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# Objectives, Actions and Anticipated Results

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## 1. Prevent New Introductions of CWD

It is clear from Wisconsin's experience in managing CWD, and Michigan and Minnesota's experiences with bovine tuberculosis, that 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) Deer & elk farms.** Wisconsin's wild and farm-raised deer 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 captive cervid industry. DATCP's responsibility includes registration of all Wisconsin captive cervid herds, regulation and monitoring of movements of captive cervids both inter-state and intra-state, and disease testing programs and protocols designed to detect, monitor, and control diseases in the deer farm industry. DNR's regulatory responsibility includes 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 improve 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

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**Action:** The DNR will continue to build on our cooperative working relationship with DATCP. This will include jointly working for federal and state funding, reducing the number of animals escaping from captive cervid farms, increasing compliance with monitoring, testing, record keeping and cervid movement regulations, the expeditious depopulation of farms with CWD-positive animals, and minimizing the future risk of those depopulated farms to wild and captive herds.

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**(b) Carcass movement.** Research indicates that carcasses of deer, elk, and moose improperly disposed of may be a potential source of disease spread. Thirty-six states and two Canadian provinces have adopted regulations addressing the transportation of hunter-harvested carcasses in an effort to minimize that risk.

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**Action:** Beginning September 1, 2009, Wisconsin will prohibit the movement of whole wild-cervid carcasses 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.

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**(c) Wild deer herds.** CWD research has documented that this disease can be spread to healthy animals through both animal to animal contact and environmental contamination. Deer herds with populations that are above established population management goals will have a greater level of animal to animal contact and shared environmental use than herds at goal.

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**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.

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**(d) Baiting & feeding.** The possibility of dispersal of CWD-positive deer to uninfected areas of the state, the escape of a CWD-positive captive cervid, or contamination of the environment through transport and improper disposal of CWD-positive cervid parts all pose the risk of spreading the disease to other parts of Wisconsin. Baiting and feeding of deer causes concentrations of deer that unnecessarily increase the risk of transmission and establishment of the disease in such situations.

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**Action:** The DNR will pursue a statewide ban on the feeding and baiting of deer to reduce the risk of transmission of CWD or other serious cervid diseases in new areas.

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### Anticipated Results by 2014

- ◆ There is a statewide ban on baiting and feeding.
- ◆ The rate of escapes and number of animals per escape from captive cervid farms has declined.
- ◆ Farms with CWD-positive animals are depopulated, secured, and decontaminated quickly.
- ◆ 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.
- ◆ No high risk parts of wild cervids are being moved from CWD affected areas.
- ◆ Statewide deer populations are moving closer to goal.

## 2. Respond to New CWD Disease Foci

CWD experts have suggested that aggressively culling animals near a newly discovered focus is the best option for disease control and has three main goals. The first goal is to determine prevalence in the immediate area of a new case. The second goal is to possibly eliminate new infection in a localized area. The third goal is to reduce the prevalence in the new area and slow the spread of the disease.

A scientifically sound surveillance strategy is key to responding to new disease foci. Should a CWD-positive deer be found significantly outside of the current CWD Management Zone boundary, DNR staff, landowners, and hunters will be asked to assist with additional sampling in the immediate vicinity of the positive deer to define the extent of the disease. The results of that sampling will determine subsequent management actions.

If the new focus is 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 would 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 adjacent to the existing CWD Management Zone, appears to be a cluster of positives, and prevalence is found to be significantly higher than in the surrounding area (e.g. Devil's Lake State Park), then the new focus would be included within the new Management Zone boundary and additional measures would immediately be taken to try to reduce deer numbers in the vicinity of that cluster.

If the new focus is distant from the existing CWD Management Zone, the DNR should respond aggressively with extended hunting opportunity, landowner permits, and

sharpshooting in an effort to evaluate and manage the new focus. If DNR staff recommend sharpshooting as part of the response to a new disease focus, staff will work with local citizens and the Conservation Congress to develop a sharpshooting plan. That plan will then be presented to the Natural Resources Board for approval, prior to deploying sharpshooters.

