WISCONSIN DEPARTMENT OF NATURAL RESOURCES
NOTICE OF FINAL GUIDANCE & CERTIFICATION

Pursuant to ch. 227, Wis. Stats., the Wisconsin Department of Natural Resources has finalized and hereby certifies the following guidance document.

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Wisconsin's Chronic Wasting Disease Response Plan: 2010-2025

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DATE FINALIZED

Dec. 9, 2019

DNR CERTIFICATION

I have reviewed this guidance document or proposed guidance document and I certify that it complies with sections 227.10 and 227.11 of the Wisconsin Statutes. I further certify that the guidance document or proposed guidance document contains no standard, requirement, or threshold that is not explicitly required or explicitly permitted by a statute or a rule that has been lawfully promulgated. I further certify that the guidance document or proposed guidance document contains no standard, requirement, or threshold that is more restrictive than a standard, requirement, or threshold contained in the Wisconsin Statutes.

Tamara Ryan 12/3/19

Signature Date

Wisconsin's Chronic Wasting Disease Response Plan: 2010–2025

"The ultimate test of man's conscience is his willingness to sacrifice something today for generations tomorrow, whose words of thanks will not be heard."

–Gaylord Nelson

Wisconsin Department of
Natural Resources, 2010

Contents

Executive Summary 3
Key Objectives 4

Background 6
Disease Overview 6
Agency Responsibility 7
Role of Ojibwe Indian Tribes 7
Principles of CWD & Disease Management 7
Risks and Potential Future Impacts of the Disease 8
A Brief History of CWD in Wild Cervids and its Management in Wisconsin 10

Conclusions after the First Eight Years 16

15-Year CWD Response Goal 17

Objectives, Actions, and Anticipated Results 18
1. Prevent New Introductions of CWD 18
2. Monitor for and Respond to New CWD Disease Foci 21
3. Control Distribution and Intensity of CWD 23
4. Increase Public Recognition and Understanding of CWD Risks and Public Participation in Disease Control Efforts 29
5. Address the Needs of Our Customers 31
6. Enhance the Scientific Information about CWD 34

Summary 36

Acknowledgements 37

Appendix A—Season structure in the CWD Management Zone as adopted by the Natural Resources Board in rule order WM-05-08 38

Appendix B – Deer management unit goals in the CWD Management Zone as recommended by the Stakeholder Advisory Group (SAG) and adopted by the Natural Resources Board in April, 2008. 39

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Executive Summary

After more than eight years of chronic wasting disease (CWD) management in Wisconsin, it is increasingly clear that controlling CWD in Wisconsin's free-ranging white-tailed deer will be extremely challenging and will require a substantial commitment of human and financial resources over an extended period of time. Disease management in free-ranging wildlife populations generally is difficult, expensive, and controversial, particularly when significant wildlife population reduction is a part of the plan. Conclusive control or eradication of CWD in a high-density, free-ranging, white-tailed deer population is unprecedented. Despite a difficult task, the Department of Natural Resources (DNR) is dedicated to limiting the spread of chronic wasting disease across the state. All available evidence indicates that CWD has the potential for significant, negative impacts on the future of deer hunting in Wisconsin. We are therefore establishing the following goal for the management of CWD over the next 15 years: **Minimize the area of Wisconsin where CWD occurs and the number of infected deer in the state.** To achieve this goal, it is imperative that the DNR has public support for and active participation in this plan.

Deer hunting is enjoyed by nearly 700,000 hunters in the state, providing nearly 7 million days of hunting recreation, and generating nearly $1.4 billion in total impact to the state's economy each year. Because of the special significance of deer to the Ojibwe people, CWD also poses a real threat to these tribes and their tribal culture. Deer and deer hunting are an extremely important part of Wisconsin's heritage and culture.

The DNR has the public trust responsibility for managing wildlife and ensuring the health of wildlife populations in the state. There are real health risks to deer and elk from CWD and ongoing questions about possible health risks to humans and livestock. Additionally, there are secondary risks to the state's economy, socio-cultural traditions, and ecosystem from the long-term effects of the disease.

The currently identified geographic distribution of CWD is substantially larger than was known in 2002 and is likely increasing. Eliminating CWD from Wisconsin using the tools currently available is unlikely given the difficulty in managing CWD in free-ranging deer, magnitude of deer reductions required to significantly affect the disease, and declining legislative support. However, there is still a need to take steps to effectively manage CWD regardless of the continued challenges. It is imperative that Wisconsin actively manage CWD so that we are in the best position possible should new, more acceptable and effective tools be developed.

CWD positive 3-year old doe showing clinical signs of the disease before being shot by a DNR warden in Columbia County, August, 2006.

Therefore, minimizing the area of the state where the disease occurs is the responsible goal to pursue. This goal does indicate a shift in our original management approach by currently accepting an area of CWD infection in southern Wisconsin, and at the same time, focusing CWD control efforts on limiting CWD to that area of the state while simultaneously controlling its intensity and distribution.

Advances in understanding of the ecology and epidemiology of CWD in Wisconsin have contributed significantly to informing our management actions. Yet, to date, there is no clear prescription for managing CWD. The DNR will need to continue intensive monitoring of CWD prevalence and distribution in order to make decisions on CWD management using an adaptive management and response approach. We believe that the results of our ongoing monitoring of CWD in the state's wild deer along with advances from research into the epidemiology of the disease over the next 15 years will allow the state to better evaluate the effectiveness of actions on controlling CWD.

Key Objectives

The key objectives of this response plan are to

- Prevent new introductions of CWD in areas where disease is not currently believed to be present
- Monitor for and respond to new areas of CWD infection (new foci)
- Minimize geographic distribution and intensity of CWD
- Increase public recognition and understanding of CWD risks and participation in disease control efforts
- Address the needs of our customers
- Enhance the scientific information about CWD

The plan includes a number of specific management and monitoring actions that will be taken in order to achieve the overall goal and the individual objectives established. These actions include

- Implement the current (2009) hunting season structure as the basic season structure for all units in the CWD Management Zone through 2015 with an evaluation of the effectiveness of the existing season structure in reducing deer populations after the 2015 and 2020 season.
- Issue post-season landowner hunting permits in the CWD Management Zone.
- Provide hunters with opportunities to have their deer tested for CWD.
- Cooperate with community organizations, food pantries, and meat processors in the CWD Management Zone to provide hunters options for donating deer.
- Pursue a statewide ban on the feeding and baiting of deer to reduce the risk of transmission of CWD and other serious cervid diseases into new areas.
- Continue statewide surveillance in areas where disease is not known to exist using new approaches to detection surveillance that balance efficiency and efficacy.
- Support and encourage the proper disposal of deer carcasses from areas inside and outside of Wisconsin where CWD has been detected to minimize disease transmission risk.
- Work jointly with DATCP to reduce the number of escapes from cervid farms and to expeditiously depopulate, secure, and decontaminate cervid farms containing CWD-positive animals.

- Continue to work with DATCP to access federal and state funding for CWD management.
- Use survey data to better understand public opinions about CWD management and utilize a professional communications firm to develop, test, and refine messages and delivery mechanisms that enhance public knowledge and support for CWD management.
- Continue to cooperate with the Department of Health Services to maintain the registry of persons known to have consumed venison from CWD positive deer.

University of Wisconsin researcher uses telemetry equipment to locate a radio-collared deer in the CWD zone.

- Support and cooperate with researchers to better assess the risks that CWD may pose to humans and livestock, including farmed cervids.
- Continue to seek new funding to support management-oriented research on CWD.
- Monitor CWD prevalence and disease patterns in the known affected area to gain knowledge about disease trends to support adaptive management.
- Conduct sharpshooting on public lands and private lands where permission can be obtained, focused in areas of newer infections along the periphery of the known CWD distribution for the purpose of controlling the geographic spread of the disease.
- Cooperate with Indian tribes to develop action plans for the management of CWD on reservation lands or ceded territories.

The goal, specific objectives, and management actions established for addressing CWD were developed based on the best scientific and socio-cultural information currently available. As new information becomes available, and we continue to monitor and evaluate progress in managing CWD, steps will be taken to adapt our management and response approaches and actions. This adaptive response strategy is essential because the understanding of both CWD epidemiology and the efficacy of CWD management techniques in free-ranging populations is still developing. Nonetheless, any adaptive measures taken will only be effective if the DNR, hunters, landowners, and other key stakeholders work together to implement these measures in an effort to reach common goals.

Background

CWD was first detected in Wisconsin on February 28, 2002. The Department of Natural Resources management goal at that time was to minimize the negative impact of CWD on wild and farmed deer and elk populations and to the state's economy, hunters, landowners and others dependent upon healthy wild and farmed populations of deer and elk. Management program objectives included: 1) defining the geographic distribution and prevalence of infection, 2) investigating the possible origin of the disease in the state, 3) minimizing the potential spread of CWD to new areas, 4) eradicating the disease in the affected area, 5) enhancing scientific information about the disease, 6) using the best available scientific information to guide management, and 7) providing the public with timely, complete, and accurate information.

Management of disease in free-ranging wildlife populations generally is difficult, expensive, and controversial, particularly when significant population reduction is a part of the plan. Control of CWD in a high density, free-ranging white-tailed deer population had not been previously attempted and there are no proven techniques for control of CWD in free-ranging populations.

Over the past eight years, we have learned much about CWD and the challenges involved in managing the disease. We have also learned much about people's views on CWD and CWD management. It is the consensus opinion of wildlife disease experts that, without intervention, CWD will spread further in Wisconsin and prevalence of the disease will increase where it is currently found. A lack of disease management will, over the long term, likely result in decreased deer populations and decreased opportunities for the enjoyment of this valuable resource in the state of Wisconsin.

This document represents an effort to use the best information currently available to update the state's CWD management plan and guide the DNR's response to CWD for the next 15 years.

Disease Overview

CWD is a fatal nervous system disease known to infect white-tailed deer, mule deer, moose, and elk. It belongs to a group of fatal diseases of animals known as transmissible spongiform encephalopathies, or TSEs. Other TSEs include scrapie in sheep, bovine spongiform encephalopathy (BSE, also called "mad cow disease") in cattle, and Creutzfeldt-Jakob disease in humans.

TSEs are thought to be caused by an abnormal form of a normally occurring protein called a prion. Infection occurs by conversion of normal prion proteins into a disease-associated, mis-folded form that is highly resistant to degradation. CWD is characterized by slow accumulation of abnormal prions in tissues, especially nervous and lymphoid tissues, where subsequent tissue degradation eventually results in host death.

Clinical signs of the disease typically appear more than 1.5 years after infection, as accumulation of prions results in the destruction of brain tissues. Animals in the later stages of the disease exhibit behavioral changes and progressive weight loss. Clinical signs are not unique to the disease and each could be due to another condition such as malnutrition, vehicle trauma, *etc*. Currently, there are no available treatments for infected individuals or vaccines for CWD and all infections are believed to be fatal. Management efforts to control CWD are complicated by the protracted course of the disease, likely multiple routes of transmission, lack of early clinical signs,

and persistence of infectious prions in the environment. The National CWD Management Plan recognizes host population reduction as the control method most likely to be effective for controlling CWD in free-ranging deer.

