

**UNDERSTANDING CHRONIC WASTING DISEASE (CWD)**

**AND**

**CWD MANAGEMENT PLANNING BACKGROUND**

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## EXECUTIVE SUMMARY

The primary purposes of this document are:

- 1) to provide a thorough understanding of chronic wasting disease (CWD), its distribution nationwide, and circumstances in Minnesota that make the state vulnerable to the threat of CWD infection; and
- 2) to *outline* the Minnesota Department of Natural Resources' (MNDNR) comprehensive management approach to reduce the threat to free-ranging and game farm captive cervids (elk and deer) and to effectively manage against CWD should it emerge within the state.

This document outlines the MNDNR's CWD management programs for free-ranging deer and elk. It also discusses potential approaches for improving regulation of captive cervid facilities, including correcting current weaknesses in the statutes or rules regulating elk and deer game farms registered with the MNDNR. A more detailed CWD Contingency Management Plan has been prepared and is reported separately.

As background and to further facilitate a thorough understanding of CWD and the complicated management challenges it poses, the following appendices are included:

- Appendix A. Brief review of what is currently known and unknown about CWD;
- Appendix B. Current status reports that describe aspects of other states' regulation and management of captive cervids and CWD monitoring and management;
- Appendix C. Description of the Minnesota Board of Animal Health's (BAH) CWD Surveillance Program, initially designed primarily for captive elk;
- Appendix D. Description of a proposed National CWD Surveillance Program;
- Appendix E. Documents addressing the position of the Minnesota Pollution Control Agency on deer and elk carcass disposal relative to CWD.
- Appendix F. Evolution of cervid import requirements for Minnesota (BAH) relative to CWD.

Chronic wasting disease is an infectious neurological disease that naturally occurs in North American deer and Rocky Mountain elk and belongs to the group of infectious diseases known as transmissible spongiform encephalopathies (TSEs). Chronic wasting disease is a progressively fatal disease with no known immunity, vaccine, or treatment. There is no evidence linking CWD to neurological disorders of humans. The first cases of CWD were detected in captive deer and elk in the late 1960s-1970s, but it was not until the mid 1980s to early 1990s that additional infections drew the attention of the scientific and management communities.

Chronic wasting disease has been detected in both captive and free-ranging deer and elk in other states. During August 2002, CWD was diagnosed in 1 captive elk in Minnesota, but it has not been detected in either captive deer or free-ranging deer or elk in the state.

Management of CWD is complicated by a number of factors. Much about CWD remains unknown or poorly understood. Clinical signs of the disease may not become apparent for 18-36 months (*incubation period*), during which time the animal is potentially infectious to other cervids. And, until recently, there has been no live-animal test for detecting the disease. Research has been demonstrating the potential of CWD-testing of biopsied tonsils and certain lymph nodes (e.g., retropharyngeal) of deer, which would find its most practical application with captive animals.

Management has been further complicated by the fact that legal responsibilities for managing captive deer and elk have either been unclear, or divided between government agencies. Frequently, regulation and enforcement capacities and abilities vary between agencies. The numbers of captive cervid operations and animals, financial investments, and the intra- and interstate movement of captive elk and deer also vary markedly between states.

There are 229 captive elk herds and 16 combination elk/deer operations registered with the Minnesota BAH, accounting for approximately 11,690 elk. This is more captive elk than in any other state, with the possible exception of Colorado. There are also 43 captive deer and 10 “other” cervid herds registered with BAH. Since 1998, there has been at least a 45% increase in cervid herds registered with the Minnesota BAH. In addition, 43 elk herds (total of 600-650 elk) and 345-360 white-tailed deer herds (total of 4,000-4,500 deer) are present on MNDNR-licensed game farms.

In 1999, the BAH developed a *voluntary* state CWD Surveillance Program, primarily for elk. Currently, 213 captive cervid herds (71.5%) of 298 operations registered with the BAH are enrolled in the program, which includes 9,926 elk (84.9%), 1028 deer (66.1%), and 202 other cervids (67.1%). This program requires that all cervids older than 16 months of age that die or are destroyed must be tested for CWD. Further, rigorous annual inventories must be conducted, operations must comply with importation restrictions, and advanced herd status is achieved with the number of years participating operations remain CWD-free. (The BAH would prefer that the program be *mandatory* for all captive cervid operations, but currently, funds and personnel are insufficient to operate the program at that scale.)

Captive elk and deer operators in Minnesota, whether registered with the BAH or MNDNR, must request an importation permit from the BAH (see Appendix E). On 17 December 2001, the BAH approved specific restrictions on the importation of *elk only* due to the health threat posed by CWD to Minnesota livestock. In early March 2002, shortly after the

report of 3 CWD-infected free-ranging deer in Wisconsin, the Minnesota BAH approved new restrictions on *all cervid* importation. *No deer or elk* originating from an area considered to be endemic for CWD would be allowed into Minnesota, and none can be imported from a herd that is infected or exposed to CWD, until that herd has been cleared to the satisfaction of the Board. *All imported elk* had to be from a herd that has been participating in a state-recognized CWD Surveillance Program for at least one year. As of May 2002, *all imported cervids* require an import permit issued by the BAH, a Certificate of Inspection, and individual identification. Related to CWD, *all cervids*, including animals imported for slaughter purposes, must be from herds under a state approved CWD surveillance program for *at least 3 years*. Further, no import is permitted if it is from a location that occurs on an expanded list of CWD endemic areas.

For more than a year, the MNDNR has been conducting targeted surveillance, wherein brain stems of about 43 Asuspect@ deer (those exhibiting clinical signs that may be consistent with CWD or that died of unknown causes) were collected and CWD-tested. Additionally, during the fall 2001 season, brain stems were collected from 43 hunter-harvested deer in southern Minnesota and tested for CWD. The results of all tests were negative. During September 2002, the MNDNR established a surveillance area surrounding the captive elk facility where a CWD(+) bull was reported on 29 August 2002. The purpose of this area was to test free-ranging deer to determine if any had been infected by CWD. Primarily within this area, 111 killed deer culled primarily by MNDNR sharpshooters, were tested for CWD. Presently, IHC-test results have been received for 69 brain stems, and all were negative.

The MNDNR has developed a CWD Monitoring Program based on geographically-focused surveillance, which involves more generalized collection and testing of brain stems from pre-determined sample sizes of deer harvested by hunters. This program began during the Fall 2002 Deer Firearm Season and will include testing of 5,000-6,000 brain stems --- 300-500 samples randomly distributed over each of 16 pre-selected Permit Areas of the state's 130 Permit Areas, allowing detection of a 1% prevalence of CWD with 95% confidence.

The MNDNR identified a number of weaknesses in procedures, statutes and rules regulating cervids on game farms licensed by the agency. They include: (1) game farm registration records and associated data (e.g., animal inventory, annual additions to and losses from herds) were not computerized, and consequently, were not readily available for effective monitoring; (2) fencing regulations are inadequate for preventing contact between captive and free-ranging cervids; (3) escapes of captive deer or elk from game farms were *not* required to be reported; (4) there was no statutory language prohibiting the release of captive deer or elk into the wild; and (5) there are no surveillance or testing requirements for CWD.

Since identifying the above needs, the MNDNR has computerized all registration data for captive cervid operations registered with the agency. The MNDNR is working with other agencies and organizations in an attempt to comprehensively address the management of captive

cervids under one uniform system. This will require a legislative initiative in the 2003 session. In the meantime, the MNDNR, in cooperation with the BAH, has begun to strengthen importation and release provisions, and to secure a source of funding for long-term CWD management through existing rule-making authorities. **Adopted in April 2002, the following outlines approved Senate and House Floor Amendments:**

- 1) Farmed cervidae may not be released or allowed to run at large. Cervidae that have escaped must be reported to the MNDNR within 24 hours.
- 2) Wild cervidae that have entered the confinement area of a farmed cervidae facility must be destroyed by the owner and be reported to the MNDNR within 24 hours of being destroyed.
- 3) Cervidae may not be imported into the state from a herd that is infected or has been exposed to CWD or from a known CWD endemic area, as determined by the Board. Further, the cervidae may be imported into the state only from a herd that is not in a known CWD endemic area, as determined by the Board, and from a herd subject to a state or provincial approved CWD surveillance/monitoring program for at least 3 years.
- 4) Fifty cents from each deer license is appropriated for emergency deer feeding and management of CWD, and this money is available until expended.
- 5) The MNDNR, BAH, and other interested parties shall study and make recommendations on management actions designed to protect captive and free-ranging cervidae from CWD, specifically addressing cervidae fencing requirements, disease infection prevention, criteria for quarantining or depopulating infected herds, methods of harvest, identification of cervidae, and other issues.

More stringent regulation of cervid game farms will reduce the risk of CWD infection occurring in Minnesota's captive and free-ranging cervid populations; however, some level of risk will persist. That risk, and the difficulties associated with CWD already discussed, dictated that a comprehensive management program for free-ranging cervids be formulated with expediency before emergence of the disease in Minnesota.