If the new focus is found within the ceded territory (1837 and 1842) and 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.

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**Action: Begin a third round of surveillance outside of the CWD Management Zone, beginning in 2011 and concluding by 2013.**

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**Action: Intensive sampling and testing of deer will be done in an area surrounding newly discovered CWD positive deer that are outside of the current CWD Management Zone to assess the spatial extent and intensity of the outbreak. Depending on the results of the assessment, aggressive localized culling may be considered in an effort to control the new focus. 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.**

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#### **Anticipated results by 2014:**

- ◆ New CWD-affected areas are discovered quickly.
- ◆ Aggressive control actions (in consultation with Indian Tribes when necessary) are implemented in a new CWD-affected area when the spatial extent and intensity of the outbreak warrant that response.

### **3. Control Distribution and Intensity of CWD**

Currently there are no practical therapeutic strategies available to control CWD in wild deer herds. Consequently, CWD disease management aimed at controlling prevalence or distribution of the disease involves deer population management to reduce the number of CWD-positive animals. This may include focal culling of deer in localized areas of high disease prevalence or along the leading edge of the disease. It also means reducing deer herds to lower levels of abundance than might be desired for cultural and recreational uses to reduce the rate of disease transmission.

Removing as many deer as possible, each year, from infected areas provides the best opportunity for controlling the disease by 1) removing infectious individuals from the population, 2) eventually reducing the number of susceptible animals below the threshold

needed for the disease to thrive or persist, and 3) limiting the accumulation of infectious CWD prions in the environment.

By increasing the number of deer removed from the population each year, the remaining population will be younger, with few older age class animals in the population likely to transmit the disease. Older aged animals (3 years old and older) have the highest levels of infection. In addition, the remaining population will have a lower density, so contact between individual animals or groups of animals will be reduced. This is expected to reduce the rate of disease transmission, as well as the number of deer that move significant distances to new areas. If annual removal of infected animals is greater than the number of deer that are newly infected with the disease each year, then over time this will result in reduced prevalence of the disease.

In Wisconsin, CWD management is highly dependent upon the cooperation and actions of deer hunters and landowners. Recreational hunting and providing access to land is critical to reducing infected deer herds to target levels and then maintaining them at those levels. The DNR will implement deer season frameworks that achieve the desired deer population objectives and to the extent practical, recognize the socio-cultural hunting season desires of citizens within the CWD-infected area of the state. The DNR also will encourage greater hunter and landowner awareness of the areas with high numbers 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 disease management, the DNR will explore additional deer removal options.

**(a) Hunting season structure.** A consistent hunting season structure for the first three years would be appreciated by hunters because they would not have to learn a new set of rules each year and would be helpful to the DNR because the consistency would make it easier to evaluate

management efforts. See Appendix A for a description of the 2008 season structure.

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**Action:** The DNR recommends that the 2008 season structure be the basic season structure for all units in the CWD Management Zone through 2010.

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**(b) Landowner permits.** The use of post-season landowner permits provides landowners who are interested in harvesting more deer opportunities to do so and intensifies harvest in locations where it is important to remove more deer than would happen under the regular hunting season framework. Permits that are valid only after the regular hunting season have minimal fiscal implication to the DNR.


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**Action:** Issue landowner hunting permits in the CWD Management Zone that are valid from the close of the regular hunting season until March 31.

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**(c) Sharpshooting.** In addition to zone-wide population reduction through the hunting season framework, there is also a need for more focused removal of CWD positive deer. Sharpshooting is an effective tool for removing additional deer after hunting seasons are over and in the case of disease management, has been shown to remove a higher proportion of positive deer than recreational hunting because of the focus in areas of high disease prevalence. Sharpshooting efforts resulted in 978 deer being shot in the CWD Zones from January—March, 2007; of which 26 deer tested positive for CWD. Although sharpshooting accounted for 1.7% of the total kill in the CWD zones, the targeted nature of the shooting effort produced 12.5% of the CWD-positive deer shot.

