. Soils are mainly loams. Topography varies from gently rolling in the east to steep coulees in the west. Farming is the primary land use. Residential sprawl is increasingly a factor in the distribution of deer, especially in the case of some woodlots which were important hunting areas in the recent past but are no longer hunted now and act as "deer refuges."

Deer Population Trends

Goals in the Southern Farmland have risen in response to hunter demand (*Figure 2.6*). However, as goals have increased, there have been corresponding increases in crop damage and car/deer collisions. Deer have gone from rare prior to 1960 to commonplace (even to nuisance levels) by the 1980s. Locally high deer populations in the early 1980s were reduced by a season that became a nightmare in local permit issuance. The herd again exceeded goal following conservative harvests in 1993. Some difficulty has been encountered in reducing herds to goals since. Special T-zone seasons were employed with some success during the mid 1990s to provide incentives for antlerless harvest and to overcome growing problems of woodland-owner imposed restrictions on harvest and hunter access. However, by the end of the decade the population had reach a new high.

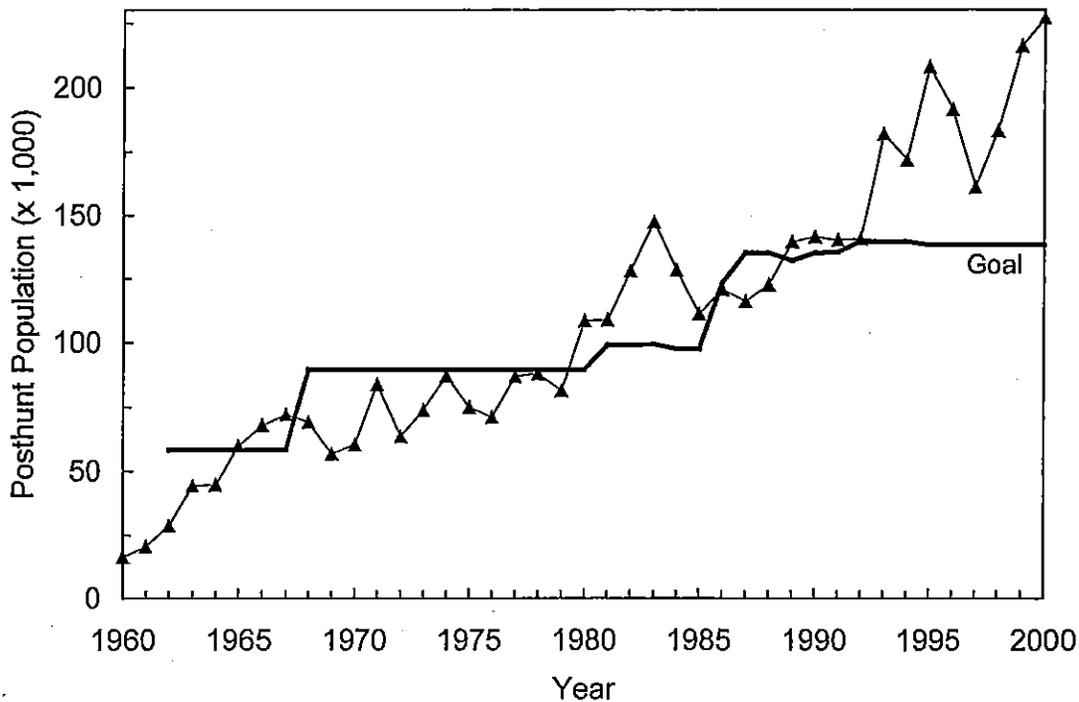


Figure 2.6. Trends in the posthunt deer population and population goal in the Southern Farmland, 1960-2000.

Chapter 3

DEER MANAGEMENT UNITS

Deer management units were initially established in Wisconsin during the mid-1950's to facilitate management of deer populations on a unit scale rather than on broad regional scales or statewide (Doll 1962). The primary purpose of the units was for deer surveys (initially pellet group surveys and beginning in 1959, harvest registration, age data, summer deer observations, hunter pressure). Initially, there were 77 units statewide. Most were blocks of land circumscribed by as few as 3 or 4 major highways. Highways and major watercourses were used to delineate units so that boundaries were readily recognized in the field by hunters and law enforcement officers. Occasionally, county lines have been used as a partial boundary. However since 1985, there has been a concerted effort to use major highways that are readily shown on a small map and visible in the field.

Units were intended to be areas of similar land use (e.g., forest vs. farm, public vs. private) and each contained about 400 mi² of deer range. Deer range includes commercial and noncommercial forest land and a 100 m area along the perimeter extending into active agricultural fields (McCaffery 1973, McCown 1994:8). On establishment, it was recognized that not all physiographic and ecological criteria used were equally met in all units. However, it was felt that they "adequately served the basic purpose of permitting the orderly gathering and interpretation of data" (Hine 1962:29). Size of units was important because it is difficult to efficiently obtain reliable survey data on small tracts. Small unit size has been an obstacle (and increasingly is a problem as more units are subdivided) to obtain meaningful unit-specific survey data. Units continue to be the foundational framework for gathering and analyzing deer population and management information.

IMPACTS OF CHANGING UNIT BOUNDARIES

Deer management units are defined by Wisconsin Administrative Code (Section NR10.28) and are established through a public review and public hearing process. Unit boundaries were subject to ad hoc modifications prior to 1985, but are now reviewed on a 3-year schedule. Formal reviews have been conducted during 1985, 1988, 1991, 1996, and 2000.