Agency Responsibility

The Department of Natural Resources holds the public trust responsibility for managing wildlife as embodied in State Statute 29.011 Title to wild animals (1) *The legal title to, and the custody and protection of, all wild animals within this state is vested in the state for the purposes of regulating the enjoyment, use, disposition and conservation of those wild animals.*

The DNR's responsibility for ensuring healthy wildlife populations is further described in Administrative Code NR 1.015(2): *The primary goal of wildlife management is to provide healthy life systems necessary to sustain Wisconsin's wildlife populations for their biological, recreational, cultural and economic values. Wildlife management is the application of knowledge in the protection, enhancement and regulation of wildlife resources for their contribution toward maintaining the integrity of the environment and for the human benefits they provide.*

The DNR must balance its responsibility for managing all wildlife in the state with its responsibility for maintaining a healthy deer herd. It is with that responsibility in mind that this 15-year plan for managing CWD has been developed.

Role of Ojibwe Indian Tribes

Although the State of Wisconsin has the public trust responsibility for managing wildlife it also has a responsibility to recognize the role that the Ojibwe Indian tribes play in the use of these same wildlife resources. There must be close, coordinated consultation between the state of Wisconsin and the Ojibwe Indians when dealing with wildlife issues on or near the various reservations and this is especially true with CWD. In the ceded territories of Wisconsin, the state's management options are, in some instances, significantly narrowed by the tribes' treaty rights and there is an increased responsibility for the state to consult with tribes about wildlife management issues, including the management of CWD. In addition, Governor Doyle's policy regarding consultation with Wisconsin's Indian tribes (2005) calls for the Wisconsin DNR to consult with the tribes when making natural resources management decisions.

Principles of CWD & Disease Management

Several assumptions, based on the best available science, guide the recommendations in this response plan.

- CWD was introduced into the state, is not part of our native ecosystems, and its distribution is currently limited to areas in southern Wisconsin.
- CWD is transmitted from deer to deer.
- CWD prions can persist in environmental reservoirs which likely serve as a source for transmission.
- CWD is consistently lethal, and there are currently no effective vaccines or treatments.
- Though a small percentage of Wisconsin deer appear to have reduced susceptibility to disease from CWD (and therefore may transmit CWD over a longer period of time), there has been no genetic profile identified that provides complete resistance to CWD infection.
- CWD is a slowly progressive disease; therefore, success of CWD management techniques cannot be measured over a few years.
- A major means by which CWD can move across the landscape is through the movement of deer and deer carcasses.

- Rate of disease spread is affected by the density of deer and the number of infected deer.
- There is no evidence that CWD will "disappear" or "run its course" on its own in the absence of management.

Risks and Potential Future Impacts of the Disease

There are documented health risks to deer and elk from CWD and ongoing questions about possible health risks to humans, livestock, and other domestic and wild animals. Additionally, there are secondary risks to economic, socio-cultural, and ecosystem values from the effects of the disease and its management.

Deer Herd

The discovery of CWD in southern Wisconsin poses a significant risk to the state's white-tailed deer population and the culture of deer hunting in the state. Wisconsin has nearly 700,000 deer hunters who have harvested an average of 470,000 deer annually during the past 10 years.

The effect of CWD on the wild deer population over the next decade may be low. However, studies of Wisconsin wild deer data and real-world data from Colorado and Wyoming show that without control efforts, CWD prevalence can reach high levels and become geographically widespread. Additionally, both the analytic modeling and the Colorado and Wyoming monitoring suggest CWD can reduce deer populations, perhaps drastically. Prevalence in adult male mule deer on some local winter ranges in Colorado more than doubled during a six year period (1997–2002), reaching levels of 25–40%. A study in Boulder, Colorado showed that prevalence among 46 adult male mule deer sampled was 41% and prevalence among 69 adult female mule deer was 20%. The study concluded that high prevalence and shortened lifespan of infected deer is sufficient to have produced the observed 45% population decline. Preliminary findings from research in Wyoming have estimated a prevalence of 28% among white-tailed deer and have documented shorter lifespans among CWD positive animals.

Human Health

Risk of transmission to humans appears to be low, but that risk cannot be dismissed. The Centers for Disease Control and World Health Organization (WHO) state that there is no scientific evidence that CWD causes human illness; however, WHO and the Wisconsin Department of Health Services (DHS) both recommend that no part of an animal known to have CWD be consumed by humans and that safe handling and processing procedures are followed.

Livestock Health

The risk of transmission to traditional livestock is likely low but cannot be dismissed altogether. There is evidence, based on experiments involving a few animals, that CWD from mule deer is not readily transmitted to cattle and sheep. However, a laboratory study suggests the possibility that CWD from white-tailed deer may be more easily transmitted to livestock. When CWD is injected directly into the brain, it has been shown that cattle and sheep can be infected. However, there have been no infections in studies where cattle are exposed orally or when cattle co-habit with infected mule deer. The risk to farm-raised cervids is high. CWD has been identified in nine farm-raised cervid herds in Wisconsin since 2002.

Economics

Deer hunting contributes more than 7 million days of recreation each year in Wisconsin. In 2006, deer hunting generated nearly $900 million dollars in retail sales and nearly $1.4 billion in total impact to the state's economy.

Should prevalence and distribution of CWD increase dramatically, the disease could severely affect the social and economic stability of the

communities that depend on hunting. Surveys of deer hunters suggest that nearly half would stop hunting if CWD prevalence increased to 50% and losses of deer hunters would be even greater if a linkage is ever made between CWD and human disease. This could have significant effects on the economic vitality of rural communities that are dependent on hunting revenue, preservation of cultural and family traditions, management and control of deer populations, funding for wildlife management programs, and public support for wildlife management.

If prevalence or distribution of CWD increases substantially it is likely that hunter demand for CWD testing of harvested deer will rise. Therefore, the costs of dealing with CWD increase if disease spreads, assuming that the state continues testing pantry deer, regulating disposal of deer carcasses, and testing hunter-killed deer. If a link to human or cattle health problems is ever established, it could convert the management of the Wisconsin deer herd into a multi-million dollar pest control program.

Socio-cultural

Wisconsin survey results indicate that the public wants the DNR to do something to control CWD. Surveys of Wisconsin hunters suggest that if risks to human or livestock health are identified, or if the severity of the disease increases, the willingness of hunters to harvest deer may decline. As a consequence of reduced hunting pressure, the deer population in the CWD affected area may actually increase for a period of time before expected disease-mortality related population declines occur. This could exacerbate already existing impacts from over-abundant deer populations in southern Wisconsin (agriculture damage, deer-vehicle collisions, *etc.*). The effects of CWD on deer populations and hunting traditions will likely develop over decades, whereas the effects of CWD control efforts (*e.g.* extended hunting seasons, earn-a-buck regulations, reduced deer populations) on hunting traditions are felt more quickly.

Ojibwe Culture

Waawaaskishi (white-tailed deer) and Waawaaskishikewin (deer hunting) are important elements of Ojibwe culture and life-way. In the Ojibwe worldview, all animals have a role to play and all have an important place. Many animal species are credited with providing indispensable service to the Ojibwa in their time of need. In Ojibwe lore, it is said that Waawaaskishi offered up himself to the Ojibwe when they found themselves starving and in need of food. The deer meat that came from this harvest sustained the Ojibwe people and Waawaaskishi was given special recognition for this service. To this day, deer hunting and the food that Waawaaskishi provides continues to sustain the Ojibwe. However, this service that Waawaaskishi provided to the Ojibwe in their time of need also has earned deer a place in their spiritual well-being. Thus, Waawaaskishi offers sustenance to the Ojibwe people, not only for their physical well-being, but also for their spiritual well-being. Because of the special significance of deer to the Ojibwe people, CWD poses a real threat to the tribes and their tribal culture. CWD has the potential to disrupt an important part of the Ojibwe social structure as well as leading to the decline in physical and spiritual health of Indian people.

Ecosystems

The risks that CWD pose to the larger ecosystem are poorly understood at this time. Numerous species of mammals and birds have been documented to feed on deer carcasses and gut piles, and other species could be exposed to prions shed into the environment. To date, testing of common mammalian scavengers (raccoons, coyotes, and opossums) from the southwestern Wisconsin affected area has not detected evidence of a prion disease in those species and laboratory studies with mink, raccoon, skunk, and ground squirrels have not

been able to demonstrate natural transmission. In contrast, experimental infection studies have shown potential for CWD to be transmitted to meadow voles and other rodents. If voles were to become naturally infected in the wild, it is possible that they could facilitate transmission to other species.

Indirect ecosystem effects are possible as a result of deer population changes. If increasing disease intensity reduces hunter numbers and therefore deer harvest declines, deer populations may increase in the short-term and ecosystem impacts resulting from overabundant deer populations (forest regeneration, browsing on preferred plant species, loss of nesting habitat for shrub-nesting birds, *etc.*) could intensify. If disease increases to the point that deer populations are significantly reduced then food availability could be reduced for a number of mammalian and avian species in southern Wisconsin (*e.g.* coyote, American crow, turkey vulture), although these species are generalists and not highly dependent on deer. If CWD were to spread to northern Wisconsin, reduced deer populations could negatively affect gray wolves and bears. Northward expansion of CWD would also threaten the health of Wisconsin's fledgling elk population.

A Brief History of CWD in Wild Cervids and its Management in Wisconsin

CWD was initially documented in a Colorado research facility in 1967. It was first found in a free ranging animal in 1981, when it was diagnosed in a Rocky Mountain elk, also from Colorado. CWD has been discovered in farmed and/or free-ranging populations of wild deer, moose, or elk in 18 states and two Canadian provinces **(Figure 1).**

The Wisconsin DNR began active surveillance for CWD in 1999 following increased awareness of interstate transport of elk from CWD-infected western game farms. Through fall 2001, approximately 1,100 hunter-harvested deer had been sampled from across the state. In February 2002, the DNR was notified that