A review of the age and sex composition of deer shot by DNR staff during that same time period shows 205 (21%) were adult bucks and 773 (79%) were antlerless deer. In comparison, deer registered by hunters included 45% adult bucks



and 55% antlerless deer. Agency shooters shot a much higher proportion of antlerless deer than hunters in the 2006 CWD Zone season.

Illinois reports similar success with sharpshooting, which is a key component of their CWD management strategy. To date, Illinois DNR sharpshooters have accounted for 13% of the deer tested for CWD but 38% of the positive deer. They believe their ability to focus culling and disproportionately remove positives can have a significant impact on the disease.

Sharpshooting will be used tactically along the periphery of the CWD Management Zone in the vicinity of disease clusters. DNR staff will work with local citizens and the Conservation Congress to develop a sharpshooting plan for each cluster. That plan will then be presented to the Natural Resources Board for approval, prior to deploying sharpshooters. The Department will use DNR-trained citizens as well as agency employees when instituting sharpshooting and will only shoot in areas with landowner permission.

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**Action:** Conduct focused sharpshooting on public and private lands where permission can be obtained in areas of disease clusters along the edges of the known CWD distribution (e.g. Devil's Lake State Park or distant new CWD foci).

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**(d) Conduct review after the 2010 and 2013 deer seasons.** The DNR has based its CWD management approach on the best scientific information available and will continue to modify management strategies over time as new data become available. As part of our adaptive management approach, the DNR will conduct a review after the conclusion of the 2010 and 2013 deer seasons to assess progress in reducing deer populations in the CWD Management Zone toward goal. Based on the results of this review, recommendations may be made to alter the hunting season framework, the use of landowner permits, and/or the use of sharpshooting.

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**Action:** Conduct a review of our progress in reducing deer populations after the 2010 and 2013 deer seasons and make needed modifications based on the review.

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**(e) Additional days of gun-hunting opportunity.** If the review indicates additional gun hunting opportunity is necessary to reduce deer populations, the DNR will recommend adding that opportunity before the traditional 9-day gun deer season.

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**Action:** Add more days of gun-hunting opportunity prior to the traditional 9-day gun deer season if additional herd reduction is recommended as a result of the review.

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**(f) Additional focused sharpshooting.** If, based on the review, recreational harvest of deer is not adequately reducing deer density the DNR may consider employing additional focused sharpshooting in areas that are not around disease clusters located along the periphery of the known CWD-affected area. DNR staff will work with local citizens and the Conservation Congress to develop a sharpshooting plan if additional focused sharpshooting is recommended. That plan will then be presented to the Natural Resources Board for approval, prior to deploying sharpshooters

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**Action:** Based on the results of the review, consider expanding the use of sharpshooting on public and private lands in areas of high disease prevalence and/or high deer density that are not along the periphery of the known CWD-affected area.

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**(g) Additional tools.** In many situations, public hunting is the most efficient method to control deer populations over large areas. Public hunting has often been supplemented by government-agency sharpshooting to reach specific disease surveillance and control objectives. These options must continue to be key components of CWD management in Wisconsin to maximize the efficiency of management actions. As additional tools for controlling deer numbers or managing the disease emerge, it will be important to evaluate those techniques for their applicability in Wisconsin.

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**Action:** Evaluate additional tools and implement those that meet efficacy and acceptability criteria as needed to enhance progress towards CWD control objectives.

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

#### *Anticipated Results by 2014:*


- ◆ The number of infected deer in the CWD Management Zone has declined.
- ◆ The geographic distribution of the disease is not significantly larger than the current known distribution.
- ◆ Deer populations in the CWD Management Zone have been reduced by 40% from the 2008 post-hunt population estimate.