During the past 40 years, the number of units has increased to 132 (including 4 island, 13 park, 5 metro, and 3 non-quota units) and units are now described by as many as 13 major and minor highways. Most of this increased complexity came in the farmland areas where deer were relatively scarce 40 years ago, but have been permitted to increase 6-fold since 1962. Public unrest regarding unit boundaries seems to have increased as deer density goals have moved above 25 deer per square mile. Some modifications of units were done in the attempt to mitigate damage (segregate areas with damage complaints from remaining portions of units) while also seeking to accommodate higher numbers of deer in the farmland units. Many boundary changes were demanded by hunters to increase local influence over management decisions (i.e., realigning boundaries to closely conform to county boundaries). Few changes have actually resulted in

improved deer management because most changes were not based on biological or management need. In many cases deer population levels have been destabilized by breaks in the harvest history, smaller sample size, and less precise population estimates because of boundary modifications.

Role in Predicting Fall Herd Status

Maintaining long histories of data for each deer management unit is critical to good herd management. Units in the two forested zones have changed little since they were initially drawn. This is especially fortunate as weather during the hunting season and winter severity normally have greater effect on predicting herd status in forested zones than in farmland units. A long history of herd performance is critical to accurate herd status predictions and harvest quota prescriptions.

This is not meant to diminish the significance of unit histories in the farm country. Here harvest management must be more precise than in the forested zones, because herd dynamics in farmland cause the impact of even small errors in harvest prescriptions to be magnified (McCaffery 1989). That is, populations in farm country are maintained below the point of maximum sustained yield (MSY) where underharvest results in more productive does and normally leads to higher net fawn recruitment (McCown 1994:25). Herd levels in the Northern Forest are more self-regulatory as goals are above MSY and higher populations as a result of underharvest would normally lead to lower net fawn recruitment.

Changes in unit boundaries break the unit data history, and compromise the long-term perspective that is critical for accurately predicting herd responses to varying harvest intensities and winter conditions (McCown 1994). Antlerless harvest prescriptions (quotas) are the means by which deer populations are maintained at specified levels. These quotas are based on the current herd status (predicted by using unit history) relative to the prescribed goal. After a change in unit boundaries, harvest prescriptions must be made without data and are based on professional judgment for at least a couple years. It takes a minimum of 5 or more years before sufficient data are available for good decisions. The longer the unit history, the more likely it will include examples that fit a current set of circumstances. For example, winters with sustained severe cold have occurred only 3 times (when Lake Superior froze over) in the last 20 years and snow conditions were different each time. The blizzard in northwestern Wisconsin, 31 October 1991 was a unique event. Even with a long history, it is sometimes difficult to accurately predict the impact of these rare events on subsequent deer herd status. Without a good history, it is virtually impossible to predict current herd status accurately.

Data Accuracy and Precision

It is commonly believed that smaller units result in more precise management, but the opposite is usually true. Fragmentation of units reduces the precision of herd monitoring capability because sample sizes (age data, hunting pressure, and productivity) are smaller and subject to more inaccuracy. A simple split of a unit has the effect of increasing the imprecision of survey data by more than 40%, all else being equal. A change in any exterior unit boundary also compromises the unit history of at least one adjacent unit.

Harvest and hunting pressure can be more precisely directed with small units. This is often the objective of public requests for revised units. However, this must be balanced with herd monitoring capability. If population estimates are inaccurate or imprecise, finely tuned harvest control does not result in improved herd management. For example, Wisconsin would have to manage on a much courser scale (regions or subregions) were it not for mandatory harvest registration. Registration enables Wisconsin to manage on a finer scale than most other states lacking registration, but there are still limits. Precision of surveys (age data, deer range estimates, fawn production, hunter pressure) and local changes in buck harvest rates puts a lower limit on the effective management unit size. The minimum efficient size depends on both geography and the ability to extract adequate samples at reasonable cost. At present, most units are too small to provide reliable unit-specific data on annual antlerless age composition, current fawn production, and annual hunting pressure with current sampling methods. Similarly, adequate age samples of adult bucks are obtained from fewer than half of existing units. Further fragmentation of units exacerbates these problems. **To account for smaller units, biologists must extrapolate from data in other nearby similar units or pool data from groups of units (or from several years) to attain sufficient sample sizes for analysis of trends. Pooling of data defeats one of the purposes of creating smaller units, by masking unit-specific trends.**

There were good scientific reasons to have units of about 400 mi² of deer range in 1962, and these reasons have not changed. Clearly, larger units have the advantage of greater efficiency and larger sample sizes which produce better estimates of herd status.

Economic Impacts and Efficiency

For every unit added to the system, there is an added administrative cost in personnel and budget. Permitting costs are increased, registration and aging stations normally increase, and all other survey costs must increase if data precision is to be maintained. Present trends toward government downsizing indicate that less time and resources are going to be available for deer management, not more. This reality is reinforced by using our dwindling resources to meet expanding demands for new initiatives on ecosystem management, biodiversity concerns, legal challenges to hunting and trapping, and increased customer service.

Changes in boundaries fragment the database and confound record keeping. Computer-assisted data handling and analyses are hampered. Personnel workload is increased and errors are multiplied. Demands for increased efficiency is causing increased reliance on automated systems. The evolution in deer population monitoring and modeling techniques increasingly demands consistent record keeping. Interpretations of these analyses are then based on the longer record. So, realignment of boundaries should be a last resort to resolving perceived problems within a unit. The administrative cost and loss of information, data precision, and consistency of herd management is high every time a unit boundary is modified. **Other alternatives should first be explored.**

Deer populations on very small properties, like many public hunting grounds, metro areas, and parks, can be surveyed using helicopters when there is snow on the ground, if the habitat does not include many conifers, at a cost of \$250 to \$560/hr (latter cost is for a frequently inspected Jet Ranger in 1995). However, the high cost of these surveys should be borne by the property manager rather than the Deer Management Program. Deer population estimates on small

properties are often a problem because the property seldom contains a discrete herd for management, with deer moving in and out of the boundary. This is true to a much smaller degree for larger sized deer management units. But, as the ratio of perimeter to area increases (*Units 41, 67B, 70E*), deer movement becomes increasingly significant.