MNDNR's CWD management plans for free-ranging cervids include 5 essential components or objectives:

- 1) ongoing targeted surveillance statewide (i.e., collecting and CWD-testing deer/elk exhibiting signs which may be consistent with CWD);
- 2) continued implementation of the geographically-focused CWD Monitoring Program;

- 3) implementation of the MNDNR's Contingency Management Plan for rapidly responding to CWD should it be detected in the state;
- 4) conduct research on the epizootiology (i.e., population effects) and effective management of CWD; and
- 5) education and information-sharing with the public, constituents, MNDNR and other government agency personnel concerning CWD.

## **INTRODUCTION**

Chronic wasting disease (CWD) is an infectious neurological disease that naturally occurs in North American deer and Rocky Mountain elk and belongs to the group of infectious diseases known as transmissible spongiform encephalopathies (TSEs). Other TSEs include bovine spongiform encephalopathy (BSE) or "mad cow disease" in cattle, scrapie in domestic sheep, Creutzfeldt-Jakob disease (CJD) and new variant CJD in humans, among others. Chronic wasting disease is a progressively fatal disease with no known immunity, vaccine, or treatment.

Chronic wasting disease infection has been detected in captive elk in Colorado, Wyoming, Nebraska, Kansas, Oklahoma, Montana, South Dakota, Saskatchewan, Alberta, and most recently in Minnesota. Further, CWD was diagnosed in captive white-tailed deer in Wisconsin during October 2002. Infections of free-ranging mule deer, white-tailed deer, and/or elk have been documented in Colorado, Wyoming, Nebraska, South Dakota, Wisconsin, New Mexico, Illinois, and Saskatchewan.

Several aspects of CWD (e.g., long incubation period) and the human market for captive elk and deer (involving intra- and interstate movement of these animals) have contributed to the high potential risk of introducing and spreading this disease and to the difficulties associated with managing it. Strict safeguards are the most effective means of preventing the establishment of this disease in Minnesota.

Management guidelines and strategies currently employed by various state and federal natural resource and agricultural agencies vary widely and are changing rapidly. Management of CWD is complicated by a number of factors. Much about CWD remains unknown or poorly understood. Clinical signs of the disease may not become apparent in a deer or elk for 18-36 months (incubation period), during which time the animal is potentially infectious to other cervids. Until recently, there has been only a post-mortem test for detecting CWD in cervids; presently, biopsy and testing of tissue from the tonsils is showing greatest potential as a live-animal test in deer, but not in elk.

Although the first cases of CWD were detected in captive deer and elk at research

facilities in the late 1960s, it was not until the mid-1980s to early 1990s that additional infections drew the attention of the scientific and management communities. Management has been further complicated by the fact that legal responsibilities for regulating captive deer and elk operations have been either unclear (e.g., until about 1993 in South Dakota) or divided between agencies (e.g., Departments of Agriculture, Boards of Animal Health, and Departments of Natural Resources). Frequently, different statutes and rules apply and enforcement capacities and abilities vary across agencies. The number of captive cervid operations and animals, financial investments, and the intra- and interstate movement of elk and deer also vary markedly among states.

## **PURPOSE AND BACKGROUND**

The primary purpose of this document is to:

- 1) provide a thorough understanding of chronic wasting disease (CWD), its distribution nationwide, and circumstances in Minnesota that make the state vulnerable to the threat of CWD infection; and
- 2) provide an outline of the Minnesota Department of Natural Resources' (MNDNR) comprehensive management approach to reduce the threat to free-ranging and game-farm captive cervids (elk and deer) and to effectively manage against CWD should it emerge within the state. It also discusses potential approaches for improving regulation of captive cervid facilities, including correcting current weaknesses in the statutes or rules regulating elk and deer game farms registered with the MNDNR. A more detailed CWD Contingency Management Plan has been prepared and is reported separately.

As background and to further facilitate a thorough understanding of CWD and the complicated management challenge it poses, the following appendices are included:

Appendix A. Brief review of what is currently known and unknown about CWD;

Appendix B. Current status reports that describe aspects of other states' regulation and management of captive cervids and CWD monitoring and management efforts;

Appendix C. Description of the Minnesota Board of Animal Health's (BAH) CWD Surveillance Program, applied primarily to captive elk;

Appendix D. Description of a proposed National CWD Surveillance Program;

Appendix E. Documents addressing the position of the Minnesota Pollution Control

Agency on deer and elk carcass disposal relative to CWD; and

Appendix F. Evolution of cervid import requirements for Minnesota (BAH) relative to CWD.

## **MINNESOTA CAPTIVE ELK AND DEER**

The scale of captive elk and deer farming, the reported incidence of CWD infection (in captive and free-ranging cervids), and state agency regulatory jurisdictions vary markedly among states (see Appendix B). While it is clear from documents and discussions with numerous government biologists, veterinarians, and administrators that states share certain management concerns and considerations relative to CWD infection, official responses have varied.

Minnesota cervid farmers have the option of registering with the state BAH or obtaining a game farm license from MNDNR. The following is a status report (as of October 28, 2002) for Minnesota:

**BAH-Registered Herds.** Currently, 298 captive cervid herds are registered with the BAH, including 229 elk herds, 43 white-tailed deer herds, 16 combination elk and white-tailed deer herds, and 10 “other” cervid herds. Collectively, these herds account for 11,690 elk, 1,555 white-tailed deer, and 301 “other” cervids. There are more captive elk in Minnesota than in any other state, except possibly Colorado. Average herd size is 39 elk. Since 1998, there has been a 45% increase in cervid herds registered with the BAH.

**MNDNR Game Farm Cervids.** Forty-three elk herds (total of 600-650 elk) are registered with MNDNR; average herd size is 15 elk. Further, 345-360 white-tailed deer game farms that include approximately 4,000-4,500 deer, are registered with MNDNR. About 15-20 mule deer occur on these game farms.

## **MINNESOTA CWD STATUS**

### **CWD-Monitoring of Captive Cervid Herds**

There has been one reported (29 August 2002) case of CWD in Minnesota. It was a captive bull elk at an elk operation in Aitkin. The remaining 48 elk in the herd have since been depopulated and CWD-tested, and *all* were negative. Two additional captive elk operations (1 in Sauk Center and 1 in Sauk Rapids), where the CWD-positive bull had previously spent time, have been quarantined. Consequently, importing and exporting of elk are prohibited indefinitely while an epidemiological investigation is being conducted. Some elk from CWD-positive herds were imported into the state from Colorado in the fall of 2001, but follow-up testing of imported animals was negative. In 1999, the BAH developed a *voluntary* state Chronic Wasting Disease Surveillance Program, primarily for elk. Currently, 213 of the BAH's 298 (71.5%) cervid operations are enrolled in the BAH's CWD Surveillance Program. These operations include 9,926 elk, 1,028 deer, and 202 other cervids, which means 84.9%, 66.1%, and 67.1% of these animals are being monitored by the BAH for CWD. Importantly, the BAH would prefer that the program be *mandatory* for at least all captive elk operations; however, currently, funds and personnel are insufficient to operate the program at that scale. Presently, there is no formal surveillance program for cervids kept on game farms licensed by MNDNR, although game farms may voluntarily participate in the BAH's CWD Surveillance Program. (for more details on the Minnesota BAH and National CWD Surveillance Programs, see Appendices C and D).

### **CWD-Monitoring of Free-Ranging (Wild) Deer**

MNDNR has been conducting *targeted surveillance* of white-tailed deer over the past year. Targeted surveillance is considered to be an effective primary initial approach to determining presence or absence of CWD statewide. Targeted surveillance involves collection and CWD-testing of "*suspect*" cervids that are exhibiting signs or symptoms of disease, particularly when consistent with CWD (e.g., emaciation, excessive salivation, tremors, lack of coordination). Those not dead when investigations were initiated were euthanized, and all had a specific portion of the brain stem (obex of the medulla oblongata) extracted for CWD-testing at the National Veterinary Services Laboratory in Ames, Iowa. Presently, 43 brain stems have been collected from suspect deer or deer that have died under unknown circumstances; all tested negative. An additional 43 brain stems were collected from deer harvested by hunters during the fall 2001 season as part of a *pilot* effort aimed at intensifying surveillance in the future. Again, all results were negative for CWD. Targeted surveillance could be expanded to include deer recently killed by vehicular collision (i.e., opportunistic surveillance).

Targeted surveillance can be augmented by *geographically-focused surveillance*, which involves more generalized collection and testing of brain stems from pre-determined sample sizes of deer harvested by hunters during the annual season. The MNDNR's new *CWD Monitoring Program*, to begin during the Fall 2002 Deer Firearm Hunting Season, will rely on this type of surveillance. A *pilot* effort was conducted during the fall of 2001, where 43 brain stem samples collected from hunter-harvested deer were tested for CWD. About half of these were from southeastern Minnesota and half were from southwestern Minnesota; all were negative for CWD.