#### **4. Increase Public Recognition and Understanding of CWD Risks**

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.

Outreach activities are used to inform the public about CWD and enhance support for CWD management policies and strategies. It is critical that the public, especially landowners in the CWD Management Zone, support the CWD management plan if we're going to be successful in minimizing the presence of this disease in Wisconsin. It is essential that the DNR engage all stakeholders and affected tribes to listen and to respond to their questions and recommendations and to gain their support and assistance. These outreach activities should be informed by research conducted to understand public perceptions about CWD and its risks as well as how the public and tribes feels about methods for management of the disease.

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, 700,000 deer hunters have killed an average of 480,000 deer each year in Wisconsin. Seven of the 10 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, after seven years it is apparent that we need to encourage hunters to shoot even more deer and that recreational hunting alone will not be enough to manage CWD. We need broad public support to manage this disease and this support must be demonstrated not just through attitudinal changes, but also through behavioral changes.

Over the past seven years there has been demonstrated unwillingness among many deer hunters to change their behavior in response to “risks” that seem remote and uncertain, even when most hunters indicate a general concern about CWD. The reality is that current CWD prevalence levels are low in most areas and the likelihood that a hunter will encounter a clinically ill deer also is low. 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 currently believed to be the disease control method most likely to be effective in controlling CWD in free-ranging deer. Regulated hunting has been shown over the past 50 years 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 seven years appears to have stabilized the growth of the deer population in this region but it has not been sufficient to cause substantial 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, human health, or livestock are immediate enough to substantially alter their hunting 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). Bow hunters passed up the highest average number of shots, followed by gun hunters and then those that enjoy gun and bow hunting equally. 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 believe the long-term risks to the deer resource are significant.

Substantial changes in public attitudes toward CWD and its management will take time, perhaps best measured by generations. The 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 would be self-defeating. In this case, if we are asking hunters to shoot more deer than they traditionally shoot, and asking landowners to allow hunters onto their land to shoot deer, then we must first identify and work to reduce the barriers to those desired behaviors. Hence, it is essential that we re-visit our constituents to identify those barriers. Information garnered from these discussions could be used to inform an outreach effort designed to build support and change behavior.

While providing the public with timely, complete, and accurate information about CWD has been an important component of Wisconsin’s CWD control effort, sufficient resources have not been 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. Relying on recreational hunters to play an important role in controlling CWD will not be successful unless communication and social marketing efforts can change the beliefs and behaviors of hunters.

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**Action:** Use survey data to better understand public opinions about CWD management and to develop, test, and refine messages and delivery mechanisms that enhance public support for CWD management. Use research to identify barriers to harvesting more deer and allowing access to land for deer removal and to develop a communication strategy to reduce those barriers.

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*Anticipated Results by 2014:*

- ◆ Communication strategies to increase support among hunters, the general public, and decision makers for the state's approach to CWD management have been developed and are being implemented.
- ◆ The deer population shows a steady (annual) decline.
- ◆ The number of deer hunters in the CWD Management Zone has not declined faster than deer hunter numbers in the rest of the state.
- ◆ Hunter effort increases (hunters are spending more time in the field and as the deer population declines, more time will be required to harvest a deer) and the harvest rate of antlerless deer in the CWD Management Zone increases.
- ◆ The percentage of landowners granting access to their land for deer removal increases.

## 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 reductions in the fiscal resources for 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 Wisconsin is not able to minimize the area affected by CWD.

**(a) Hunter service testing.** The World Health Organization, Centers for Disease Control and Wisconsin Department of Health Services 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 through 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.

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**Action:** The DNR will insure that hunters have 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.

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**(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 the Wisconsin Department of Health Services. A protocol was established following DATCP and DHS recommendations that would allow participating meat processors in the CWD zones to hold donated carcasses until test results are returned, finish processing those deer that



tested negative, and dispose of carcasses from lots that included a CWD positive deer. Lots containing all negative carcasses were then ground and distributed to cooperating food pantry's that indicated an interest in receiving that product.