Public Perceptions

Many requests for boundary changes have been prompted by localized and temporary situations where high numbers of deer are causing damage. As deer population goals have increased since the mid-1970s, deer damage has increased. In addition, public demands for boundary revisions have increased due to the perception that boundary modifications will "correct" a problem associated with overabundant deer (Regional Task Force Minutes 1994). Changing a unit boundary for a short-term problem is a high-priced solution. Short-term problems can often be addressed through the Hotspot Shooting Program or Wildlife Damage Abatement and Claims Program. Chronic deer damage suggests a lower deer population goal should be considered rather than boundary modifications. The former would preserve the integrity and consistency of the management system and permit early evaluation of the goal change. If problems persist after a trial with a 5 to 10 deer/mi² herd reduction, then other measures (temporary kill blocks, shotgun zones, and boundary changes) might have to be considered.

Most recommendations for modifying unit boundaries will result in smaller units and reduced ability to accurately monitor deer populations. Recommendations for park-units and metro-units create areas for which the current herd monitoring method (Sex-Age-Kill) will not apply. Deer population estimates may be less important in parks and metro areas as long as the public realizes that aggressive herd control will be practiced (with a higher risk of reducing the population too much) to minimize risk to humans and vegetation. Elsewhere, sound estimates of herd status are fundamental to the harvest management program. To the extent that deer herds are not controlled at responsible numbers, there are adverse ecological, economic, and safety impacts.

Many recommendations for boundary revisions are meant to address local deer damage situations in agricultural areas. Many of these deer damage problems are associated with local overabundance of deer. This is the result of an inequitable distribution of antlerless deer harvest, caused by restricted hunter access (i.e., posted land) or a restricted harvest (i.e., buck only hunting) imposed by local landowners. Creating a new unit will not improve hunter access or change landowner-imposed restrictions on harvest and therefore will not remedy many localized damage problems. Public perceptions and demands should not outweigh the scientific facts and result in further fragmentation of the unit system. Further fragmentation of the unit system will not likely increase the precision of deer management. Rather it will likely reduce the precision of our management and cost more to do so.

CHRONOLOGY OF UNIT BOUNDARY CHANGES, 1958-99

The configuration of unit boundaries has changed frequently since they were initially established in the late 1950's. Northern and Central Forest units have changed least, while farmland units have changed most frequently. Some of these changes were made in an effort to better distribute harvest. Other changes were the result of administrative decisions or "political" considerations. In any case, boundary revisions complicate attempts to scientifically develop and maintain

meaningful datasets. Normally the numerical designation of units has not changed although the shape or location of a unit may have changed (*especially Unit 54B*). So, one cannot assume that a history of data bearing the same unit number is representative of the same area. Care must be taken when viewing a Unit History to insure that the data are all for the same area. A change in gross land area is often a signal that the unit has changed in shape or location.

The chronology below lists significant boundary changes and contains maps showing the history of unit shapes from 1958-99 (*Table 3.1*). The maps used with the chronological listing show cumulative changes for convenient time periods (*Figures 3.1-3.9*).

Table 3.1. Chronology of changes in Deer Management Units, with reference to the appropriate figures showing boundary changes.

YEAR(S)	BOUNDARY CHANGE	FIGURE
1958-64	Management unit boundaries did not change during this period.	
1965	Added units 78 and 79 (Apostle Islands).	3.1
1966	Revised boundaries of 70 and 76 to include county boundaries. Antlerless harvest quotas were established for county portions of units 47, 48, 63, 64, and 69.	3.2
1967	Returned 1966 changes to boundaries of Figure 3.1.	3.1
1968	Revised boundaries of 11/12, 7/28, 58/59, and 67/68; split units 13, 59, 62, and 66; added or revised units 54B, 59D, 70A, 70B, 71, 72, and 74.	3.3
1969	Units 13, 62 and 66 rejoined; new boundary for 64/69; joined units 70A and 70B; added units 80 and 81 (Washington Island).	
1970	Split units 57, 62, and 63.	
1971-75	Revised and added units in 1971 including 68, 69A, 69B, 70A, 70B, 70C, 71, 72, 73, 75, 76, 77A, and 77B.	3.4
1976-77	Added unit 61A (Perrot S.P.), 70E from 70B and revised boundaries for 6/14.	
1978	Split unit 29.	
1979-80	Revised boundary for 32/52; added 70D (Blue Mounds S.P.).	
1981-82	Revised units 69 and 76; added unit 82 (Chambers Island).	

YEAR(S)	BOUNDARY CHANGE	FIGURE
1983	Revised and added units including 61B (Trempeleau), 68/69, 70, 70A, 70B, 71, 73, 75, and 76.	3.5
1984	Split unit 67.	
1985	Split unit 54B into 54B and 54C.	3.6
1986-88	Added and revised units including 12, 15, 17, 22, 22A, 43, 44, 47, 48, 51, 54B, 55, 57, 57A, 59B, 60, 60A, 61, 61C (Nelson-Trevino), 64, 65A, 65B, 66, 67A, 67B, 68, 69, 70, 70A, 70F (Natural Bridge S.P.), 72, 73, 73A (Wyalusing S.P.) 73B, 73C, 75, 75A, 76, 76A, 77A, 77B, and 77C.	
1989	Unit 70B split 70B/70G, Juneau portion of 72 added to 54B.	3.7
1990-91	Unit 49 split A/B, Unit 51 split A/B.	
1992-94	Metro units formed 59M (LaCrosse), 76M (Madison), 77M (Milwaukee); units 68, 69, 80 split A/B. New Unit 80C (Peninsula S.P.). Unit 61C eliminated.	
1995	New 69C (Harrington Beach S.P.).	
1996-97	New metro units 60M (St.Paul/St.Croix) splitting from 60 renamed 60B and 64M (Green Bay) taken from Units 63B, 64.	3.8
1998	New park units 23A (Brunet Island S.P.), 57D (Rib Mountain S.P.), 72A (Wildcat Mountain S.P.), 75B (Yellowstone S.P.), and 77D (Loew Lake).	
1999	Unit 75 split at Iowa/LaFayette county line into 75C and 75D; Boundary between 73 and 73C moved west from County Highway G to State Highway 61, forming new units 73D and 73E.	3.9