This season's (fall 2002) monitoring efforts involved a collection and CWD-testing of 5,000-6,000 brain stems --- 300-500 samples randomly distributed over each of 16 pre-selected Permit Areas of the state's 130 Permit Areas. Statistically, this level of sampling should permit detection of a 1% or higher prevalence of CWD (1 or more infected deer per 100 tested) with 95% confidence. Considerations for selection of the Permit Areas monitored this year included, 1) proximity to Wisconsin and South Dakota borders and location of CWD-positive animals in those states, 2) local density of captive deer and elk operations, 3) occurrence of a CWD-positive captive elk in an Aitkin captive operation and potential exposure of other captive herds to that infected elk, 4) allowing for sampling of deer in the more northern parts of the states, 5) agency personnel and funding requirements of the monitoring effort related to statewide distribution of the actual sampling, and 6) logistical and other factors. The MNDNR's CWD Monitoring Program will be conducted as far into the future as required to thoroughly sample deer in all 130 Permit Areas of the state and determine the presence or absence of the disease, and if present, its spatial distribution and prevalence. The CWD Monitoring Program was designed with inherent flexibility to allow for contingency modifications related to CWD-test findings of the ongoing program.

During September 2002, a surveillance area was established by the MNDNR, which included approximately 9 square miles immediately surrounding the captive elk facility where a CWD(+) bull was reported on 29 August 2002. The purpose of this area was to test free-ranging deer to determine if any had been infected by CWD. Primarily within this area, 111 deer were killed by MNDNR sharpshooters, archery hunters, area landowners, and traffic accidents and tested for CWD. As of this writing, IHC-test results were received for 69 brain stems, and all were negative.

### *Carcass Disposal*

The MNDNR is disposing of deer and elk carcasses by incineration in an air-flow incinerator and by landfilling. During September 2002, the MNDNR purchased an air-flow incinerator capable of burning carcasses at temperatures up to 2,800° F, which exceeds what is required (1,100° F) to denature the infectious abnormal prion proteins associated with CWD. Presently, the MNDNR recommends that hunters dispose of bones and other remains through rendering, burial, incineration, or landfilling. In November 2002, the Minnesota Pollution Control Agency (MPCA) recommended incineration (above 1,100°F), disposal at Lined Mixed Municipal Solid Waste and Ash Landfills, or at the SKB Rosemount Industrial Landfill as acceptable, safe, and practical alternatives for carcass disposal of CWD(+) carcasses of deer and elk. This was based on careful review of a thorough assessment of risks associated with landfilling of deer infected with CWD completed by the Wisconsin Department of Natural Resources (see the assessment at [www.dnr.state.wi.us](http://www.dnr.state.wi.us)). The MPCA stated that "direct burial of deer that test positive for CWD is not appropriate." Details of the MPCA's position can be viewed in documents in Appendix E.

Also in November 2002, the federal Food and Drug Administration announced “the agency will not permit material from CWD(+) animals, or animals at high risk for CWD, to be used as an ingredient in feed for any animal species.” High risk animals would include those from CWD(+) captive herds, free-ranging deer from the endemic area of Colorado and Wyoming or the eradication zone of Wisconsin, and deer or elk “from any areas designated around any new foci of CWD infection that might be identified through surveillance or hunter harvest testing.”

## **Importation of all cervids**

Captive elk and deer operators in Minnesota, whether registered with the BAH or licensed by MNDNR, must obtain an importation permit from the BAH. Importation of elk and deer requires health certificates and specific tests and clearance for tuberculosis and brucellosis. Elk must also be imported only from a herd monitored for CWD for a specified minimum length of time and may not come from a CWD endemic area for free-ranging deer and elk (as discussed below). With the increased detection of CWD across North America, requirements for cervid importation have become increasingly restrictive.

On **17 December 2001**, the BAH approved the following restrictions on importation of elk due to the health threat posed by CWD to Minnesota livestock (quoted from a BAH document, 2001):

*No elk* will be permitted entry into Minnesota if they originate in herds:

- located in the area of the United States where CWD is endemic in the free-ranging deer and elk,
- that have purchased elk from CWD-infected herds unless these herds are cleared to the satisfaction of the BAH,
- infected with CWD,
- that have not been in a state recognized CWD Surveillance Program for at least one year.

Further, in **early March 2002**, shortly after the report of 3 CWD-infected, free-ranging male white-tailed deer in Wisconsin, the BAH approved a new motion to strengthen restrictions on cervid importation as follows (see Appendix F):

*No cervid (includes deer)* originating from an area considered to be endemic for CWD will be allowed entry into Minnesota. This area includes the following states and counties:

**Wyoming:** Albany, Carbon, Converse, Laramie, Platte, Niobrara, Goshen  
**Nebraska:** Kimball, Sioux, Banner, Scotts Bluff, Cheyenne, Deuel, Keith, Perkins, Chase

**Colorado:** Boulder, Gilpin, Larimer, Weld, Logan, Morgan, Phillips, Sedgwick, Washington

**South Dakota:** Fall River

**Wisconsin:** Dane, Iowa, Sauk, Columbia, Juneau, Jefferson, Rock, Green, Lafayette

*No cervid* can be imported that is from a herd that is infected or has been exposed to CWD, or that has purchased a cervid from an infected herd, unless the herd has been cleared to the satisfaction of the Board.

*All elk* imported must be from a herd that has been participating in a state recognized CWD Surveillance Program for at least one year. The CWD herd number and numbers of years in the program must be written on the Certificate of Veterinary Inspection.

Effective **17 May 2002**, *all imported cervids* require an import permit issued by the BAH, a Certificate of Veterinary Inspection, and individual identification. Related to CWD, *all cervids*, including animals imported for slaughter purposes, must be from herds under state-approved CWD surveillance for *at least 3 years*. Cervids imported in violation of this section may be seized and destroyed by the Commissioner of the Department of Natural Resources.

Further no importation is allowed from infected or exposed herds or from the following expanded list of endemic areas:

**Wyoming:** Albany, Carbon, Converse, Laramie, Platte, Niobrara, Goshen, Platte

**Nebraska:** Kimball, Sioux, Banner, Scotts Bluff, Cheyenne, Deuel, Keith, Perkins, Chase

**Colorado:** Boulder, Gilpin, Larimer, Weld, Logan, Morgan, Phillips, Sedgwick, Washington

**South Dakota:** Fall River

**Wisconsin:** Dane, Iowa, Sauk, Columbia, Juneau, Jefferson, Rock, Green, Lafayette

**Saskatchewan:** Must have approval from a BAH veterinarian

Effective **14 November 2002**, the counties of Eagle, Garfield, Grand, Jackson, Larimer, Moffit, Rio Blanco, Routt, and Summitt (Colorado); Boone, Stephenson, and Winnebago (Illinois); Crawford, Grant, Richland, and Walworth (Wisconsin) were added to the endemic areas listed above from which importation of cervids is banned.

## **MNDNR=s CWD MANAGEMENT PLAN: AN OUTLINE**

Diseases such as CWD tend to be most effectively managed when efforts are applied before or as the disease emerges, rather than after it becomes established. Chronic wasting disease is an emerging disease. The current number of known infections among captive elk varies markedly among states (and Canada) and is increasing steadily with continued surveillance and

investigations. Even more disturbing is the increased prevalence and geographic spread of CWD in free-ranging mule deer, white-tailed deer, and elk. Most disturbing of all is the recent discovery of CWD in free-ranging white-tailed deer in Wisconsin, approximately 700 miles east of any previously known infection. Further, the first cases of CWD in captive white-tailed deer in private/commercial operations were reported during September-October 2002.

Further, in some local areas prevalence appears to be increasing at a more rapid rate than in the past, although it is not clear whether or not this is because of increased incidence or increased surveillance, reporting, and testing. Minnesota's cervid management (MNDNR and BAH) and health agencies can learn a great deal from the knowledge gained by states with previous direct experience managing CWD and those states are being consulted in the development of Minnesota's plans.

While CWD has not been detected free-ranging deer in Minnesota, it has been reported in bordering states to the west and east (i.e., South Dakota and Wisconsin), and as discussed above, it was recently diagnosed in a captive elk in Minnesota. Consequently, the MNDNR has developed more intensive targeted and geographically-focused surveillance plans to monitor free-ranging deer for presence of the disease and a contingency plan to guide MNDNR's response if CWD is detected here. Also, the MNDNR has been evaluating *cervid management laws, rules, regulations, and policies* for those captive and free-ranging cervids that are under MNDNR authority, to identify and assess issues and weaknesses that may be related to disease vulnerability and management. In these efforts, the MNDNR will work with other agencies and organizations (e.g., BAH, Minnesota Departments of Agriculture and Health, Minnesota Deer Hunters Association) responsible for or concerned about free-ranging and captive cervid disease management in an attempt to assure comprehensive approaches to effective management of CWD risks.