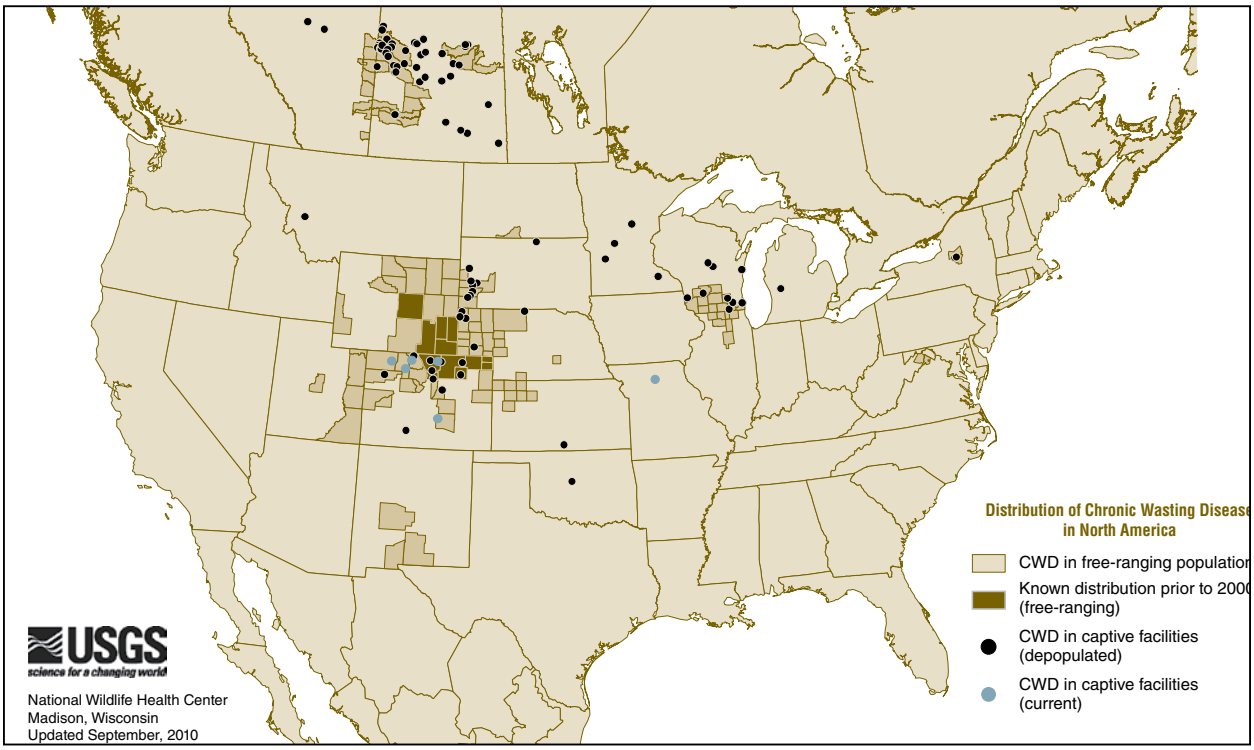


Figure 1. *2010 Map of Chronic Wasting Disease in North America*

three deer harvested the previous fall from Deer Management Unit 70A in western Dane County had tested positive for CWD. This discovery launched an intensive surveillance effort in Wisconsin that continues today and includes nearly 160,000 samples from wild white-tailed deer as of June 2010, 1,354 of which have tested CWD-positive. Surveillance has been continuously conducted since 2002 in the southern portions of the state and routinely on a rotating basis throughout the rest of the state. Sampling intensity has been sufficient in the majority of the state to have a high degree of confidence that CWD would have been detected if the disease existed at 1% prevalence during the time of surveillance. CWD has been found in 12 southern Wisconsin counties. The current CWD Management Zone encompasses all the known locations of CWD test-positive free-ranging deer **(Figure 2)**.

There appear to be two central areas of CWD infection in Wisconsin **(Figure 3)**. One is centered in western Dane and eastern Iowa counties. The second is located in northern Illinois and extends into southeastern Wisconsin. Illinois first detected the presence of CWD in this area in the fall of 2002 and as of June 2010, 294 CWD positive deer have been found. Disease monitoring areas have been established within each central infection area in Wisconsin.

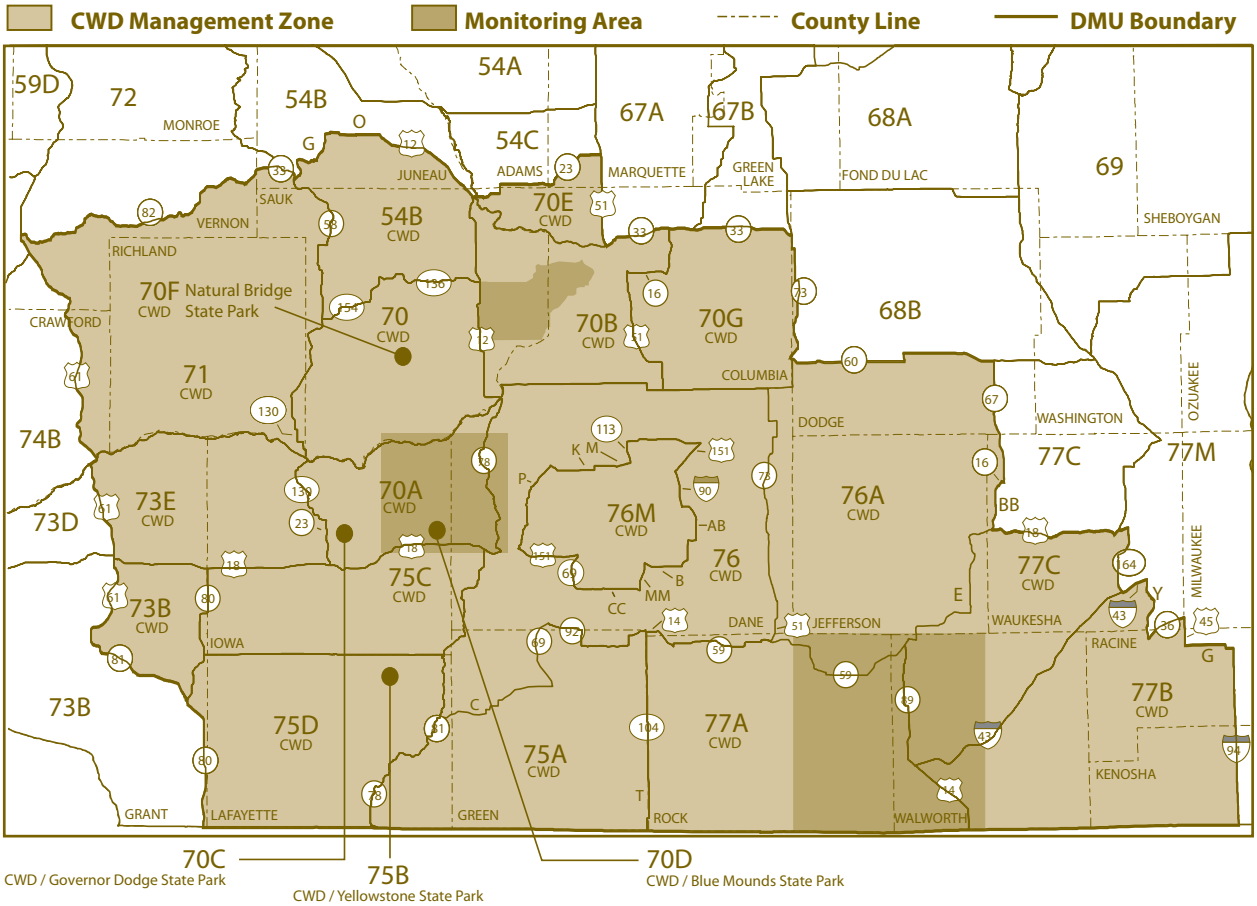


Figure 2. *CWD Management Zone Map (including boundaries of western core, Baraboo, and eastern monitoring areas)*

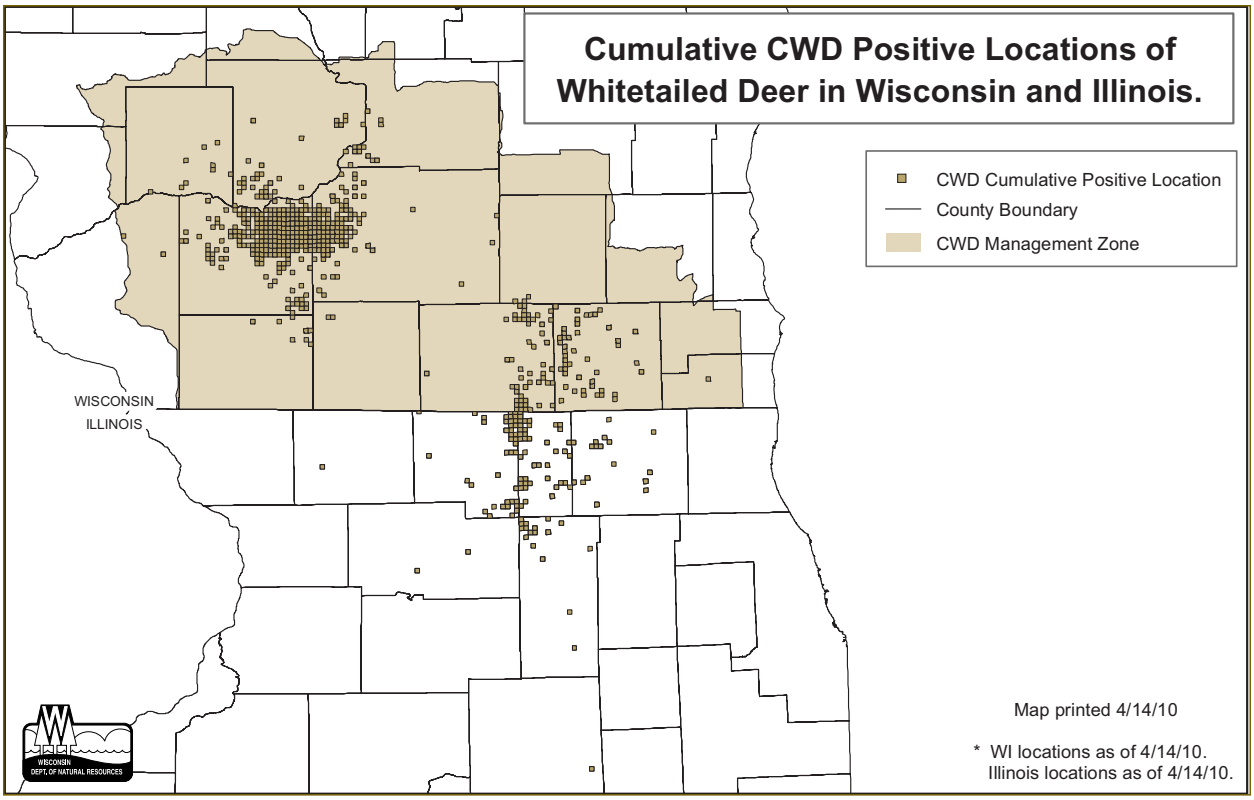
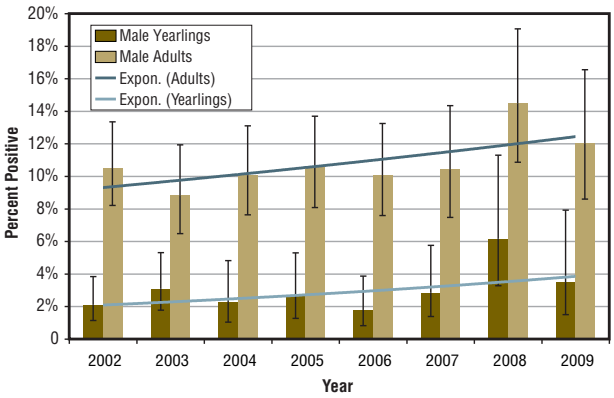


Figure 3. *Cumulative CWD positive locations of white-tailed deer in Wisconsin and Illinois.*

Analysis of the sex and age composition of positive deer over the past eight years in Wisconsin has shown that disease prevalence has increased with age and that prevalence in males has been higher than in females, indicating an historical faster rate of increase. Recently, however, there is some evidence that prevalence in yearling females may now be increasing faster than in other age and sex classes. This may be important since females, in general, tend to be better indicators of local prevalence levels than males due to their tendency to stay near their birth range. What the underlying mechanism, if any, is driving this recent trend remains unclear at this time and only through continued monitoring and analysis will it be determined if prevalence levels continue to increase. Overall, there has been an increasing trend in prevalence in all sex and age



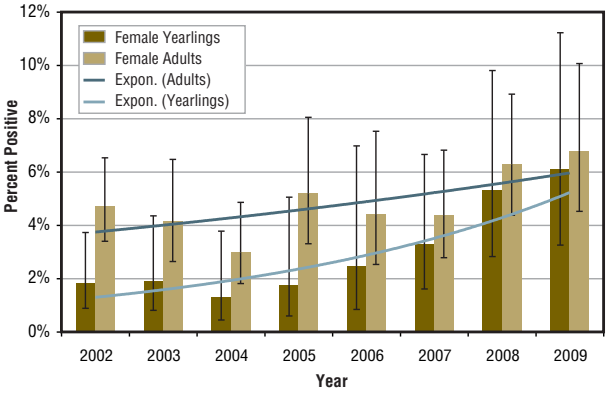


Figure 4. *Estimated prevalence and exponential trend lines of CWD in yearling and adult male (left) and female (right) white-tailed deer from the western core monitoring area, 2002-2009. Vertical lines are 95% confidence intervals.*

classes in the western and eastern Wisconsin core monitoring areas. Since 2002, prevalence in the western core among adult males has risen from about 10% to over 12%, and in adult females from about 4% to about 6%. In the same area during the same period, prevalence in yearling males has increased from about 2% to about 4%, and in yearling females from 2% to nearly 6% **(Figure 4).** Prevalence increases are also evident in the eastern monitoring area where prevalence in adult males has increased from 2% to 8% and in adult females from 1% to 4% between 2003-2009. Very few fawns have tested positive for CWD (23 out of more than 15,000 tested since 2002).