1965 Deer Management Units

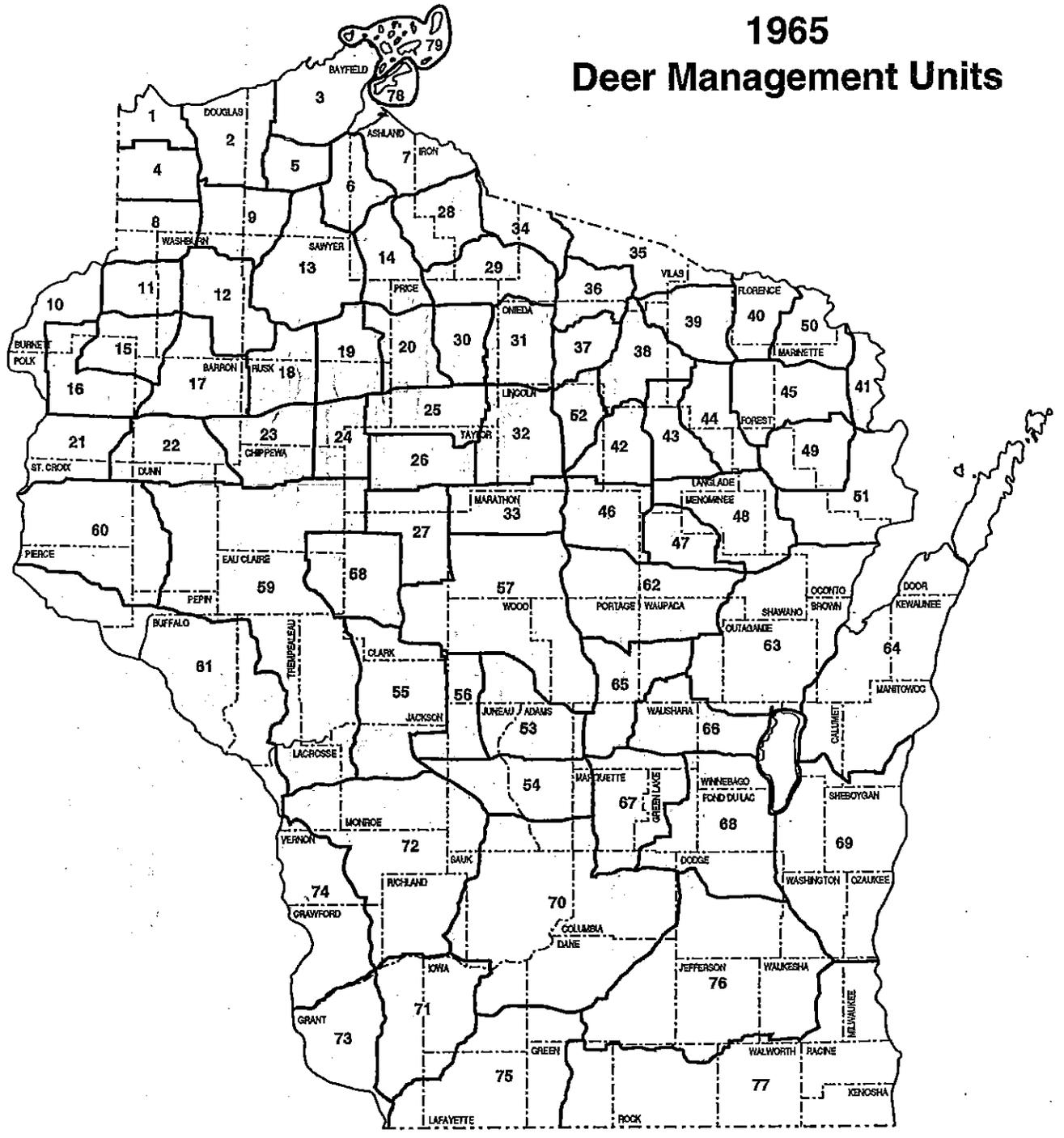


Figure 3.1. Deer Management Units, 1965.