## **Free-Ranging Cervids**

Comprehensive management plans for CWD detection in free-ranging cervids (i.e., CWD Monitoring Program) and response (i.e., CWD Contingency Management Plan) have been developed. Review of CWD management plans of other state natural resource management agencies (e.g., Colorado, Nebraska) with experience with CWD were of value in formulating these plans, and consultation with other states will continue as details are developed further. A general outline for the Contingency Plan is described below.

The MNDNR CWD management plans for free-ranging cervids include at least 5 essential components or objectives:

- 1) ongoing targeted surveillance statewide (i.e., collecting and CWD-testing of deer/elk exhibiting signs which may be consistent with CWD);

- 2) continued development and implementation of the state's geographically-focused CWD Monitoring Program involving the sampling and CWD-testing of hunter-harvested deer;
- 3) implementation and further development of the CWD Contingency Management Plan for rapidly responding to CWD should it be detected in the state;
- 4) conduct research on the epizootiology (i.e., population effects) and effectiveness management strategies focused on CWD; and
- 5) education and information-sharing with the public, constituents, MNDNR and other government agency personnel concerning CWD.

Each of these general objectives is discussed in more detail below.

### *1) Continued Targeted Surveillance of Free-Ranging Deer Statewide*

For about a year MNDNR has been collecting brain stems for CWD-testing from "suspect" free-ranging deer (i.e., deer exhibiting signs that may be consistent with CWD or that died recently under questionable or unknown circumstances). This practice has been reported by researchers in other states to be particularly useful for detecting the presence/absence of CWD in local areas statewide. MNDNR will continue testing "suspect" free-ranging deer for CWD.

### *2) Continued Development and Implementation of a Geographically-Focused CWD Monitoring Program for Free-Ranging Deer*

A geographically-focused CWD Monitoring Program for free-ranging deer was initiated during the Fall 2002 Deer Hunting Firearm Season. Its objective involved collection and CWD-testing of brain stems from 5,000-6,000 deer harvested by hunters in 16 Permit Areas distributed around the state. Areas are selected based on a variety of criteria, which may include proximity of captive elk/deer operations, deer density, number of check stations and availability of samples, and proximity to areas where CWD has been detected (e.g., 40 CWD-infected deer recently found in Wisconsin). This type of Monitoring Program will augment the targeted surveillance in detecting presence or absence of CWD, and in determining prevalence should the disease be detected.

### *3) Implementation and Further Development of a Contingency Plan for Responding Rapidly and Aggressively to CWD Should It be Detected*

*A) Preventing the Transmission of CWD Between Captive and Free-Ranging Cervids*

The potential for transmission of CWD between captive and wild cervids may be minimized by limiting private possession of deer and elk in local areas where CWD has occurred; by minimizing or eliminating the potential for physical contact between captive and wild cervids (e.g., by more stringent fencing requirements, such as double-fencing and frequent fence inspections); by immediate reporting of captive animals that have escaped or wild animals that have entered a captive facility; and by requiring captive animal CWD surveillance and reporting.

*B) Limiting the Distribution of CWD in Free-ranging Deer and Elk*

Chronic wasting disease may spread naturally (i.e., infectious contacts between deer), as well as by the inadvertent influence of humans (e.g., inadvertent movement of CWD-infected animals). The distribution of CWD among free-ranging cervids may be limited by: (1) preventing inadvertent movements of CWD-infected free-ranging animals, (2) reducing factors that allow increased physical contact between free-ranging and captive cervids, (3) limiting potential sources of CWD infection (e.g., hunter-harvested carcasses from CWD endemic areas), and (4) use of ongoing targeted surveillance and field investigations to detect CWD and monitor changes in prevalence and distribution.

*C) Reducing the Occurrence of CWD in Free-Ranging Deer and Elk*

Chronic wasting disease transmission may be reduced by: 1) encouraging public reporting of suspect animals and promptly culling (killing) and testing wild deer exhibiting symptoms consistent with CWD statewide; 2) prohibiting feeding of wild cervids (include education of public on the adverse effects of feeding); 3) reducing high deer densities through increased hunting or by culling in areas where CWD has occurred; and 4) other alternative strategies developed through cooperative research and management. Alternative strategies could include integrated field and modeling efforts examining methods for monitoring population size, disease prevalence, disease and system responses to population reduction by hunting and culling.

*4) Research on the Epidemiology, Epizootiology, and Management of CWD*

Research of the numerous aspects of CWD that remain unknown or poorly understood is essential to assuring improved effective management of CWD in captive cervid herds and free-ranging populations. Some of the most important CWD-related topics and issues that require immediate and continued study include: determination of transmission routes, causative agent(s), and the potential of infection from environmental contamination (versus lateral animal to animal) in natural areas and captive facilities; potential for transmission to livestock, other wildlife, and humans; development of treatments and a live-test for CWD; and the potential for reclaiming captive facilities and natural areas where CWD infection has occurred.

Knowledge gained from study of the relationships between deer densities, migration and dispersal, winter severity and nutritional condition to susceptibility of animals to CWD infection, transmission rates, and disease distribution will be critical to future management. Increased understanding of the influence of CWD prevalence on deer and elk mortality rates from other sources (e.g., wolf and bobcat predation, starvation, hunter-harvest), reproductive success, and on population growth rates will assist management in decision-making and planning optimum strategies over time. Ultimately, integrated field and modeling efforts will be necessary to determine the effectiveness of management intervention (e.g., intense surveillance, population reduction by hunter-harvest and culling) on prevalence and distribution of CWD among free-ranging populations.

### *5) Education and Information-Sharing*

The MNDNR will continue to help educate and share current information with the general public, constituent groups, and other agency personnel. Information-sharing and education are accomplished by website updates, distribution of brochures and fact sheets, periodic news releases, public meetings, televised informational programs, and agency communications and reports. This information includes: basic history and understanding of CWD, its nationwide distribution, and status of knowledge of the disease (e.g., epidemiology, transmission, clinical signs, population effects); other CWD-related issues and concerns (e.g., carcass handling, meat processing and consumption, transmission to humans and livestock, deer feeding); and management and research actions being taken by the MNDNR and the BAH. Information products designed to focus on specific issues of importance to hunters, meat-processors, taxidermists, deer feeders, and operators of captive deer and elk facilities.

Further, publication of technical findings of research in peer-reviewed journals and agency reports will be strongly encouraged. Chronic wasting disease is a management issue that will likely become more serious with time. The more informed all agencies and the public become, the more effectively CWD risks will be managed in the future.

### **Captive Cervids on MNDNR-Licensed Game Farms**

MNDNR has regulatory jurisdiction over approximately 1,100 licensed game farms, 345-360 of which have cervids (approximately 4,000-4,500 white-tailed deer and 600 elk). These game farms range from having just a few animals to large commercial operations.

#### *Game Farm Regulation Weaknesses and Concerns*

During winter 2001-02, a number of weaknesses and issues were identified involving game farm regulation, licensee knowledge of regulatory requirements, and consistency of enforcement

of those requirements. These issues have implications relative to potential CWD introduction into these game farms and transmission among captive and free-ranging white-tailed deer (and elk). Specific issues identified included the following:

- 1) Game farm animal registration records and associated data (e.g., animal inventory, additions and losses from herds) had not been computerized. Consequently, game farm records were not easily accessible or amenable to the scrutiny necessary for effective monitoring and enforcement;
- 2) There are no specific fencing regulations for game farms with white-tailed deer and elk, other than that they be adequate to contain the animals; they lack specific height requirements and are inadequate for preventing contact between, or commingling of, captive and free-ranging cervids;
- 3) Reporting of escapes of captive deer or elk from game farms was not required;
- 4) There was no specific regulatory language prohibiting the intentional release of captive deer or elk into the wild;
- 5) There are no specific requirements for unique individual identification of captive deer or elk on game farms;
- 6) There is poor compliance with regulations requiring submission of reports, sales receipts, and accurate annual inventories (e.g., during the 1999-2000 and 2000-2001 license years, violation rates of 35-44% were detected);
- 7) There is poor compliance with disease-testing requirements (e.g., tuberculosis, brucellosis) by captive deer operations prior to importing and exporting of animals;
- 8) There has been no surveillance or testing requirements for CWD specific to game farms;
- 9) Accounts of sales by brokers and game farm auction houses are poor;
- 10) MNDNR-licensed game farms at times have been used as “emergency” type rehabilitation centers for orphaned wild newborn fawns; and
- 11) MNDNR Enforcement inspections of game farms have too often been inconsistent.

Much of the game farm regulatory language is antiquated and was formulated when game farms were primarily licensed for raising pheasants and other game birds, not cervids. Many of

the regulations are vague or subject to various interpretations. The result is that in many violation cases, the benefit of the doubt often goes to the violator, and fines and penalties are often inadequate to be effective.