Analyses of the geographic distribution of disease show that the disease is not evenly distributed throughout the affected areas. Disease prevalence is much higher near the centers of each infection and declines with increasing distance from the center. In a few sections near the center of the southwest infection, overall prevalence has been 5–8%. These spatial patterns are consistent with two separate disease introductions at some time in the past (likely more than 20 years ago) with growth in prevalence near the points of introduction and spread to the current distribution.

Hunters and landowners play a pivotal role in managing deer and CWD in Wisconsin. Statewide deer population goals and disease management goals cannot be met without the continued support of hunters and landowners across the state. Over the last decade, nearly 700,000 deer hunters have killed an average of over 470,000 deer each year in Wisconsin. Seven of the ten highest deer harvests ever recorded in Wisconsin have occurred during the past 10 years. Over the last 25 years, hunters have doubled the total deer kill/deer hunting license sold from approximately 0.25 deer killed/license sold to more than 0.5 deer killed/license sold.

However, it has been eight years since CWD was discovered in Wisconsin and it is apparent that greater hunter participation in management efforts is needed and that recreational hunting alone will not be enough to effectively manage CWD. Broad public understanding and support is needed to manage this disease and this support must be demonstrated not just through attitudinal changes, but also through behavioral changes.

Over the past eight years, many deer hunters have demonstrated an unwillingness to change their behavior in response to "risks" that seem remote, uncertain, and long term, even when most hunters indicate a general concern about CWD. Current CWD prevalence levels are low in most areas of the CWD Management Zone and the likelihood is also low that a hunter will harvest a CWD positive deer, much less one that is clinically ill. Not surprisingly, hunters' perception of risks from CWD is limited by the fact that most have not yet experienced the impacts of the disease directly.

Deer population reduction is the available disease control method most likely to be effective in controlling CWD in free-ranging deer. Over the past 50 years, regulated hunting has been shown to be an ecologically sound, socially beneficial, and fiscally responsible method of managing deer populations. Hunter harvest in the CWD Management Zone during the past eight years appears to have reduced the deer population in this region but it has not been sufficient to cause substantial, widespread population decline. Surveys have shown that while hunters acknowledge the potential for long-term negative impacts from CWD, they are largely unconvinced that the risks to the deer resource are immediate enough to warrant substantially altering their hunting behavior.

Disease management in free-ranging wildlife populations is difficult. If there are no methods to control the disease agent or treat the effects of the disease (such as vaccines), wildlife disease management often involves lowering the populations of infected and susceptible animals. Because there are currently no

practical, effective systems for CWD vaccination or treatment, CWD management focuses on lowering the overall deer populations and the number of infected deer. In an effort to achieve these goals in the CWD-MZ, Wisconsin has implemented a variety of approaches. Methods have included 1) extended hunting seasons with liberal bag limits to achieve overall herd reduction, 2) out-of-season shooting permits issued to landowners with property in high prevalence areas, 3) government-agency sharpshooters to strategically reduce local populations, and 4) incentives aimed at focused deer removal. Intensified public hunting was intended to achieve significant deer population reduction and removal of positive deer over large geographic areas while landowner permits, agency sharpshooters, and a payment-for-positives incentive were intended to focus culling efforts in high prevalence areas. Earn-a-buck regulations were used during seven of the last eight deer-hunting seasons to focus harvest on the antlerless (doe and fawn) component of the population because harvesting does has the greatest effect on the reduction of deer populations. Current analyses suggest that the deer population in the CWD Management Zone increased substantially during the 1990s, peaked at over 200,000 in 2002, and has been slowly declining since then **(Figure 5).**

Illinois has pursued a strategy of expanded public hunting regimes supplemented by

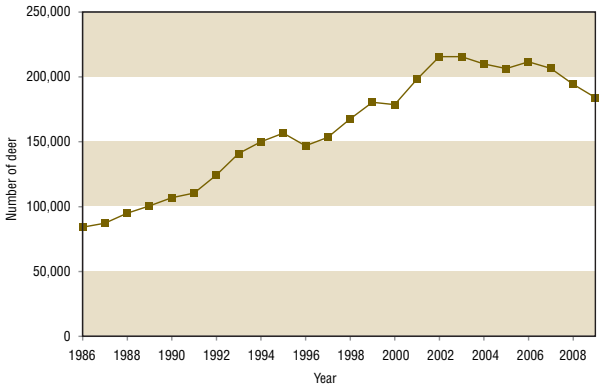


Figure 5. *Estimated post-hunt deer population in deer management units currently affected by CWD (includes portions of 54B, 73B, and 77C that are outside of the CWD Management Zone).*

localized, intensive sharpshooting in an effort to increase population turnover with a goal of preventing spread of CWD and eventually eliminating CWD from the affected populations. Sharpshooting has contributed more than 20% of the deer removed from the four Illinois counties that have been the primary focus of management efforts during the past five years. The goal is to annually augment the hunting season kill by significantly reducing post-hunt local deer populations in known CWD areas. Illinois is currently evaluating the effectiveness of their first five years of CWD management. Preliminary analyses indicate that they have achieved both local herd reductions and a corresponding decline in local prevalence levels in certain age and sex classes. The Wisconsin and Illinois efforts to manage and respond to CWD are inextricably linked to the success or failure of one another, and to formally acknowledge this fact, the two states signed a memorandum of understanding in mid 2010. It will be imperative that the two states continue to work together on a mutual goal for CWD management to have a chance at success.

In other states and provinces, approaches to CWD management and response vary depending upon such factors as length of time the disease has been present, cervid population density, human and financial resources, and social dynamics. In areas where CWD may be recently introduced, such as New York or West Virginia, and not yet established, disease eradication or containment is being considered as the ultimate goals for management. In states where there has been sufficient surveillance to document that CWD is established and widely distributed, such as Colorado and Wyoming, managers have refrained from committing to disease eradication because it is likely unachievable given current tools.

Varieties of strategies additional to deer population reduction have been adopted in jurisdictions as part of CWD response plans. A number of states and provinces have cervid

feeding and/or baiting bans or restrictions in place. Carcass movement restrictions are in place in 36 states and 2 Canadian provinces. Selective culling of clinical suspects is common practice. Localized population reduction and focal culling by agency personnel have been used by disease-affected states and provinces to try to manage the disease and gather additional surveillance data.

Increasing scientific knowledge about CWD has been a priority of the DNR since the disease was discovered in the state. A comprehensive research plan was developed and numerous research projects were actively supported through either direct funding or sharing of tissues and data. This research has expanded our understanding of many facets of the disease including: 1) genetic susceptibility of white-tailed deer to CWD, 2) deer social organization and movement patterns, 3) effects of artificial feeding and baiting on deer interactions, 4) binding of prions to soils, and 5) attitudes and behaviors of hunters and landowners in the CWD affected area. In addition, research to improve the diagnostic tools for detecting CWD has significantly reduced the cost of CWD surveillance and shortened the time required to notify most hunters of their test results. However, the DNR's financial support for CWD research was greatly reduced in 2007 due to reductions in both state and federal funding for CWD management in Wisconsin.

The DNR spent approximately $5 million annually on CWD management from 2002 through 2006. Funding for management came primarily from hunting license revenue along with some federal funding, which was mostly provided by the United States Department of Agriculture. The limited availability of outside funding has required the DNR to redirect wildlife program staff and program dollars to maintain sufficient efforts on CWD management and control. From 2007 through 2009, with budget cuts at the state and federal level, expenditures on CWD management were cut in half, to approximately $2.5 million.

In the summer of 2007, the DNR began a seven-month process of engaging an 18-member Stakeholder Advisory Group in a discussion about the next phase of CWD management in Wisconsin. The goal of the CWD dialogue was for the public and the DNR to reach decisions on how to manage chronic wasting disease to minimize the impact of the disease on Wisconsin's free-ranging deer population, the habitats and biological systems that include deer, the economy, hunters, landowners, and other constituents that benefit from a healthy deer herd. Selected recommendations from the Stakeholder Advisory Group final report were incorporated into the season framework and regulations that were implemented during the 2008 deer season. The work of the Group also helped to inform the objectives and actions contained in this plan. In 2009, a draft of this CWD plan was thoroughly reviewed by an outside panel of wildlife disease, ecology, and sociology experts from around North America. Their recommendations helped shape and strengthen several areas of the final plan.

DNR wildlife biologist works with a hunter to locate the property on which he killed his deer as part of disease surveillance efforts.

Conclusions after the First Eight Years

When Wisconsin initiated efforts to control CWD in 2002, the goal was to eradicate the disease from the state. This was an ambitious goal and it was not known at that time whether it was going to be possible to achieve that goal. Control options were and continue to be limited because no treatment currently exists for infected animals and there are no vaccines available to prevent infection. Deer population reduction and the removal of CWD-positive deer are currently the control methods most likely to be effective in controlling CWD in the wild. Strategies to significantly reduce deer populations and remove infected deer in the CWD affected area were implemented using 1) extended deer-hunting seasons with unlimited earn-a-buck bag limits, 2) out-of-season shooting permits issued to landowners, 3) government agency sharpshooters, and 4) monetary incentives.

The success of the strategies to eliminate CWD from Wisconsin depended on a number of factors including 1) the geographic distribution of CWD, 2) landowners' willingness to allow hunters and agency shooters access to their land, 3) hunters' willingness to hunt in the infected area and shoot more deer than they normally would, 4) agency resources available for CWD control, and 5) need to control further introductions of CWD. After eight years of surveillance, the currently identified geographic distribution of CWD is substantially larger than was known in 2002, and is likely increasing, despite moderate deer population reduction during that same time. Given the difficulty in managing CWD in free-ranging deer, the magnitude of deer reductions required to meaningfully affect disease progression, and the declining legislative support, eliminating CWD from Wisconsin using currently available tools is unlikely. Nonetheless, given the importance of deer and deer hunting to Wisconsin and the threat that CWD poses to the long-term viability of both, there still is a need and a responsibility to take steps to effectively manage this disease regardless of the continued challenges.