Donations to the pantry program have, to date, accounted for 2–3% of the total deer harvest in CWD zones. Although few hunters have shot more deer to donate to pantries, 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 psychological value of knowing the pantry program exists may be significant in motivating hunters. Therefore, a robust pantry program and creative marketing of that program are considered important to increasing the deer kill.

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**Action:** The DNR 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 off set the costs of processing and storing donated venison.

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**(c) Disposal assistance.** Safe and cost-effective means of containing prions from deer carcasses are important for limiting new infections and facilitating 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. Lastly, the University of Wisconsin-Madison has completed a quantitative risk assessment that supports landfilling of deer. However, local governments, landfill operators,

and municipal waste water 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 and this will likely affect hunters' willingness to harvest deer.

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**Action:** The DNR will continue to work with local governments, landfill operators, and municipal waste water treatment facilities to increase their understanding of the safety and cost-effectiveness of landfilling deer so as to increase the availability of landfills for carcass disposal.

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***(d) Monitoring for human prion diseases.***

Although there is no evidence that CWD has ever caused illness in people, because BSE has been linked to the new variant form of Creutzfeldt-Jakob disease (CJD) in humans, uncertainty remains about the health risk 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 accumulate. The Wisconsin Department of Health Services (DHS) has been 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.

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**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.

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***(e) Potential risk to livestock.*** The risk of transmission to traditional livestock is low but may not be zero. It has been shown, when CWD is injected directly into the brain, 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. However, 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. Certainly, uncontrolled CWD in wild Wisconsin deer poses a high risk to the state's farmed cervids and is of great concern to those producers.

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**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.

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*Anticipated results by 2014:*

- ◆ Hunters in the CWD Management Zone are able to get their deer tested if they so desire and work is underway to expand financial and logistical partnerships to provide this service.
- ◆ Food pantries will accept donated venison from the CWD-MZ and hunter contributions to the pantry program will exceed historic contributions.
- ◆ Additional landfills within the CWD Management Zone will accept untested deer carcasses and butcher waste.
- ◆ Hunters have a clear understanding of what is known about the human health risks associated with venison consumption from CWD-affected deer populations 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, both 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 has off set 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 needs related to improving our understanding of the risk of CWD to humans, livestock, and other animals and the effectiveness of public communication strategies have been previously addressed in this plan. 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 sets to identify opportunities to increase the cost-effectiveness of disease surveillance and monitoring strategies should be a priority.

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. Research to identify specific mechanisms of disease transmission and 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. 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 of the disease. Control of CWD transmission risk from deer and elk farms would be enhanced by development of effective disinfection mechanisms for disease-impacted captive facilities.

Increased understanding of effects of CWD on deer reproductive rates and susceptibility of CWD positive deer to different sources of mortality (hunting, predation, vehicle-collisions, etc.) is needed to refine estimates of impacts to deer populations in Wisconsin. Additional data are needed to predict the economic costs of disease control activities and failure to control the spread of CWD in Wisconsin.

Management experiments to directly assess the effects of specific disease control strategies on the intensity and spread of CWD are critically needed for 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 rates. 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, ability to selectively remove deer without significantly impacting non-target species, and social acceptability.

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**Action:** The DNR will continue to seek funding to support applied, management focused research on CWD and will continue to cooperate with outside researchers by sharing tissues and data.

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*Anticipated results by 2014:*

- ◆ There is a well-funded and vibrant CWD research program in the state.
- ◆ Research to fill important knowledge gaps related to disease transmission mechanisms and CWD effects on deer populations in Wisconsin is under way.
- ◆ Assessments about the effectiveness of specific disease management tools have been initiated.
- ◆ Better methods are available to assess the progression of CWD, spatially and in intensity.



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