### *MNDNR Response to Game Farm Regulatory Concerns*

Until 29 August 2002, CWD had not been detected in captive or free-ranging cervids in Minnesota, but evidence was mounting that the risk of CWD introduction into Minnesota was increasing. This has been particularly true in the absence of an effective CWD Surveillance Program for *all* captive cervids, including those under the regulatory jurisdiction of the MNDNR. The need for intensified geographic surveillance of free-ranging cervids (discussed previously) also was becoming evident.

Relative to MNDNR-regulated captive cervid operations, management needs of highest priority have included:

- 1) Computer-entry and annual database maintenance of all registration data for all captive cervid operations, including total number of animals, species, sex, age, deaths, causes of deaths, movement of animals into and out of the operation, and records of disease-testing;
- 2) Strengthening fencing requirements to minimize the risk of ingress and egress of cervids and commingling of captive and free-ranging cervids at the fence;
- 3) Specifically prohibiting intentional release of captive cervids and requiring immediate reporting of animals that have escaped;
- 4) Requiring 2 forms of identification for each individual animal, 1 of which is permanent;
- 5) Requiring CWD-testing of all animals that die, in addition to requiring reporting of all deaths; and
- 6) Providing all game farm licensees with a clear summary of all regulatory requirements so that the pertinent laws and rules are comprehensible and compliance can be enforced.

Since identifying the above needs, the MNDNR has computerized all registration data for captive cervid operations registered with the agency. Further, the MNDNR is working with other agencies and organizations in an attempt to comprehensively address the management of captive cervids under one uniform system. This will require a legislative initiative in the 2003 session, which is currently being prepared. In the meantime, the MNDNR, in cooperation with

the BAH, has begun to strengthen importation and release provisions, and to secure a source of funding for long-term CWD management through existing rule-making authorities. **The following outlines approved Senate and House Floor amendments adopted in April 2002:**

- 1) Farmed cervidae may not be released or allowed to run at large. Cervidae that have escaped must be reported to the MNDNR within 24 hours, and if the owner can not capture escaped cervidae within 24 hours of escape, then the MNDNR may destroy the animal(s);
- 2) Wild cervidae that have entered the confinement area of a farmed cervidae facility must be destroyed by the owner, employee or an agent of the owner; be reported to the MNDNR within 24 hours of being destroyed; and the animal must be disposed of as prescribed by the MNDNR;
- 3) Cervidae may not be imported into the state from a herd that is infected or exposed to CWD or from a known CWD endemic area, as determined by the Board. Further, the cervidae may be imported into the state only from a herd that is not in a known CWD endemic area, as determined by the board, and from a herd subject to a state or provincial-approved CWD monitoring program for *at least 3 years*. Violation of this rule may result in the seizure and destroying of those cervidae by the MNDNR.
- 4) Fifty cents from each deer license is appropriated for emergency deer feeding and management of CWD, and this money is available until expended.
- 5) The MNDNR, BAH, and other interested parties shall study in concert and make recommendations on management actions designed to protect captive and free-ranging cervidae from CWD, specifically addressing cervidae fencing requirements, disease infection prevention, criteria for quarantining or depopulating infected herds, methods of harvest, identification of cervidae, and other issues.

## **APPENDIX A. CHRONIC WASTING DISEASE: STATUS OF OUR KNOWLEDGE**

### **Occurrence and Distribution**

Chronic wasting disease is a transmissible spongiform encephalopathy (TSE), which is a disease that alters the structure of the brain, particularly the gray matter, in a way that resembles a sponge-like appearance and texture. Much about CWD is still unknown, including its origin, exact mode of transmission, and the causative agent, although concerning the latter, current evidence strongly indicates that a proteinase-resistant prion (pronounced pree-on) protein (PrP<sup>res</sup>) is the causative agent. The source of CWD may be related in some way to scrapie in domestic sheep, or a more plausible theory may be that CWD is caused by a point mutation of a

normal membrane-bound prion protein in the brain (medulla oblongata), tonsils (in deer only), or lymphoid tissue.

The only known long-term distribution of CWD in free-ranging cervids includes 2 contiguous local areas in northeastern Colorado and southeastern Wyoming, which has expanded recently to include northwestern Nebraska. Up to 16%, and a less than 1% CWD prevalence were reported for local populations of deer (mule and white-tailed deer) and elk, respectively, in certain management units. Further, recently in Colorado, cases of CWD have been detected in free-ranging mule deer and elk on the west side of the Continental Divide, and in mule deer in suburbs close to Denver. Infections in captive elk have been documented in Colorado, Wyoming, Nebraska, Oklahoma, Kansas, Montana, South Dakota, Minnesota, Saskatchewan, and Alberta; in captive mule deer and white-tailed deer at wildlife research facilities in Colorado and Wyoming; and most recently in captive white-tailed deer at a shooting preserve and at a game farm in Wisconsin. In 2002, CWD was detected in free-ranging white-tailed deer in South Dakota (1 deer), Wisconsin (40 deer), and Illinois (1 deer) and in a free-ranging mule deer near White Sands, New Mexico. Cases of CWD have been documented in free-ranging mule deer (4 deer) in Saskatchewan as well.

### **Incubation, Transmission, and Clinical Course of CWD**

Incubation time, time from infection to appearance of clinical signs, typically is less than 2 years (12-24 months). However, incubation time has ranged up to 34 months. Maximum course of the disease (i.e., infection to death) can exceed 25 months in deer and 34 months in elk. The exact mode of transmission of CWD is unknown; however, circumstantial and experimental data indicate *horizontal* (or lateral) transmission in captive cervids (similar for scrapie in domestic sheep), either by direct animal-to-animal contact or by environmental contamination. For cervids, the routes of transmission are *presumed* to be by exposure to saliva, urine, feces, or placental tissue, with infection occurring through the alimentary canal (mouth/nose→ esophagus→ stomach→ intestines). If this transmission mode is confirmed for free-ranging cervids, then it follows that practices such as artificial feeding that unnaturally concentrate free-ranging deer or elk could potentially exacerbate the risk of infection. In contrast to outbreaks of mad cow disease, where exposure to animal protein-contaminated feed was documented, this has not been the case for captive or wild cervids infected with CWD. Presently, feed contamination is not considered a likely underlying transmission mechanism. Whereas, the importance of maternal transmission (mother to fetus or nursing young) as a mode of scrapie transmission in domestic sheep has at least been debated, its importance relative to CWD persistence in captive and wild cervid herds has been contraindicated thus far by current reports. Although the route of agent-shedding from infected individuals is presently unknown, it is believed that the rate of agent-shedding may very well increase as the disease progresses. Thus far, evidence also indicates that there is no difference between males and females or across age classes in

susceptibility to CWD.

Importantly, *natural* transmission of TSEs (i.e., BSE, CWD) between domesticated bovids (i.e., cattle, bison), sheep and cervids has not been documented. Evidence indicates that domestic livestock (e.g., cattle, sheep, and goats) are not naturally susceptible to CWD. “Studies of cattle intensely exposed to CWD-infected deer and elk via oral inoculation or confinement with infected mule deer and elk have remained healthy for over 5 years” (Williams et al. 2002, *Journal of Wildlife Management* 66:555). A number of species are “experimentally susceptible” to CWD. That is, if CWD prions or prions of other TSEs are injected directly into the brain (intracerebral inoculation), they may develop the respective TSE disease. Research has shown that the experimental route of transmission of CWD was inefficient in goats, cattle, and mice when compared to the same experimental transmission route used for BSE (“mad cow disease”) or scrapie. When healthy deer have been inoculated with brain tissue from scrapie-infected sheep, the deer developed CWD; however, when healthy sheep were intracerebrally inoculated with CWD-infected tissue, they did not develop scrapie or CWD.

The clinical course of CWD can vary from days to a year. That is, once clinical signs are apparent, cervids rarely survive more than 12 months. Chronic wasting disease is a progressive, fatal disease, with no vaccine to prevent the disease or treatment for reversing its course (recovery), and there is no evidence of immunity (e.g., antibodies). There has been no effective, practical antemortem (live-animal) test for diagnosis until recently; a live-test for deer (not elk) involving tonsil biopsy and immunohistochemical analysis for PrP<sup>res</sup> accumulation has demonstrated promise, and may be more sensitive than the post-mortem analysis of the obex of the medulla oblongata in the brain. The practicality of this test remains to be decided; it may be more applicable to screening captive deer.