Very few fawns have tested positive for CWD (23 out of more than 15,000 tested since 2002).

15-Year CWD Response Goal

Minimize the area of Wisconsin where CWD occurs and the number of infected deer in the state.

This 15-year goal for managing CWD will drive the DNR's response approaches. This goal will focus on minimizing (defined as reducing to the smallest possible number, degree, or extent) the area affected by the disease and reducing the number of deer infected. This goal means currently accepting an area of CWD infection in southern Wisconsin and focusing CWD control efforts on limiting CWD to southern Wisconsin.

Even with active, successful management, some growth in the size of the affected area and the intensity of disease may occur during the next 15 years. However, significant progress in CWD control will have been achieved during this period if the population goals are reached or exceed, and thus, in theory, the growth of the affected area and disease intensity within the affected area are less than would have occurred in the absence of active management. Ultimately, the goal of Wisconsin's CWD program will be to lower disease prevalence and decrease the affected area of the state. Achieving this goal will be a long-term commitment necessitating actions beyond the 15-year scope of this plan.

Because we cannot know with certainty how quickly the distribution and severity of CWD would change in the absence of management, it will be difficult to directly measure effectiveness of control actions over limited time spans. Such an evaluation will have to be based not only on data from Wisconsin but will also have to consider results of management and monitoring efforts in other states and provinces that have CWD in wild cervid populations.

Ultimately, assessment of the effectiveness of control actions for CWD must be based primarily on documentation of changes in the prevalence and geographic distribution of the disease. Because CWD is a slowly progressive disease and difficult to accurately measure at low prevalence levels, significant changes in distribution and prevalence in free-ranging deer populations will likely occur over a protracted time scale.

Advances in understanding about the ecology and epidemiology of CWD in Wisconsin have contributed significantly to informing our management actions; however, there is not yet a clear prescription for managing CWD. The DNR will need to continue to intensively monitor CWD prevalence and distribution in order to make decisions on CWD management using an adaptive response approach. We believe that the results of our ongoing monitoring of CWD in the state's wild deer along with advances from research into the epidemiology of the disease will allow the state to better evaluate the effectiveness of management actions on controlling CWD.

Photo by Jerry Davis

Deer with CWD will appear healthy until the late stages of the disease.

Objectives, Actions, and Anticipated Results

1. Prevent New Introductions of CWD

Based on Wisconsin's and other states' experiences in managing CWD and other diseases such as bovine tuberculosis, preventing new disease establishment in wild deer herds is much less expensive and less damaging to the state than fighting diseases after they are established. As a result, the DNR will pursue the following policies to reduce the risk of CWD establishment in areas of Wisconsin where the disease has not yet been detected.

(a) Carcass movement. Research indicates that tissues from deer, elk, and moose carcasses that are improperly disposed may be a potential source of CWD spread. Along with many other states and Canadian provinces, Wisconsin has adopted regulations addressing the transportation of hunter-harvested carcasses and potentially infectious tissue in an effort to minimize that risk.

→ Action: Through outreach and enforcement of carcass transportation restrictions, the DNR will seek to prevent the movement of whole wild-cervid carcasses and potentially infectious tissues from within the CWD Management Zone into the rest of the state as well as into Wisconsin from other states and provinces that have CWD in wild cervids.

Photo by Jerry Davis

Normal movement and dispersal of deer is one of several ways CWD can spread.

(b) Wild deer herds. CWD can be spread to healthy animals through both animal-to-animal contact and environmental contamination. Deer herds with populations that are above ecologically sound goals will have a greater level of animal-to-animal contact and potentially greater environmental contamination from CWD prions than herds at goal.

→ Action: The DNR will continue to recommend annual statewide deer quotas and seasons designed to keep deer populations at the established population goals for Wisconsin's deer management units. When deer population goals are reevaluated as part of the statewide unit review process (currently every three years), disease control will be a primary consideration in those units adjacent to the CWD Management Zone.

(c) Baiting & feeding of deer. Baiting and feeding of deer causes unnaturally high concentrations of deer and increases the risk of transmission in areas where CWD is found. Once CWD is introduced, baiting and feeding facilitate the spread of the disease.

→ Action: The DNR will continue to encourage the legislature to pursue a statewide ban on the baiting and feeding of deer to reduce the risk of disease transmission and establishment of CWD and other serious cervid diseases in new areas.

(d) Farmed cervid regulation. Wisconsin's wild and farm-raised deer and elk herds are both at risk from CWD. Since January 2003 the DNR and the Department of Agriculture, Trade, and Consumer Protection (DATCP) have shared enforcement and regulatory oversight of the Wisconsin farmed cervid industry. Currently, there are over 600 active cervid farms in Wisconsin. DATCP's responsibilities include registration of all Wisconsin farmed cervid herds; regulation and monitoring of interstate and intrastate movements of farmed cervids; and disease testing programs and protocols designed to detect, monitor, and control diseases in the farmed-cervid industry. DNR's regulatory responsibilities include the administration of a white-tailed deer farm fence program and the investigation of and response to reports of escaped farm raised deer. Staff at different levels of both agencies meet regularly in an effort to facilitate inter-agency communication, share data and information, and coordinate agency field enforcement and compliance efforts. A joint task force was established to oversee these shared responsibilities.

Mature bucks are more likely to test positive for CWD than other age or sex classes.

→ Action: The DNR will continue to build on our cooperative working relationship with DATCP. This will include efforts to work jointly for federal and state funding and to update a Memorandum of Understanding that clearly identifies each agency's responsibilities and roles.

(e) Farmed Cervid Escapes. Fencing failures and violations are a major cause of farmed cervid escapes. The state regulates all cervid farm fences; however, currently the DNR only has authority over white-tailed deer farm fencing. In an effort to standardize fencing requirements and recognizing the larger field staff of the DNR and the relative limitations that DATCP has with their ability to conduct on-site inspections, the DNR is seeking the legislative authority over all farmed cervid fencing. It is recognized that despite the currently available additional DNR field staff, this authority will likely involve a significant time commitment from the DNR and may require additional resources. Nonetheless, because the DNR has greater staff resources available for field observations, this authority will be a valuable tool for increasing the security of cervid farms and reducing escapes due to fencing failures.

→ Action: The DNR will work to reduce the number of animals escaping from cervid farms by seeking legislative authority for the regulation of all cervid-farm fencing.

(f) Farmed cervid testing and depopulation of infected farms. The DNR recognizes the threat of disease spread to other farmed cervids and to wild cervids from either escapes from or interactions with cervid farms that have tested positive for CWD. Accordingly, it is imperative that DNR and DATCP work together to detect such positive farms and to quickly depopulate their herds once detected. Additionally, it must be recognized that once a CWD positive farm is depopulated, the amount of time that fencing must remain intact needs to be assessed on an individual basis to prevent the possible ingress and disease exposure of wild deer in the area.

→ Action: The DNR will continue to work with DATCP and the farmed cervid industry to: increase the compliance with monitoring, testing, record keeping and cervid movement regulations; expedite the depopulation of farms with CWD-positive animals; and minimize the future risk of those depopulated farms to wild and farmed herds by seeking legislative authority to regulate fences of depopulated farms.

Photo by Jerry Davis

Fawns of CWD infected does are not born with the disease, but contract it from contact with infected deer or exposure to prions in the environment.

Anticipated Results by 2025

- There is a statewide ban on baiting and feeding.
- The number of preventable escapes and number of animals per escape from cervid farms is minimized as much as possible.
- The time elapsed from notification of an escape event until the joint DNR/DATCP action to remove the escaped cervids from the landscape is reduced.
- Farms with CWD-positive animals are depopulated, secured, and decontaminated quickly.
- The DNR has fencing authority over farms of all cervid species and over farms that have been depopulated.
- Depopulated CWD-positive farms are secured against the ingress of wild cervids until, using the best science available, it is determined that those premises are no longer high-risk sources of CWD-causing prions.
- Hunters throughout the state are aware of the importance of proper disposal of butcher waste and carcass parts and options for proper disposal are readily available.
- High-risk parts of wild cervids are not being moved from CWD affected areas.
- There is significant progress in bringing statewide deer populations closer to ecologically sound population levels.

2. Monitor for and Respond to New CWD Disease Foci

To "minimize the area of Wisconsin where CWD occurs", it is critical to expeditiously detect and respond to new disease foci. This will require ongoing and intensive statewide surveillance, especially adjacent to known CWD areas, and a plan for specific actions to implement when new CWD areas are identified so that they can be quickly and effectively initiated.

(a) Statewide Surveillance. A scientifically sound surveillance strategy is essential to the timely detection and effective response to new areas of disease (new disease foci). CWD is a disease that cannot be confirmed through simple, visual inspection. It requires the collection of specific tissues and testing conducted by a USDA-approved laboratory. Sampling and testing costs accounted for over 50% of the total DNR expenditures during 2002–2009 and will likely continue to be the single largest expense in the CWD program over the coming years. However, state and national efforts to improve the cost efficiency of surveillance methodologies (tissue collection, testing, and data management and assessment) should result in cost savings during the duration of this plan. There is increasing evidence that collection and testing of deer that show clinical signs consistent with CWD is a cost-efficient means of detecting CWD at low levels of prevalence. Research also supports a strategy of assigning weights to CWD test results of a deer based on the age, sex, and method of harvest because these factors influence the chance that the test results will be CWD positive. Strategies developed will include the testing of clinical-suspect deer and of samples provided by hunters.

→ Action: The DNR will develop and implement surveillance strategies to detect new foci of CWD outside of the current CWD Management Zone. These strategies will take advantage of the greater surveillance value of clinical suspect deer by encouraging people statewide to report adult deer that exhibit signs consistent with CWD. The approach will also include statewide hunter-harvest based surveillance using weighted approaches that balance efficiency and efficacy.

b) Surveillance response to new foci. Should a free-ranging CWD-positive deer be found outside of the current CWD Management Zone boundary, DNR staff, landowners, and hunters will be asked to assist with additional sampling in at least a ten-mile radius of the positive deer to define the extent of the disease. The exact radius will be determined by assessing the deer habitat, deer population density, and other factors of the area. Including the recent sampling history in the area, in general, the number of samples collected will be sufficient to be 95% confident of detecting the highest level of disease prevalence in the surveillance radius. The sample number is dependant upon the underlying level of prevalence in the area and the number of positive animals identified. The specific methods used to collect these samples will depend on a number of factors, including time of year when the positive is found, deer densities, and habitat. The results of that sampling will inform decision-making about subsequent management actions.

→ Action: After the detection of a free-ranging CWD positive deer outside of the current CWD Management Zone there will be intensive sampling and testing of deer in at least a ten-mile radius surrounding the new positive in order to assess the spatial extent and intensity of the outbreak.

c) Management response to new foci.
Management actions in areas of newly detected CWD foci will depend on the results of the assessment surveillance described in section (b) above.