1966 Deer Management Units

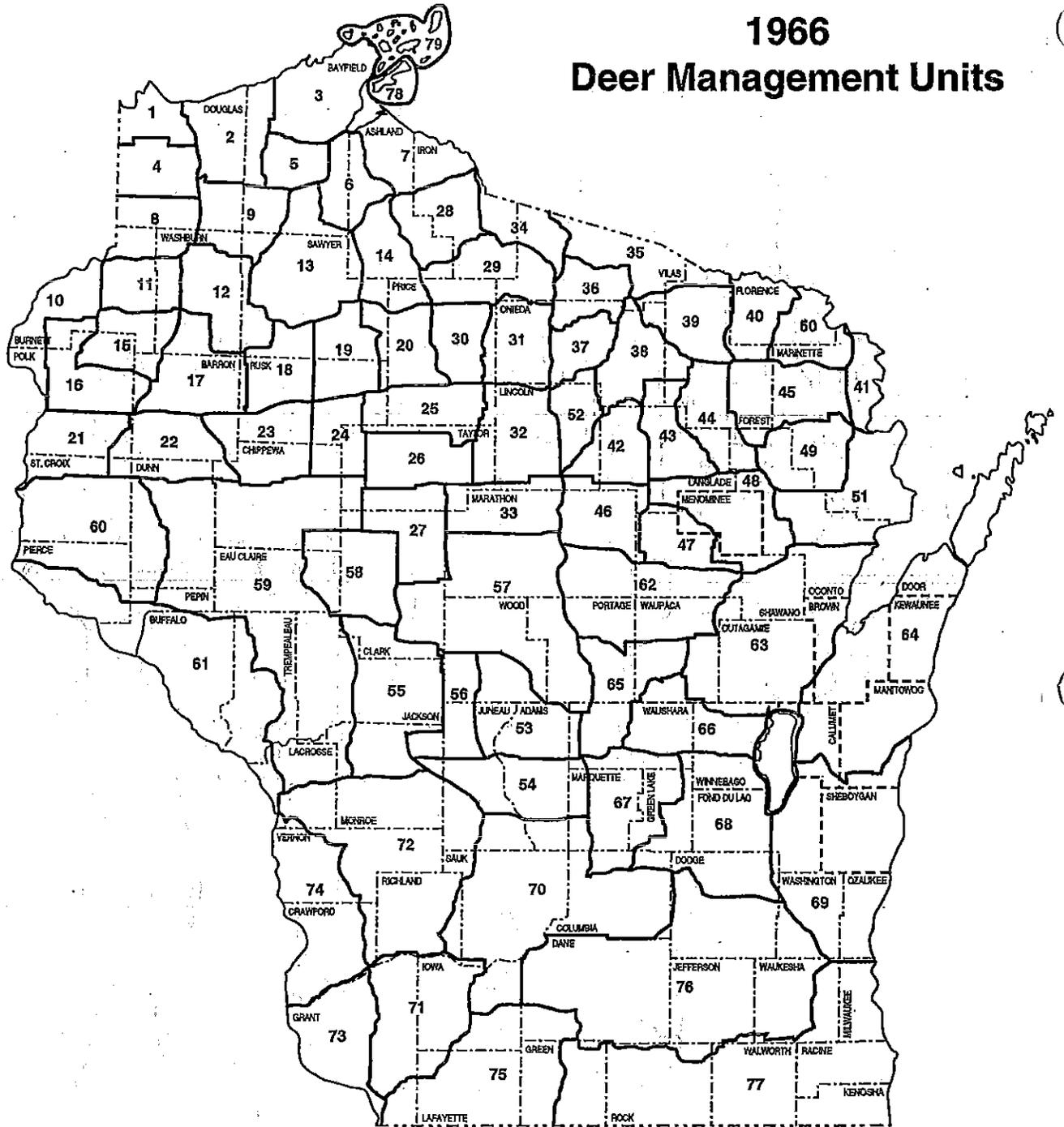


Figure 3.2. Deer Management Units, 1966.

1968 Deer Management Units

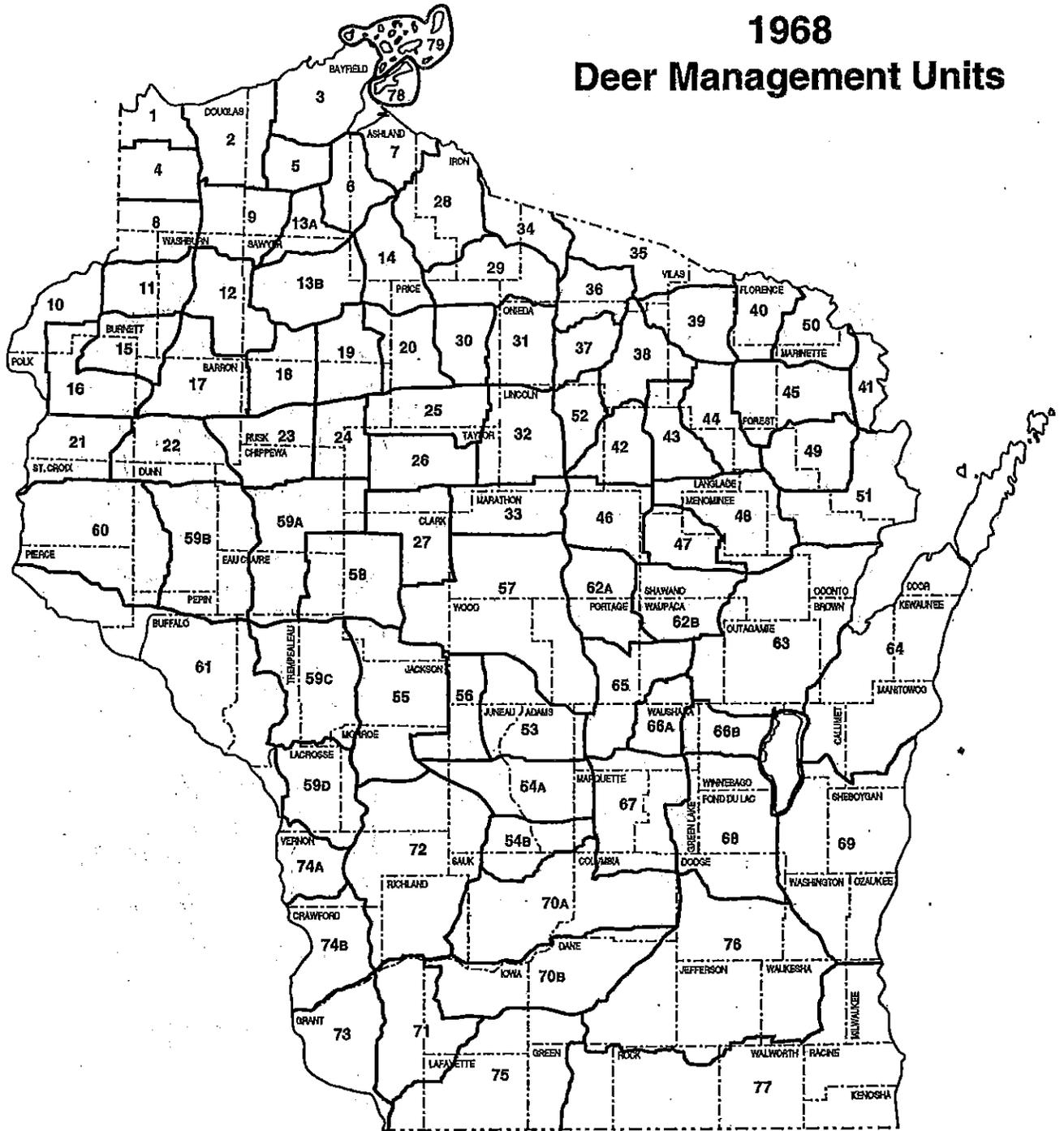


Figure 3.3. Deer Management Units, 1968.