## **Clinical Signs of CWD**

All signs or symptoms of CWD do not occur in all cases, and many of these signs are symptoms of other diseases and conditions as well. Further, the occurrence and severity of symptoms will depend in part on the stage (*early* versus *advanced*) of the disease. Below is a comprehensive list of the clinical signs of CWD: (1) loss of fear of humans; (2) nervousness or hyperexcitability; (3) teeth-grinding; (4) ataxia or loss of coordination; (5) notable weakness; (6) intractability; (7) inability to stand; (8) rough dull haircoat; (9) excessive salivation; (10) flaccid, hypotonia of the facial muscles; (11) drooping of the head and ears; (12) excessive thirst (polydipsia); (13) excessive urination (polyuria); (14) esophageal hypotonia and dilation, difficulty swallowing, and regurgitating ruminal fluid and ingesta; (15) severe emaciation and dehydration, and (16) death.

It is important to note that while some primary symptoms may be directly related to CWD, others may be secondary, more of a consequence of the deteriorating body condition

(emaciation), related physiology, and compromised immunity (e.g., pneumonia, abscesses, enteritis, or internal parasitism) that often accompany emaciation.

## **Pathological Signs of CWD**

Pathological signs of the disease include: (1) emaciation associated with absence or serous atrophy of subcutaneous and visceral adipose tissue or fat, and yellow gelatinous bone marrow; (2) subacute to chronic bronchopneumonia; (3) digestive tract (abomasal or omasal) ulcers; (4) enlarged adrenal glands; (5) watery or frothy rumen contents; and (6) histological lesions. These lesions have primarily and most consistently been observed in the brain and spinal cord. (7) Immunohistochemistry (IHC) is very sensitive and specific to CWD and is typically used to confirm diagnoses by measuring accumulations of PrP<sup>res</sup> in brain tissues (specifically in the obex of the medulla oblongata) of infected deer and elk. This abnormal prion protein is antigenically indistinguishable from the scrapie-associated prion protein (PrP<sup>Sc</sup>) found in brain tissues of domestic sheep infected with scrapie, but other differences have been noted. PrP<sup>res</sup> has *not* been detected in uninfected cervids. This test can detect CWD infection before lesions are observable; however, IHC(+) results are not detected until at least 3 months after infection. Lesions do not always accompany PrP<sup>res</sup> accumulation and IHC(+) results. (8) Scrapie associated fibrils (SAFs) have been observed by electron microscopy in the brain tissue of infected cervids, but not in uninfected cervids. (10) Generally, blood (whole blood and serum) and urine profiles have remained within the normal range, with the exception that certain characteristics have reflected the emaciated condition of the infected animals. Low specific gravity of the urine, is the one urine characteristic that may be directly related to CWD, specifically to degenerative encephalopathic changes in the hypothalamus. The hypothalamus is important in regulating antidiuretic hormone, which influences concentrations of urinary electrolytes (e.g., Na) and osmolality.

## **Chronic Wasting Disease and Human Health**

According to health officials of the World Health Organization, U. S. Food and Drug Administration, and the Center for Disease Control, there is no evidence indicating a link between CWD and neurological diseases that affect humans. Further, the infective prions of CWD have *never* been found in the muscle tissue or meat of CWD-infected deer or elk. However, as always, health officials advise hunters *not* to consume meat of animals that are infected with CWD or appear sick in any way. Further, they recommend that hunters follow simple precautions when field dressing their deer or elk. Recommendations include the following:

- 1) Do not shoot, handle, or consume any deer or elk that appears sick, and report the animal to the local MNDNR conservation officer or area wildlife manager;
- 3) Wear rubber gloves when field dressing carcasses;

- 3) Minimize handling of the brain and spinal tissues;
- 4) Wash hands and instruments thoroughly after field-dressing is completed;
- 5) Avoid consuming the brain, spinal cord, eyes, spleen, tonsils, and lymph nodes. (Normal field dressing, including boning out the carcass will remove most, if not all, of these body parts. Trimming away all fatty tissue will remove any remaining lymph nodes); and
- 6) Request that your animal is processed individually, without meat from other animals being added to meat from your animal.

## **APPENDIX B. STATUS OF CAPTIVE ELK AND DEER OPERATIONS, REGULATORY AUTHORITY, INFECTIONS, AND MANAGEMENT IN OTHER SELECT STATES**

### **Colorado**

There are 121 elk ranches in Colorado, accounting for 12,000 elk (9,000 adults, 3,000 in the 2002 calf crop), most of which are registered with the Department of Agriculture. No captive

deer are registered with the Department of Agriculture. Only a few elk operations, and 6-7 captive deer operations in the entire state, comprised of about 200 deer, are registered with the Division of Wildlife. The Division has minimal management responsibility of most captive operations, except involving site and report reviews.

The earliest detection of CWD in captive deer occurred in a wildlife research facility in Fort Collins in 1967. Since then, additional infections have been identified in deer and elk in that research facility, as well as in another in southeastern Wyoming. Thus far, positive cases of CWD have been identified in at least 9 licensed (i.e., commercial) captive operations. This includes elk that had been traced out to 38 other operations from the operations within the endemic area where the original infections were detected. Elk from the herds originally infected also have been traced to commercial herds in North Dakota, South Dakota, New Mexico, Utah, Minnesota, Wisconsin, Texas, Oklahoma, Idaho, Indiana, Illinois, Kansas, Missouri, Nebraska, and Pennsylvania. All exposed elk in each state have been identified and CWD-tested, or are at least under quarantine.

Management responses of the Department of Agriculture have ranged from quarantine to complete depopulation of exposed herds. CWD-infected, trace, and exposed elk herds that have been depopulated involved more than 3,000 elk. The captive facilities of greatest concern were 2 operations located outside of the CWD endemic area. The Division of Wildlife's concern for protecting free-ranging cervids in the vicinity surrounding 2 CWD-positive facilities prompted them to pay \$330,000 for double-fence construction around the facilities.

### *Chronic Wasting Disease in Free-Ranging Elk and Deer*

Chronic wasting disease was first diagnosed in free-ranging cervids in a contiguous area of northeastern Colorado and southeastern Wyoming in 1981. In northeastern Colorado, CWD has been diagnosed in 18 game management units, which cover about 10,000 square miles (about 10% of Colorado's land mass). Chronic wasting disease has infected up to 13% of free-ranging deer and 1% of elk in certain local management units within this endemic area. Overall within the endemic area (15,000 mi<sup>2</sup> or 5,790 km<sup>2</sup>), CWD prevalence has been estimated at 4.9% for mule deer, 2.1% for white-tailed deer, and 0.5% for elk. During the past year, CWD has been diagnosed in free-ranging mule deer and/or elk outside of the endemic area (northeastern Colorado), both in the suburbs of Denver, as well as in 5 Game Management Units (2 elk, 12 mule deer) on the west slope of the Rocky Mountains. Additional CWD(+) deer and elk have been detected in deer and elk in northwestern Colorado and in the endemic area of northeastern Colorado as the state's hunting seasons continue. As of 12 November, tests of more than 6,500 brain stems have been completed of more than 8,000 submitted, and 50 were CWD(+), including 16 outside the endemic area.

### *Chronic Wasting Disease Surveillance Programs*

In May 1998, Colorado was one of the first states to adopt a CWD Surveillance Program. The surveillance and importation components of their program are mandatory for all elk operators registered with the Department of Agriculture. That is, all alternative livestock mortalities, 15 months and older, regardless of cause, must be reported and a brain stem submitted for IHC-testing for CWD. The importation component also applies to *all* cervids, and requires that animals may only be imported from herds that have been under surveillance for CWD for at least 60 months. The “status” component of the CWD Surveillance Program is voluntary, but it is important to each operation’s ability to export elk, because many other state CWD Surveillance Programs will restrict importing to elk from herds that have attained specific CWD Surveillance Program status or certification. This part of the program requires annual inventories and inspections of the elk operations. The Department of Agriculture is also working to change the rule addressing fencing of captive operations to ensure that the fencing is “effective.” Currently, fencing efficacy is being addressed through a double-barrier rule (i.e., double-fencing, electric fencing). The Department believes that strict individual animal identification regulations, annual inventories, and inspections of operations and records will provide the most effective animal movement control and the mechanism for reconciling deaths and CWD specimen submission. Importantly, the Department of Agriculture recently purchased an “air-curtain incinerator” (\$46,000) to provide for thorough disposal of CWD-infected carcasses. This incinerator burns at 1,700-2,800° F; at least 1,500° F is required to adequately destroy the PrP<sup>res</sup> accumulations in CWD-infected cervids.

For captive cervid operations licensed with the Division of Wildlife, a CWD Surveillance Program has been in place since 1998. Further, the Colorado Division of Wildlife and Colorado Wildlife Commission have adopted a long range comprehensive CWD policy. The policy addresses numerous critical issues, including: (1) disease management (i.e., minimize the potential for the CWD to spread beyond the endemic area and reduce the current prevalence of CWD in the endemic area), (2) development of Data Analysis Unit (DAU) plans for the endemic area, (3) research, (4) the role of hunting in the endemic area, (5) hunter information (e.g., human health), (6) use of Division staff to remove animals from the endemic area for management and/or research, (7) testing of animals killed in the endemic area, (8) the role of the Department of Agriculture in CWD management, (9) movement of live animals (under Division of Wildlife jurisdiction), (10) removal and disposal of carcasses from the endemic area, and (11) communication.