If the new focus is in a deer management unit adjacent to the existing CWD Management Zone and prevalence at the new focus appears to be similar to that of the adjacent zone, then the new focus will be included in a new Management Zone boundary as allowed by the CWD rule currently in place (NR 10.41(3) (f) 1. —*The department may include additional deer management units in the CWD management zone where and when additional CWD positive deer are found)*.

If the new focus is in a deer management unit adjacent to the existing CWD Management Zone and appears to be a cluster of positives (prevalence significantly higher than in the surrounding area) then that unit will be included within the new Management Zone boundary and additional measures will immediately be initiated to try to reduce deer numbers in the vicinity of that cluster.

If the new focus is distant from the existing CWD Management Zone, and the initial assessment indicates that an aggressive course of action is warranted for the purpose of effective disease management, the DNR will respond with extended hunting opportunities, landowner permits, and agency shooting, in an effort to further evaluate and manage the new focus. If DNR staff recommend local herd reduction as part of the response to a new disease focus, staff will conduct outreach and inform local citizens and landowners as the plan is developed.

If the new focus is found within the ceded territory (1837 and 1842) but off-reservation, the DNR will consult with the Ojibwe tribes prior to any action that reasonably impacts the Ojibwe harvest right. If the new focus is found on or adjacent to reservations, the DNR will meet with and reach consensus on actions with the affected tribes.

In all cases, baiting, feeding, and rehabilitation of deer will be prohibited in areas around the new positive, as per ss 29.335, 29.336, and NR 19.72. Additional rules and regulations, such as those concerning the movement of deer carcasses, may be instituted to help assist with CWD control.

→ Action: If the new focus is in a deer management unit adjacent to the existing CWD Management Zone, then the new focus will be included in a new Management Zone boundary. If the initial assessment outlined in (b) above indicates that an aggressive course of action is warranted for disease management efforts, the DNR will employ localized herd reduction in an effort to control the new focus. When local culling is implemented, it will need to be intensive and implemented over a period of many years until the effects and efficacy can be assessed. Additional existent rules and regulations will go into effect as required by statute and code (deer rehabilitation, baiting and feeding) or as deemed necessary. Ojibwe tribes must be consulted before any action is taken in the ceded territory or on (or adjacent to) reservations that reasonably impacts the Ojibwe harvest right.

Anticipated Results by 2025

- New CWD-affected areas are discovered as quickly as possible.
- The extent and intensity of the new foci are defined in a timely manner to allow informed and collaborative response action planning.
- Aggressive control actions (in consultation with Indian Tribes when necessary) are implemented in a new CWD-affected area when the location, spatial extent, and intensity of the outbreak warrant that response.

3. Control Distribution and Intensity of CWD

Currently there are no therapeutic strategies available to control CWD in wild deer herds. Consequently, controlling prevalence and distribution of the disease requires both reducing the number of CWD-positive animals and reducing the number of susceptible deer through overall herd reduction. This may include focused culling of deer in localized areas of high disease prevalence or along the leading edge of the known disease outbreak. It also means reducing regional deer herds to at least interim population goals (see Appendix B) which are likely levels lower than would be desired for cultural and recreational uses and are also likely higher than desired for disease control.

Removing as many deer as possible, each year, from infected areas and adjacent areas provides the best opportunity for controlling the disease by:

1) increasing the likelihood of removing infected individuals capable of transmitting the disease from the population
2) eventually reducing the number of susceptible animals below the threshold needed for the disease to increase or persist
3) limiting the accumulation of infectious CWD prions in the environment.

Photo by Jerry Davis

CWD infected deer have shorter lifespans so infected does may produce fewer fawns over the course of their lives.

By increasing the number of deer removed from the population each year, the remaining population will have a lower density and thus contact between individual animals or groups of animals will likely be reduced. This is expected to reduce the rate of disease spread, at least partially by reducing the number of deer that move significant distances to new areas. Also, annual removal of infected animals at a rate greater than the number of deer that are estimated to be newly infected with the disease each year will, over time, result in reduced prevalence of the disease. Finally, reducing the number of infected deer will reduce the rate of environmental contamination from CWD positive animals.

In Wisconsin, an effective CWD response depends upon the cooperation and actions of deer hunters and landowners. Recreational hunting and access to huntable land are critical to reducing infected deer herds to target levels and then maintaining them at those levels. The DNR will implement deer season frameworks that continue to utilize recreational hunting as the primary tool to assist with deer herd reduction. The Department will recognize Wisconsin's socio-cultural hunting desires to the extent practical for effective, long-term disease management.

The DNR will inform hunters and landowners about the areas with a high proportion of CWD-positive deer and encourage maximum hunting effort in these locations. In situations and locations where recreational hunting is not able to provide the needed deer harvest for disease management, the DNR and researchers will explore and implement additional deer removal options working cooperatively with area landowners and hunters.

(a) Hunting season structure. A consistent hunting-season structure should improve hunter understanding of regulations and enhance both compliance and enforcement of those regulations. It should also make it easier to evaluate management efforts. For consistent season structures to be maintained throughout the duration of this plan, herd reduction will need to be sufficient to at least reach the interim population goals (as described in Appendix A). If regular assessments of the CWD response show that the structure in place is not sufficient to bring deer populations to the established goals, adjustments to the hunting season structure will be made accordingly to attempt to increase harvest numbers.

→ Action: The DNR recommends that the 2008 season structure (as described in Appendix A) be the basic season structure for all units in the CWD Management Zone through 2015. The effectiveness of this structure to at least reach the interim population goals will be assessed at five-year increments and will be modified if results indicate it is insufficient to contribute to population or disease management goals.

(b) Landowner permits. The use of post deer-hunting season landowner permits provides landowners and their designees the opportunity to remove more deer from their property. These permits will be available for any landowner within the CWD Management Zone but outreach efforts to landowners will be focused on areas of high prevalence and along the leading edge of the disease.

→ Action: Issue post-season landowner hunting permits in the CWD Management Zone.

DNR wildlife staff working with hunters to collect samples for CWD testing.

(c) Sharpshooting. In addition to the contributions of the hunting season framework and landowner permits to the CWD Management Zone-wide deer population reduction, sharpshooting will be another tool available for more focused removal of CWD positive deer.

Sharpshooting will be used as a strategic, complementary tool for disease management and for additional surveillance in local areas. The total cost of removing a deer by sharpshooting in Wisconsin has averaged $400 per deer. Given current financial resources, the DNR cannot afford to remove more than, at most, 1,000 deer a year, and likely far less than that. Even with increased funding, staff and financial resources simply will not allow for considerably more widespread uses of this tool thereby continuing to make recreational hunting the main population management method.

Sharpshooting will be used tactically along the periphery of the known CWD affected area in the vicinity of disease clusters as well as in new disease foci areas as indicated in section (2) above. If DNR staff recommend local herd reduction as part of the response to a new cluster, staff will conduct outreach and inform local citizens and landowners as the plan is developed. The Department may use DNR-trained citizens as well as agency employees when instituting sharpshooting and will only shoot on properties with the landowner's permission.

Sharpshooting is an effective tool for removing additional deer after hunting seasons are over. In the case of CWD management, it removes positive animals from the landscape at a greater rate than recreational hunting because it can be focused in areas of high disease prevalence. During January - March 2007, sharpshooting efforts removed 978 deer from the CWD Management Zone, of which 26 deer tested positive for CWD. Although sharpshooting accounted for 1.7% of the total kill in the CWD zone, the targeted nature of the shooting effort

Photo by Jerry Davis

Increasing the harvest of does has the greatest effect on reducing deer populations.

produced 12.5% of the CWD-positive deer shot. An additional benefit from Department shooting was that a much higher proportion of antlerless deer (79%) were killed by department shooters than by hunters (55%) in that same year, the 2006-2007 CWD Zone season.

Illinois reports similar success with sharpshooting, which is a key component of their CWD management strategy. To date, Illinois DNR sharpshooting has accounted for 12% of the deer tested for CWD but 38% of the positive deer removed. They believe their ability to focus culling and disproportionately remove positives can have a significant impact on the disease.

→ Action: The DNR will conduct focused sharpshooting on public lands and on private lands where permission can be obtained in areas of disease clusters in the periphery of the known CWD distribution (*e.g.* Devil's Lake State Park) or in the areas of newly identified CWD foci where assessments deem such activities strategically advantageous. Sharpshooting efforts will need to be intensive and sustained over a period of many years before the impact on disease progression can be assessed and control can be documented.

(d) Monitoring disease trends and patterns.
The Department will need to effectively monitor disease patterns and trends to determine whether management efforts are controlling the distribution and intensity of CWD. Current knowledge about CWD in wild white-tailed deer populations limits the ability to predict how the disease pattern would likely change over the next 15 years without management; thus, determining whether control efforts have limited the expected changes will be challenging. Such evaluations will therefore have to be based not only on data from Wisconsin, but will also have to consider results of monitoring and control efforts in other states and provinces that have CWD in wild cervid populations.

Detecting meaningful trends at the periphery of the currently known geographic distribution is difficult because there are relatively few CWD-positive deer in these areas. Assessing geographic spread and detecting significant changes in the intensity of the disease at very low prevalence requires testing extremely large numbers of deer. Meaningful trends in CWD prevalence and geographic distribution can only be measured if large-scale sampling is conducted at regular intervals not to exceed a few years.

Based on surveillance results in the known CWD-affected areas of Wisconsin, monitoring areas have been chosen in the higher prevalence CWD areas in south-central and southeastern Wisconsin. These are the best areas for monitoring the effects of control efforts on disease patterns, including changes in geographic distribution and number of positive deer. Sampling and testing of hunter-harvested deer from the western core, eastern, and Baraboo monitoring areas at levels sufficient to continue to monitor these trends will be conducted regularly for the duration of this plan.

→ Action: The DNR will conduct sampling and CWD testing that is sufficient to monitor trends in prevalence and disease pattern within the western core monitoring area in Dane and Iowa counties, the eastern monitoring area in Rock and Walworth counties, and in the Baraboo monitoring area. In addition, the DNR will monitor spatial and prevalence patterns at selected higher prevalence areas along the periphery of the currently known CWD geographic distribution.

(e) CWD Zone Deer Population Monitoring.
Monitoring changes in deer populations in the CWD-affected areas over the next 15 years is important for understanding changes in CWD transmission and prevalence rates and the effectiveness of response efforts. Reducing the deer population is currently the only available management strategy for the control of CWD once it is established in a free-ranging deer population. For all units in the CWD Management Zone to reach the interim goals recommended by the CWD Stakeholder Advisory Group (SAG), the population would have to drop nearly 60% (equivalent to ~68,000 deer post-hunt or 19 deer/square mile of deer range) (Appendix B).

→ Action: Trends in the size of the deer population in the CWD Management Zone will be monitored using a combination of helicopter and fixed-wing aircraft surveys and population modeling. Deer population monitoring will likely be conducted annually over the duration of the plan.

(f) Collaborate with Illinois. The effectiveness of Wisconsin's CWD response efforts is ultimately tied to the effectiveness of CWD management in Illinois. It is essential that the states work cooperatively in order to complement and maximize each other's management efforts. To this end, the Wisconsin and Illinois DNRs signed a Memorandum of Understanding (MOU) in mid 2010 which outlines the development and enhancement of mutually beneficial management methods and practices, research endeavors, and communications and messaging strategies for managing CWD as a joint venture.