1983 Deer Management Units

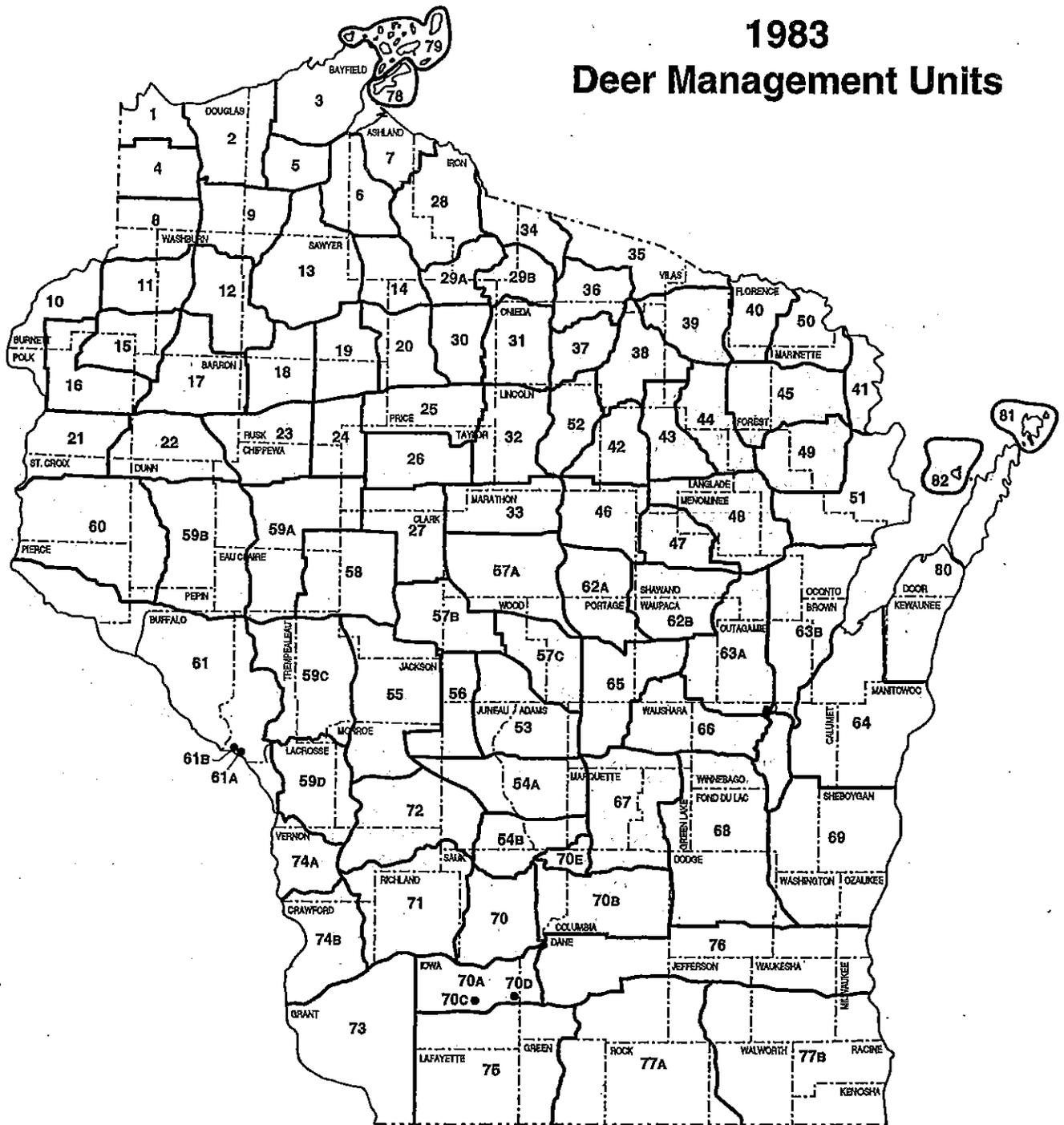


Figure 3.5. Deer Management Units, 1983.