A critical part of the Colorado Division of Wildlife’s management policy for CWD has been aggressive targeted surveillance and culling of deer and elk exhibiting clinical signs consistent with CWD, followed by IHC-testing of brain stem samples and tonsils (useful in deer only) for CWD. Geographically-focused random surveys, involving more than 5,500 sampled deer and elk have also been conducted within and outside the endemic area to determine prevalence and spatial distribution of affected animals. Presently, submission and testing of brain stems for CWD is

mandatory and free for deer and elk harvested within the endemic area of northeastern Colorado; testing is voluntary and is being offered at a low rate (about \$17.00) for animals harvested outside the endemic area. During 2002 hunting seasons, the Division expects that 20,000-50,000 brain stems will be tested statewide.

The Division disposes of carcasses in 2 ways. Most go to a landfill (in the endemic area) after being double-bagged. Other carcasses go to the laboratories at Colorado State University and the University of Wyoming for incineration according to recommended standards. Additionally, Colorado has implemented new regulations that restrict the transport of certain carcass parts of wild or domestic cervids out of its endemic area or into Colorado from CWD-infected areas of other states or countries. Carcass parts that may be transported include: meat that is cut and wrapped, quarters or other portions of meat with no part of the spinal column or head attached, boned-out meat, hides with no heads, upper canine teeth of elk, and finished taxidermied heads. If hunters wish to take antlers with the skull plate from the endemic area, the skull plate must be sufficiently cleaned (i.e., no meat or tissue attached).

## **Nebraska**

There are 91 captive elk/deer operations in Nebraska that include approximately 4,000 elk. White-tailed deer and mule deer are not permitted in captivity in Nebraska; exotic cervids are allowed. There are 1-2 small captive white-tailed deer and 5-6 mule deer operations that were grandfathered in. These deer operations can not import deer, but they can export their deer. In 1997, the Nebraska Department of Agriculture received all management responsibility, including enforcement (e.g., monitoring, inspections), for all captive cervids.

Chronic wasting disease infection has been detected in 4 commercial elk operations in northwest Nebraska, not far from the endemic area of northeast Colorado-southeast Wyoming. The earliest was a facility with very good records, and the infection was detected before CWD was receiving much attention. One elk exhibiting clinical signs of CWD was put down and tested positive. The total herd included about 130 elk. Eighty to 100 elk were shot, and because they all tested negative, and because the records were very thorough, the only other action was a 3-year quarantine. The second CWD infection was identified in a small herd of 15 elk, and the entire herd was depopulated. In the third operation (Edwards' elk facility) tested, 8 of 80 elk and 11 of 21 white-tailed deer were CWD(+), initially. There was strong circumstantial evidence that the infected deer were free-ranging animals that were attracted and corralled into one of the adjacent fenced pastures by the operator before the first infections in elk were diagnosed; subsequently the deer had contact with the infected elk. This facility was depopulated during the summer of 2002. In an attempt to determine the source and spatial limit of CWD in free-ranging deer in and around the Edwards' operation, the Commission of Game and Parks conducted additional deer drives (with culling) during the week of 9 January 2002, collecting an additional 79 brain stems for CWD-testing. One hundred and seventy-one and 138 samples were collected

from deer inside and outside the Edwards' fenced pasture, respectively. As of 1 October 2002, test results showed 10 of the 138 brain samples from free-ranging animals tested IHC(+) for CWD and 89 of 171 from inside the pen were positive. During early March 2002, a cooperative culling and CWD-testing effort with South Dakota resulted in all CWD (-) results for 103 deer collected on the Nebraska side of their mutual border. According to Nebraska officials, this is narrowing the focus of CWD in northern Sioux County, Nebraska, to an area within 10 miles of the Edwards' captive operation.

Between 1997 and 1999, the Game and Parks Commission conducted a modest survey of free-ranging deer by collecting 80 brain stems from hunter-harvested animals in southwest Nebraska. All tested negative for CWD. In 2000, 750 additional heads collected by hunter-harvest and tested, yielded 1 mule deer positive for CWD. A second IHC(+) mule deer was identified when the Commission culled another 150 deer in the southern panhandle. Of 804 samples collected from free-ranging deer during 2001, 802 were IHC(-), but 1 IHC(-) for the brain sample was IHC(+) for the tonsils, and 1 deer was IHC(+) for the brain stem. (In deer, the PrP<sup>res</sup> accumulates in the tonsils earlier than in the brain.) The tonsil-positive deer was shot within 7 miles of the 2 IHC(+) free-ranging mule deer tested in 2000, while the other positive deer was in a new location approximately 50 miles from the others. To date, the Nebraska Game and Parks Commission has culled (not including brain stems from hunter-harvested deer) and tested (or in the process) 426 deer for CWD.

In an effort to remove as many captive cervid operations from the Nebraska endemic area as possible, the Nebraska Department of Agriculture and USDA-APHIS recently completed the depopulation of 15 captive cervid operations in the Nebraska Panhandle. About 1,000 elk were included in the depopulation effort, and are currently being tested for CWD. As a result of this effort, so far, 1 additional elk facility (in Sioux County) has had an elk test positive for CWD, bringing the total number of CWD(+) captive operations in Nebraska to 4. Three of the 4 have been depopulated, the remaining operation was quarantined for 3 years with no additional positives, and the quarantine was lifted in the spring of 2001. Seven facilities chose not to participate in this effort.

Currently, carcass disposal is accomplished by depositing them in approved dead animal pits at licensed landfills. The Commission is still attempting to obtain an air-curtain incinerator for future carcass disposal. The use of bait for hunting deer, elk, mountain sheep and pronghorn antelope in Nebraska is now illegal based on recent changes in state regulations.

### *Chronic Wasting Disease Surveillance Program and Importation*

The Department of Agriculture has a CWD Surveillance Program, which applies to *all* cervids. Major components of their program include: (1) definitions of commonly used terms

(e.g., affected herd, trace-back herd, trace-forward herd, etc...) that conform with the National CWD Surveillance Program (to be implemented soon), (2) requirements for entry into the program, (3) program protocol (General Provisions, Inspections, Program Status, Management of CWD Affected or Exposed Herds, Acquisitions and Commingling, Use of Semen and Embryos, Animals Imported from Foreign Countries), (4) herd information, and (5) laboratory submission of samples. This latter part requires that all deaths of captive cervids at least 16 months of age must be reported and brain stems IHC-tested for CWD.

Currently there is a broad ban on most cervid importation. Importation is prohibited for *any cervids* from Colorado and Saskatchewan, and from any herd that has received animals from these states within the past 5 years. Importation is also banned for any cervids from any facility that has had a CWD-positive or exposed animal during the past 5 years. Furthermore, cervids imported into Nebraska must have been enrolled in a CWD Surveillance Program for at least 36 months, and an imported animal must be accompanied by documentation of its complete history to its birth herd. Imported cervids are isolated until a state veterinary representative confirms that the identification numbers agree.

The Game and Parks Commission formulated a CWD Management Plan which includes 4 broad areas of action to address critical issues related to CWD in free-ranging deer and elk. The areas of action are: (1) informing and educating the public (including hunters), constituents (e.g., wildlife producers, meat processors, taxidermists), NGPC and other agency personnel (e.g., local, federal) concerning CWD; (2) limiting distribution of CWD in deer and elk (e.g., (a) preventing inadvertent movement of CWD-infected wild deer and elk and inadvertent introduction of CWD into captive cervid operations, (b) continue field investigations and surveillance to monitor changes in prevalence and distribution of CWD cases); (3) reducing prevalence of CWD in local free-ranging deer and elk populations (e.g., reduce the potential for CWD transmission; and (4) conduct and support research on epizootiology and management of CWD (e.g., transmission routes, live-test for CWD, treatment, modeling to examine effects of CWD on affected populations, and effectiveness of management responses).

## **South Dakota**

South Dakota has 50-60 herds of about 1,500 captive elk and 100-300 captive deer. Until 1993, no state department had actual jurisdiction over the captive cervid operations, and the existing laws were vague. In 1993, the Animal Industry Board (AIB) of the Department of Agriculture gained responsibility for *all* captive cervid operations. In December 1997, 2 captive elk herds were discovered to have CWD. In 1998, 8 additional captive elk herds were diagnosed with CWD or to have been exposed to CWD. All 10 herds were immediately quarantined. Through a law passed in 1998, AIB initiated a CWD Surveillance Identification Program for captive cervid operations statewide. The quarantine means that no elk movement is permitted into or out of the facilities for at least 5 years. Bear Country, in Rapid City, was one of 3

operations owned by the Casey family in South Dakota that had CWD-infected elk, and therefore was under quarantine. The Bear Country site was permitted to re-open to the public while under quarantine, but only after double-fencing was constructed. The last of 7 private herds that were eventually confirmed to have CWD was depopulated early in 2001. This was a herd sold to the North American Elk Breeder's Association for research. The State Veterinarian then declared all captive cervids in South Dakota free of CWD in March 2001. In August 2002, a captive elk herd (147 animals) in the Black Hills was found to be CWD-positive. This herd is adjacent to a site of 1 of the original CWD quarantined and depopulated captive elk herds. This new CWD herd was depopulated in September 2002.