→ Action: The DNR will continue to work cooperatively with the Illinois DNR on CWD management, as outlined in the MOU.

(g) Conduct reviews after the 2015, 2020, and 2025 deer hunting seasons. The DNR has based its CWD response approach on the best scientific and social information available and will continue to modify management strategies over time as new CWD information and data become available. As part of our adaptive response approach, the DNR will conduct management program reviews after the conclusions of the 2015, 2020, and 2025 deer seasons to assess progress towards meeting the Plan's established goal and objectives. Factors that will be considered include

1) trends in the prevalence of the disease in the western and eastern monitoring areas,
2) trends in the known geographic distribution of CWD,
3) progress in reducing deer populations in the CWD Management Zone toward goal,
4) changes in public attitudes and actions relevant to CWD and the CWD management program,
5) current funding and prospects for future funding for CWD management,
6) results of assessments of additional tools for disease control,
7) information from CWD programs in other states and provinces, and
8) information from research into the risks and impacts of CWD on deer populations.

Based on the results of these reviews, recommendations will be made to alter CWD management efforts being implemented, possibly including the hunting season framework, the use of landowner permits, the use of sharpshooting, and outreach and education methods.

→ Action: The DNR will conduct program reviews of our progress toward meeting the goal and objectives of this plan after the 2015, 2020, and 2025 deer seasons and, based on these reviews, make any needed modifications, some of which are outlined in actions (h), (i), and (j) below.

(h) Additional days of gun-hunting opportunity. Additional days of gun hunting opportunity may be added if the review indicates the need for further herd reduction.

→ Action: Based on the results of the review, add more days of gun-hunting opportunity.

(i) Additional focused sharpshooting. If deer densities are not being adequately reduced towards goals, the DNR will consider implementing or expanding focused sharpshooting in areas of high disease prevalence and/or high deer density that are within and not necessarily along the periphery of the known CWD-affected area. Department staff will work with local citizens and landowners if such sharpshooting is recommended.

→ Action: Consider the use of sharpshooting on public and private lands, where permission can be obtained, in areas of high disease prevalence.

(j) Additional tools. As tools other than recreational hunting and sharpshooting are developed for managing the disease, it will be important to evaluate those techniques for their applicability in Wisconsin. These tools may include but are not limited to incentives and alternative deer removal-methods.

→ Action: Conduct and support research to develop and evaluate additional tools that have management applications and implement those that meet efficacy and acceptability criteria as needed to enhance progress towards CWD control objectives.

Anticipated Results by 2025

- Through population reduction and focused and targeted removal of deer from high prevalence areas, the estimated number of infected deer in the CWD Management Zone is significantly less than estimates show it would have been in the absence of management.
- The geographic distribution of the disease is not significantly larger than the known distribution in 2010.
- Overall deer populations in the CWD Management Zone have been reduced to at least the interim population goals.

University of Wisconsin researchers attach a radio collar to a deer in the CWD zone.

4. Increase Public Recognition and Understanding of CWD Risks and Public Participation in Disease Control Efforts

Information about CWD is growing as additional experience is gained and research is completed. It is important that Wisconsin's citizens are kept informed on the latest scientific knowledge and recommendations for managing this disease in order to facilitate a cooperative understanding and effort among all stakeholders.

Outreach activities are used to inform the public about CWD and garner support for CWD management policies and strategies. It is critical that the public, especially hunters and landowners in the CWD Management Zone, understand and support the CWD response plan if it is going to be effective in minimizing the impacts of this disease in Wisconsin. Outreach activities should be informed by research conducted to understand public perceptions about CWD and its risks as well as research on how the public and tribes feels about methods for management of the disease.

(a) Human Dimensions of CWD Management. While providing the public with timely, complete, and accurate information about CWD has been an important component of Wisconsin's CWD control efforts, sufficient resources have not been consistently directed toward communicating with the public and hunters to inform them of the magnitude of the risks posed by CWD to Wisconsin's deer hunting tradition. Furthermore, these efforts have largely been conducted by staff without expertise in this kind of communication. Relying on recreational hunters to play an important role in controlling CWD will continue to be a challenge unless communication and social marketing efforts result in increased support (attitudinal and behavioral) from constituents.

Substantial changes in public attitudes toward CWD and its management will take time, perhaps best measured by decades. Literature on social marketing advises that if there are barriers to a particular behavior (*i.e.*, shooting more deer) that are insurmountable within the target audience (*i.e.*, hunters and landowners), focusing on that behavior without first reducing the barriers will be self-defeating. In this case, if hunters are being asked to shoot more deer than they traditionally shoot, and if landowners are being asked to allow hunters onto their land to shoot deer, then the barriers to those desired behaviors must first be identified and reduced. Hence, it is essential that our constituents be re-visited to identify those barriers. Information garnered from these discussions could be used to inform an outreach effort designed to build support and change behavior.

A 2006 survey of Disease Eradication Zone hunters conducted by the University of Wisconsin Stevens Point found that buck hunters, on average, passed up more shots (~5.0 shots) than either-sex hunters (2.4 shots). These findings underscore the difficulty in getting hunters to shoot additional deer, but also demonstrate that there is an opportunity for hunters to kill more deer if they understand and agree that the long-term risks to the deer resource are significant and that their actions will contribute to disease control.

→ Action: Working with a professional communication firm, the DNR will use group interviews and survey data to better understand public opinions about CWD management and to develop, test, and refine messages and delivery mechanisms that enhance public understanding about CWD and the long-term threat the disease poses to Wisconsin. The DNR will utilize this information to develop communication strategies that attempt to overcome the barriers to deer herd reduction and accessibility to land for deer removal.

(b) Monitoring Changes in Public Opinion. We will continue to monitor public opinions and attitudes towards CWD and CWD response strategies over the next 15 years. Assessing specific public opinions and attitudes towards CWD will involve monitoring trends in

1) the public support of the DNR's CWD response goal and its strategies,
2) the public acceptance of the fundamental assumptions and basic disease information about CWD,
3) the public agreement that the risks of CWD to the deer herd and to recreational hunting warrant the efforts to control CWD,
4) the level of concern regarding CWD in the state,
5) hunters and landowners feeling a personal responsibility for helping to manage the deer population in the area they most frequently hunt/on the land that they own, and
6) the public opinions regarding our overall communication strategies.

Public support must go beyond attitudinal measures. Public support must be demonstrated through changed behavior for CWD management efforts to be effective. As with public attitudes, we must continue to monitor hunter and landowner behavior—that is, are hunters shooting more deer now in an effort to assure good hunting and a healthy herd for future generations? Specific behavioral measures to be monitored include

1) the number of hunters in the CWD Management Zone (including hunter retention, recruitment, and changed hunting locations to non-CWD deer management units),
2) hunter effort in the CWD Management Zone (including number of days hunted and hours hunted per harvested deer),
3) the number of antlerless and antlered deer harvested,
4) the number of deer donated to food pantry programs from the CWD Management Zone,
5) the number of hunters that landowners allow to hunt on their land, and
6) the number of landowners who grant hunters and the Department access to their land to kill deer.

→ Action: To assess the impacts of outreach and education efforts, the DNR will conduct scientific behavioral and attitudinal studies of hunters, landowners, and Wisconsin residents in general on a regular basis, especially in response to a change in management strategy.

Anticipated Results by 2025

- With guidance from communications professionals both inside and outside the DNR, communication strategies to increase knowledge and support for the state's approach to CWD management among hunters, the general public, and decision makers have been developed, are being implemented, and increases in understanding and support are being realized.
- The number of deer hunters in the CWD Management Zone has not declined more than deer hunter numbers in the rest of the state.
- Hunter effort has increased and hunters are spending more time in the field (as the deer population declines, more time will be required to harvest a deer).
- Access to private land for deer removal has increased.
- The percent of deer harvested in relation to the total deer population in the CWD-MZ has stayed consistent or increased and the deer population has shown a steady declining trend.

5. Address the Needs of Our Customers

Human dimension research has shown that a large majority of hunters believe that the state should offer CWD testing to hunters who shoot deer in areas where CWD is present. In addition, most hunters surveyed believe that the state should contribute to the costs of processing venison donated to food pantries and should assume the costs for disposal of deer carcasses, butcher waste, and road-killed deer from the CWD affected area. However, recent budget cuts to the CWD program have significantly limited the DNR's ability to meet these expectations. Public expectations for these services and the resulting costs are projected to increase if the area of Wisconsin affected by CWD increases.

(a) Hunter service testing. The World Health Organization, Centers for Disease Control, and Wisconsin Department of Health Services (DHS) recommend that deer that test positive for CWD not be consumed. The vast majority of hunters surveyed responded that they believed testing should be available in the CWD affected area and for some families the ability to get a deer tested affects their willingness to kill deer. Currently, only laboratories certified by the USDA are authorized to conduct CWD tests and virtually all CWD testing in Wisconsin is conducted though a program jointly operated by the DNR and the Wisconsin Veterinary Diagnostic Laboratory. This program has been funded by the DNR, and testing fees have generally not been charged to hunters to cover the costs of the testing service provided. However, it must be realized that strictly hunter service testing provides little additional knowledge to the state outside of the test result status of that one animal, yet it continues to be a relatively costly part of the management program. Nonetheless, alternatives, such as hunters directly submitting samples to veterinarians or testing facilities, have not proved economically viable for the hunting public. Until such programs can be developed further, the DNR will continue to try to provide this service for little or no cost to hunters.

→ Action: The DNR will insure that hunters have continued access to CWD testing in areas with the highest prevalence of CWD. The DNR will explore alternative strategies for reducing or recovering costs and/or privatizing this program such as developing programs that would allow hunters to collect their own samples or charging testing fees to partially cover costs of sample collection and testing. The DNR also will support efforts to develop quicker and less expensive sampling and testing procedures.

Photo by Jerry Davis

Public CWD informational meeting at Mt. Horeb High School, 2002.

(b) Donation of venison to food pantries. The DNR and local partners have operated a food pantry program for CWD zone deer in cooperation with DATCP and DHS. A protocol was established following DATCP and DHS recommendations that prevent meat from deer that test positive for CWD from being distributed to food pantries. Meat from deer with negative test results is distributed to cooperating food pantries that indicated an interest in receiving it.

In 2009, hunters donated over 170,000 pounds of venison to food pantries in Wisconsin.

Donations to the pantry program have, to date, accounted for 2–3% of the total deer harvest in the CWD zones. Although few hunters have increased their deer harvest because of this program, the majority of survey respondents believe that the DNR should continue to pay these costs as a way to encourage hunters to participate in the deer donation program. The existence of the venison donation program continues to motivate some hunters to harvest additional deer. Therefore, increasing hunter participation in the venison donation program may be an effective tool to increase the number of deer killed each year in the CWD zone.

→ Action: The DNR, through the Wildlife Damage Abatement and Claims Program, and in conjunction with local and community organizations, will cooperate with food pantries and meat processors in the CWD Management Zone to provide hunters an avenue for donation of harvested deer in excess of their personal needs. The DNR will actively market the pantry program to encourage an increase in hunter harvest. The DNR will partner with others to seek funding from nongovernmental organizations to help offset the costs of processing and storing donated venison.