1985 Deer Management Units

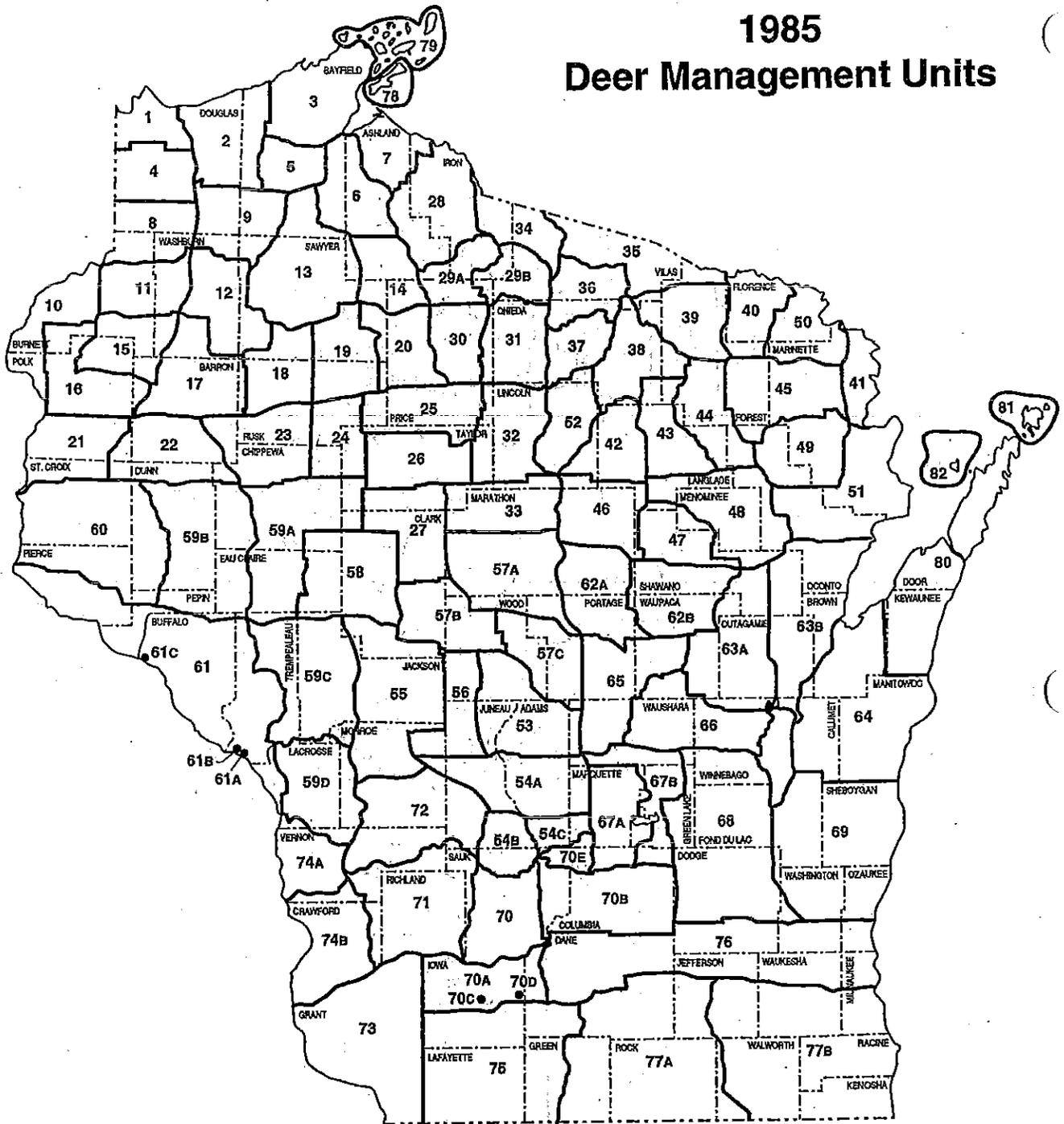


Figure 3.6. Deer Management Units, 1985.

1989 Deer Management Units

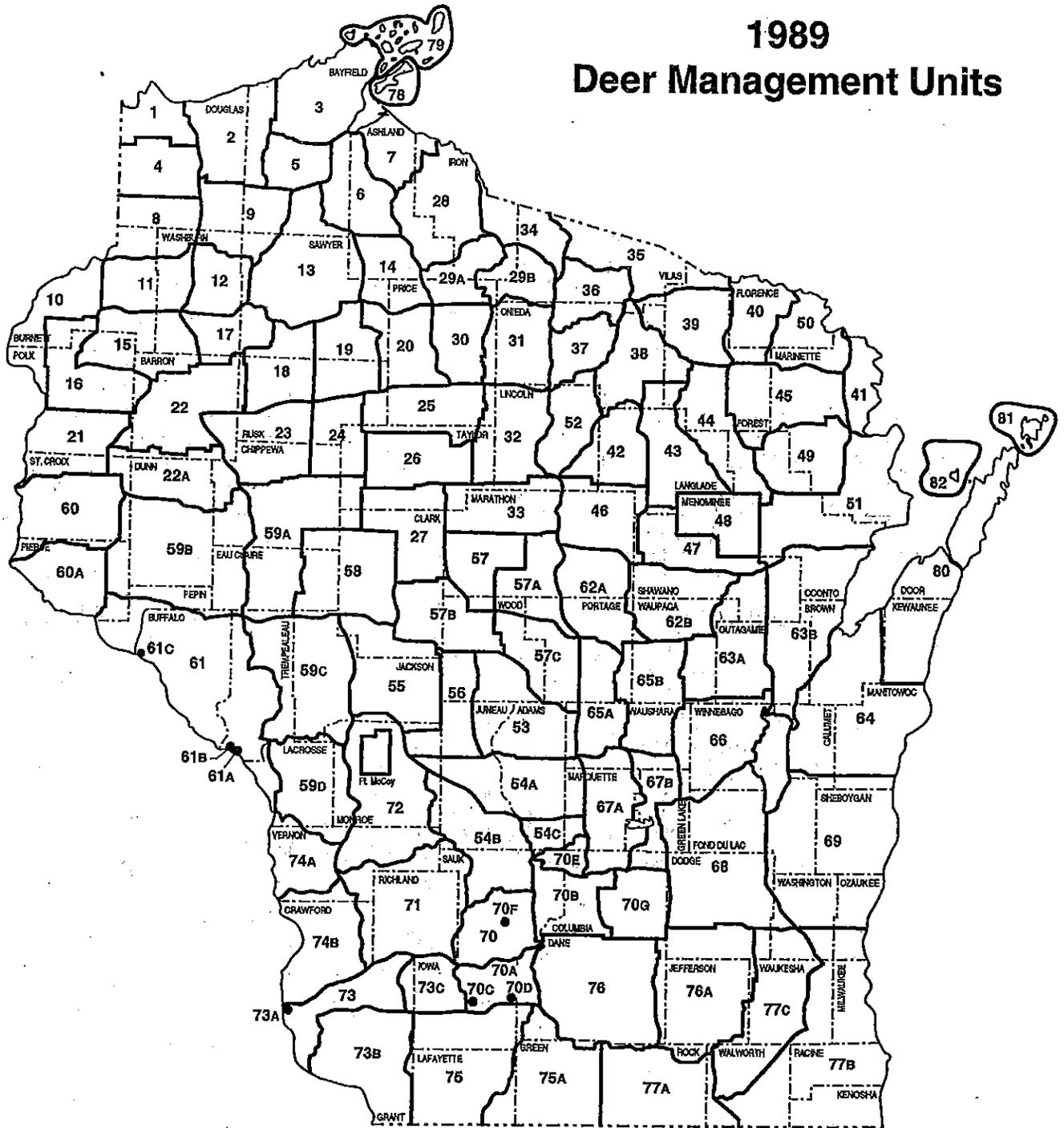


Figure 3.7. Deer Management Units, 1989.

1997 Deer Management Units

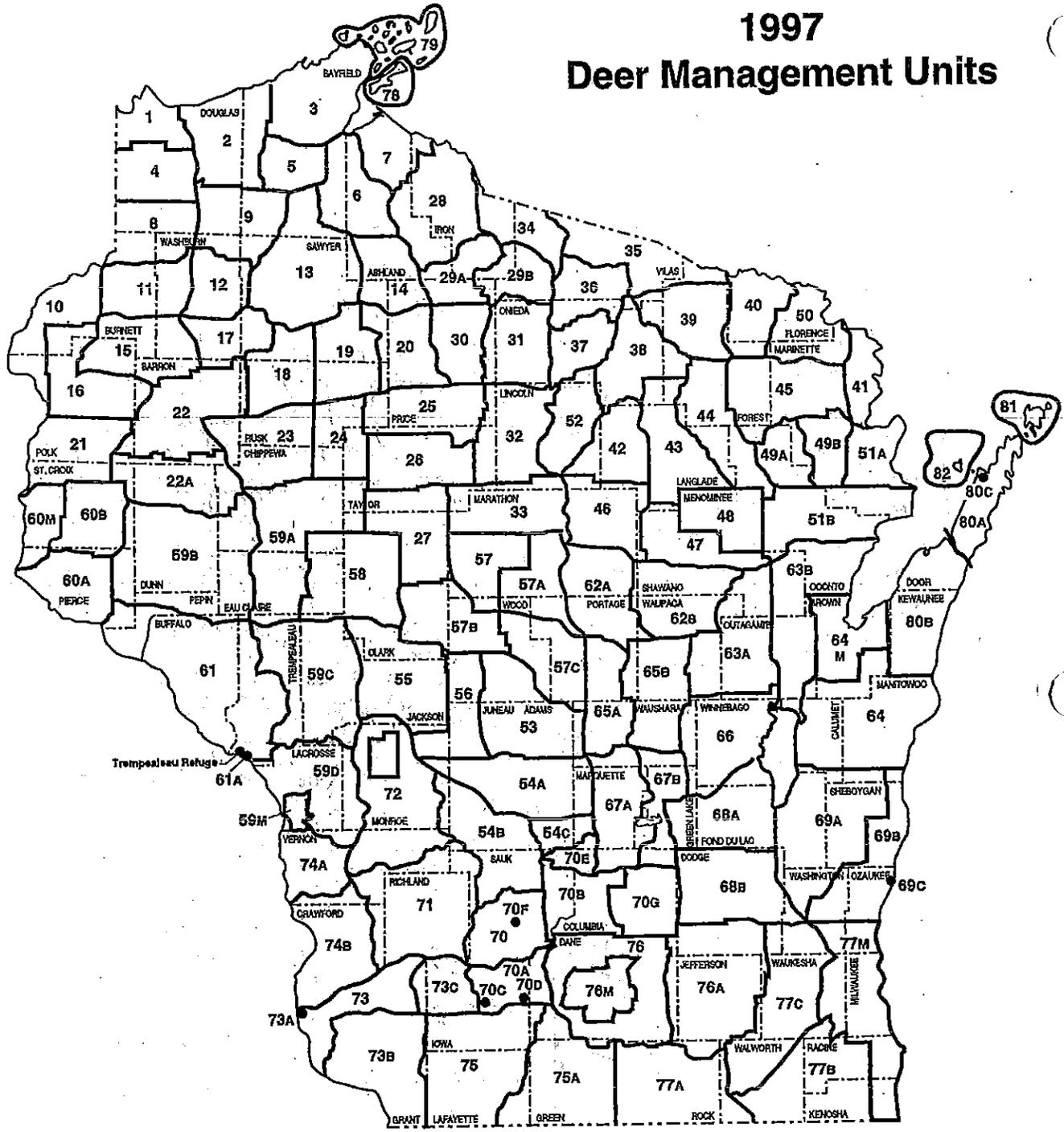


Figure 3.8. Deer Management Units, 1997.

LITERATURE CITED

Doll, A.D. 1962. A management plan for Wisconsin's whitetails. Wisconsin Conservation Department. Madison. 8pp. Mimeograph.

Hine, R.L. ed. 1962. Deer-forest interrelationships in forest land management. Wisconsin Conservation Department. Madison. 62pp.

McCaffery, K.R. 1973. Reinventory of statewide deer range. Wisconsin Department of Natural Resources. Final Reproduction. P-R Proj. W-141-r-8. 31pp.

McCaffery, K.R. 1989. Population dynamics and management of deer in Wisconsin. Pages 155-161 in S.R. Craven ed. Proc. Fourth Eastern Wildlife Damage Control Conference. USAD/APHIS/ADC, Sun Prairie, WI. 258pp.

McCown, W. ed. 1994. Wisconsin's deer management program: the issues involved in decision making. Wisconsin Department of Natural Resources. Publ-RS-911-94. Madison. 31pp.

Regional Task Force Minutes. 1994. Review of overwinter goals for Wisconsin's deer management units- Administrative Area reports. Wisconsin Department of Natural Resources. Madison.

Deer Management Regions