(c) Deer carcass disposal assistance. Containing prions from CWD-infected deer carcasses is important for limiting new infections and providing disposal assistance can help facilitate hunter harvest. The Interagency CWD Health and Science Team conducted a qualitative risk assessment in 2002 and concluded that engineered sanitary landfills provide a safe and effective means for carcass disposal. An indemnification bill has been enacted that protects landfills from financial liability. Additionally, the University of Wisconsin-Madison has completed a quantitative risk assessment that supports landfilling of deer. However, local governments, landfill operators, and municipal wastewater treatment facilities throughout the CWD Management Zone remain concerned about accepting unwanted carcasses, butcher waste, and car-killed deer. Providing easy and cost-effective disposal options for hunters and meat processors will become a bigger problem if the geographic extent of the disease increases. If hunters cannot easily dispose of deer carcass waste in the recommended manner, they may end up disposing of it improperly or be reluctant to harvest a deer.

→ Action: The DNR will continue to work with local governments, landfill operators, and municipal wastewater treatment facilities to increase their understanding of the safety and cost-effectiveness of landfilling deer in order to increase the availability of landfills for carcass disposal. The DNR will continue to offer indemnification to landfills that accept CWD positive carcasses and waste.

(d) Monitoring for human prion diseases.
Although there is no evidence that CWD has ever caused illness in people, because bovine spongiform encephalopathy (BSE) has been linked to the new variant form of Creutzfeldt-Jakob disease (CJD) in humans and there is still much to be learned about prion diseases in general, uncertainty remains about the health risks posed by CWD. International health authorities continue to recommend that deer known to be infected with CWD not be consumed by people and that people avoid consuming certain tissues where prions are more likely to accumulate. The DHS is conducting surveillance for CJD to assess potential relationships between CJD and CWD. This surveillance is based on reports from clinicians as well as ongoing reviews of all death certificates. DHS, in cooperation with DNR, has established a registry of persons known to have consumed venison from CWD positive deer for later comparison to the CJD case list.

→ Action: The DNR will continue to cooperate with DHS to maintain the registry of persons known to have consumed venison from CWD-positive deer. The DNR will monitor and support research to better assess the risks that CWD may pose to humans. The DNR will continue to provide hunters with information on ways to reduce risks when field dressing and butchering deer.

(e) Investigating potential risk to livestock.
The risk of transmission to traditional livestock cannot be dismissed. When CWD is injected directly into the brain, it has been shown that cattle and sheep can be infected. However, there have been no cattle infections in studies where cattle are exposed orally or when cattle co-habit with infected deer, and TSE-like disease has not been detected in cattle in areas of North America where they share range with CWD-affected wild deer and elk populations. Studies have shown that TSEs can go through changes when in an abnormal host and increase their ability to affect new species; this increases concern about the possibility that eventually, if uncontrolled, CWD could become a problem for cattle or sheep. Uncontrolled CWD in wild Wisconsin deer poses a high risk to the state's farmed cervids and is of great concern to those producers.

→ Action: The DNR will support and cooperate with research to better assess the risks that CWD may pose over time to livestock, including farmed cervids.

To date, CWD has not been found to pose a health risk to Wisconsin's dairy herds.

Anticipated results by 2025:

- Hunters in CWD affected areas are able to get their deer tested and financial and logistical partnerships have been expanded to provide this service.
- Food pantries will accept donated venison from the CWD Management Zone and hunter contributions to the pantry program will exceed historic contributions.
- Additional landfills within the CWD Management Zone will accept untested deer carcasses and carcass waste.
- Hunters have a clear understanding of what is known about the human health risks associated with consuming venison from CWD-positive deer and ways to minimize those risks.
- Stakeholders have access to current information about potential risks to livestock, and cervid farmers' concerns continue to be part of the consideration in state CWD management planning.

6. Enhance the Scientific Information about CWD

The DNR has played an important role in generating new information on many aspects of CWD: by conducting in-house research, directly funding university research, and by collaborating in studies conducted nationally and internationally. Although a sustained research and monitoring effort is needed, funding available for these activities has declined. Outside funding, primarily federal grants, has offset some of the decline in state funding, but reliance on such funding could jeopardize long-term research efforts if such funding diminishes.

Priorities for CWD research in Wisconsin should be reviewed and updated so that efforts most important to disease control will continue. Research related to improving our understanding of the risk of CWD to humans, livestock, and other animals and the effectiveness of public communication strategies are addressed elsewhere in this plan (objectives 4 and 5). Continued research and modeling to assess changes in spatial distribution and prevalence of disease will be important for assessing the effectiveness of management actions. Analysis of our existing data to identify opportunities to increase the cost-effectiveness of disease detection and monitoring strategies should be a priority.

Management experiments to directly assess the effects of specific disease control strategies on the intensity and spread of CWD are critically needed for improving long-term control efforts. Specifically, research to determine the effects of intensive deer population reduction on disease dynamics is needed to resolve questions about the effects of deer density on CWD transmission and spread, and to establish what level of deer population reduction is needed to achieve CWD management goals. In addition, research is needed to evaluate the cost-effectiveness of alternative tools beyond recreational hunting and sharpshooting to reduce deer populations and/or remove CWD-positive deer. These evaluations should also consider animal welfare issues, the ability to selectively remove deer without significantly affecting non-target species, and social acceptability.

Additional information on the persistence and availability of prions in the environment, and how these are affected by environmental conditions such as temperature, moisture, or soil ecology, is needed to improve our forecasts of disease dynamics and long-term implications. Control of CWD transmission risk from deer and elk farms would be enhanced by the development of effective disinfection mechanisms.

A better understanding is needed of host and habitat factors that may affect disease transmission and geographic spread. By understanding the effects of factors such as deer density, deer movement patterns, habitat composition, and landscape pattern, we will be able to improve predictions of disease progression and to focus management efforts appropriately. Research to identify specific mechanisms of disease transmission and to assess the relative contribution of direct (deer-to-deer) and indirect (deer-to-environment-to-deer) transmission is needed to identify opportunities to block transmission.

Research is being conducted on how host genetics relate to susceptibility to CWD, on treatments that would lessen disease effects, on methods to decontaminate small, prion-infected areas, and on the development of vaccines applicable to both free-ranging and farmed cervids. While very early in the research and development process at this stage, effective therapeutic measures such as treatments and vaccines with feasible delivery systems would greatly facilitate the control of CWD.

Increased understanding about the effects of CWD on deer reproductive rates and susceptibility of CWD-positive deer to different sources of mortality (hunting, predation, vehicle-collisions, *etc.*) will improve estimates

of impacts to deer populations in Wisconsin. Additional information is needed to predict how these changes to deer populations will affect the citizens of Wisconsin.

The importance of deer and deer hunting to Wisconsin must be a major consideration in all management decisions. Research is needed to compare the socio-economic costs of disease control activities to those resulting from the failure to control the spread of CWD in Wisconsin.

→ Action: The DNR will continue to cooperate with outside researchers by sharing tissues and data and may initiate research when appropriate. The DNR will continue to: develop methods for assessing the progression of CWD; seek funding to support applied, management-focused research on CWD; and promote research into prion biology that may, in time lead to effective procedures for prevention and/or treatment of CWD in deer and decontamination of environments.

Anticipated Results by 2025

- There is a well-funded and active CWD research program for the state.
- Research to fill important knowledge gaps related to disease transmission mechanisms and CWD effects on deer populations in Wisconsin is progressing or has been completed.
- Better methods are available to assess the progression of CWD.
- Management experiments to assess the effects of disease control strategies on the progression of CWD are progressing or have been completed, such as
  - the effects of intensive, prolonged, local deer culling on disease dynamics, and
  - the cost-effectiveness of alternative tools beyond recreational hunting and sharpshooting to reduce deer populations and/or remove CWD-positive deer.

Staff at the WDNR's Black Earth lab process samples collected from hunter-killed deer in preparation for CWD testing

Summary

The goal for the CWD response in Wisconsin over the next 15 years is to minimize the area of Wisconsin where CWD occurs and the number of infected deer in the state. This will require a sustained commitment of effort and resources to support the surveillance, management, research, education, and citizen involvement necessary to reach this goal. Our ability to reach this goal is subject to support from the legislature and continuing state and federal financial support. Ultimately, this plan will be successful when its implementation has reduced disease progression and has earned the support of our partners and the public.

This plan's specific objectives and recommended actions are based on the best scientific information currently available. An adaptive strategy for the CWD response is essential because there is still much to learn about CWD epidemiology and the efficacy of CWD control techniques in free-ranging populations. As additional information becomes available through research and monitoring in Wisconsin and elsewhere, the Department will continue to modify the CWD management objectives and actions to improve the response in Wisconsin.

Photo by Jerry Davis

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Appendix A—Season structure in the CWD Management Zone as adopted by the Natural Resources Board in rule order WM-05-08

Archery season: An archery deer hunt beginning on the Saturday nearest September 15 and continuing through the Sunday nearest January 6.

Early firearm season: An antlerless-only firearm deer hunt beginning on the Thursday nearest October 15 and continuing for four consecutive days.

Traditional 9-day firearm season: A firearm deer hunt beginning on the Saturday immediately preceding the Thanksgiving holiday and continuing for nine consecutive days.

10-day muzzleloader-only season: A muzzleloader hunt beginning on the Monday immediately following the Thanksgiving holiday and continuing for 10 consecutive days.

Late firearm season: An antlerless-only firearm deer hunt beginning on the second Thursday following the Thanksgiving holiday and continuing for four consecutive days.

Holiday firearm season: A holiday firearm season with earn-a-buck regulations when the deer population is above goal beginning on December 24 and continuing through the Sunday nearest January 6.

All seasons: For deer management units above goal, unlimited earn-a-buck regulations (except antlerless-only seasons) are in effect with the ability to be pre-qualified by shooting an antlerless deer in the previous year's season. For deer management units at or below goal, unlimited either-sex regulations (except for antlerless-only seasons) are in effect.

Photo by Jerry Davis

Appendix B – Deer management unit goals in the CWD Management Zone as recommended by the Stakeholder Advisory Group (SAG) and adopted by the Natural Resources Board in April, 2008.

DMU	2001 Goal	SAG Goal	Deer Range	Deer Population at Goal	2009 Post-Hunt Population
54BCWD	25	20	203	4060	7100
70CWD	25	20	273	5460	9000
70ACWD	25	20	219	4380	7400
70BCWD	30	24	212	5088	6300
70ECWD	30	24	69	1656	3100
70GCWD	30	24	122	2928	5200
71CWD	25	20	626	12520	30600
73BCWD	20	16	54	864	2500
73ECWD	22	18	277	4986	9100
75ACWD	20	16	146	2336	7400
75CCWD	20	16	124	1984	9300
75DCWD	20	16	112	1792	11100
76CWD	20	16	320	5120	12600
76ACWD	25	20	305	6100	13300
76MCWD	10	10	78	780	2700
77ACWD	20	16	124	1984	8100
77BCWD	15	15	216	3240	11000
77CCWD	15	15	187	2805	8600
Total			**3667**	**68083**	**164400**

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