### *Chronic Wasting Disease in Free-Ranging Elk and Deer*

Only 1 white-tailed deer in captivity has tested IHC(+) in South Dakota; it was among some wild deer fenced into a "buffer pasture" adjacent to a pasture with a CWD-infected elk herd. In a collaborative (1997-1999) effort to determine the risk of CWD infection in free-ranging cervids, the South Dakota Department of Game, Fish, and Parks (DGF&P) and South Dakota State University collected heads from a total of 128, 519, and 368 hunter-harvested mule deer, white-tailed deer, and elk, respectively, in geographically-focused surveillance areas throughout the state. All brain stem samples tested negative for CWD. No collection or testing of heads from free-ranging cervids was conducted during 2000; however, the survey was resumed in fall 2001 when 500 additional elk and deer heads were collected. About 400 of these brain stems were collected in southwestern South Dakota. In early February 2002, 1 of these was reported to be CWD(+). This CWD(+) was from a white-tailed deer shot in the northeastern part of Fall River County, about 10 miles east-southeast of Hot Springs, which is about 26 miles north of the Nebraska border. However, it is about 50 miles northeast of the CWD-infected (elk and deer) Edward's Ranch (in Nebraska). During late February, South Dakota began its first culling and testing operations. Ninety deer were collected in southwestern South Dakota, not far from where CWD(+) deer were detected in Nebraska; all tested CWD (-). Additional culling and testing within 5 miles around where the South Dakota CWD-infected white-tailed deer was shot, resulted in a sample of 52 deer, of which none tested positive. Since 1997, 1,693 deer and elk have been tested for CWD. During fall 2002, a 5-year old free-ranging bull elk in Wind Cave National Park, exhibiting clinical signs consistent with CWD, was shot and tested positive. Alternative management actions in this case are being considered. Additionally, a 2.5 year-old white-tailed deer buck killed in a vehicular collision within the city limits of Rapid City tested positive for CWD. This fall, South Dakota DGF&P has submitted a total of 1,600 brain stems from elk (472), white-tailed deer (657), and mule deer (471), most of which have been collected from hunter-harvested animals. Presently, South Dakota is disposing of carcasses and heads in the Rapid City landfill, as per the advice of their State veterinarian.

### *Chronic Wasting Disease Surveillance Program and Management Policy*

South Dakota AIB's CWD Surveillance Identification Program is similar to Minnesota's program in that it basically (1) requires annual herd inventories; (2) requires surveillance and CWD-testing of animals that have died, are slaughtered, or are destroyed after exhibiting symptoms consistent with CWD; (3) designates herd status based on years of monitoring in the program; and (4) imposes rules for importing and adding cervids to a captive herd. Importation of cervids into South Dakota requires specific written certifications addressing each animal's herd and movement history, and documentation of herd monitoring demonstrating that the animal has not been exposed to CWD in any herd (i.e., trace-back or trace-forward within the past 5 years).

According to this program and supportive statutes/rules, cervids that have escaped from a captive operation must be reported immediately and become the property of AIB. The AIB determines whether the animal, if captured, is returned to the permittee or transferred to the DGF&P. Typically, if an animal escapes, the owner has 2-3 days to capture it before the DGF&P can take action. However, if an elk or deer escapes from a CWD-infected or exposed herd, then the DGF&P can destroy the animal immediately.

Before issuance of a permit to operate a captive cervid facility, the AIB and DGF&P may inspect the facility and must be satisfied that it does not include any free-ranging cervids. If free-ranging cervids have been fenced in, they must be removed at the owner's expense before a permit is issued. Disposal of the animals is decided by AIB and DGF&P.

South Dakota's DGF&P has not yet adopted a formal CWD management policy, but rather, has thus far taken an "*operational approach*." At this point, according to Ron Fowler (Wildlife Program Administrator), "whatever is needed, including funds, travel to meetings for information-gathering, cervid brain stem collections and CWD-testing, etc..., the agency will support in attempts to manage CWD." A CWD Management Plan is in the final stages of being approved.

## **Wisconsin**

In Wisconsin there are about 272 captive elk operations (total of 10,815 elk), 100 exotic and other deer operators, and 575 white-tailed deer farms (total of 22,500 deer). During the mid-1990s, registration and management responsibilities for captive elk, red deer, and all other exotic cervids were transferred from the Wisconsin Department of Natural Resources (DNR) to the Department of Agriculture, Trade and Consumer Protection (DATCP). The DNR retains management responsibility for the white-tailed deer farms, but this responsibility will be transferred to DATCP as of 1 January 2003. Currently, if an operation has white-tailed deer and elk (or other exotic cervids), then it must register with the DNR and the DATCP.

### *CWD Surveillance Program and Management Policy*

The Department of Agriculture has helped captive cervid producers with CWD surveillance since 1998, but created a mandated state CWD Monitoring Program under emergency rule this spring after discovery of CWD in Wisconsin's wild deer. The CWD Monitoring Program applies to *all* species of cervids, and (1) limits inter-state imports to farms/operations of origin that are participating in CWD monitoring or have a 5-year history of being a closed herd with no clinical evidence of CWD, (2) requires farms that ship live deer/elk to conduct CWD-testing on all animals at least 16 months of age that die, and (3) requires farms that send deer/elk to slaughter or allow hunter-harvesting (and removal of any parts) to have each of those animals (at least 16 months of age) CWD-tested. "Hobby" farms that do not ship live animals, send animals to slaughter, or have hunters harvest animals and remove parts from the farm are not required to participate in the CWD Monitoring Program. The CWD Monitoring Program requires farms that ship live animals to do individual animal identification, annual herd censuses, death and transaction reporting, and provide an annual veterinary herd health letter.

To date approximately 130 Wisconsin cervid farms have had at least 1 animal tested for CWD. Since 1998, over 600 deer/elk have been tested. All have been negative, until September 2002, when 1 hunter-harvested white-tailed deer tested positive from a breeding farm/hunting preserve in Portage County. As of 1 October 2002, this farm and 5 additional trace-back cervid farms (Marathon, Walworth, Portage, Dane counties) have been quarantined, and subsequently, an additional CWD(+) deer was diagnosed in at least 1 of the Walworth County farms. State officials have reported (24 October update) that several deer had escaped from this farm in March 2002. The investigation is ongoing.

Until recently, there have been no bans or extraordinary restrictions on importation of deer, elk, or exotic cervids into Wisconsin. All 20 elk imported into Wisconsin from infected herds in Colorado have been traced, and all but 2 have tested negative for CWD or have survived for 5 years without clinical signs of CWD. The 2 elk that weren't tested died before the trace-outs were done.

The Wisconsin DNR has produced a draft CWD Management Plan for free-ranging deer and elk, which will be finalized soon. The DNR has been conducting targeted surveillance and geographically-focused random surveys to determine if CWD is present in free-ranging deer. During 1999-2000, approximately 600 brainstem samples were collected from hunter-harvested deer, "suspect" deer, and some urban deer taken by sharp-shooters during winter. Some of the sample collection was focused around elk ranches known to have received animals from CWD(+) Colorado ranches. All of these were IHC(-) for CWD. During fall 2001, the DNR collected about 550 brain samples from hunter-harvested deer brought to check stations in areas known to have high numbers of deer taken and where there has been no sampling effort

previously. All analyses were conducted at the National Veterinary Services Laboratory in Ames, Iowa, and on 28 February 2002, the DNR reported CWD infection (positive tests) for 3 male white-tailed deer that had been shot within 3 miles of one another, Deer Management Unit 70A, in Dane County. These bucks were 2.5-3.0 years old, and one was reported to be in poor condition. In response, the Wisconsin DNR established a surveillance area of 415 square miles surrounding the area of initial CWD discovery, and set a sampling goal of 500 deer to be culled and tested in the surveillance area. About 516 deer were harvested and brain stem-sampled over the next month, and 15 deer tested CWD(+).

On May 1, an approximate 400-square mile "Eradication Zone" was established that included all the locations where CWD(+) deer had been detected and a 4.5-mile buffer zone around all of these locations. The ultimate goal for this affected area is to cull and test as many of the deer as possible, as quickly as possible, in an attempt to eradicate the disease. To achieve this goal, landowners in the Zone have been permitted to harvest deer or invite government sharpshooters to harvest deer during week-long monthly hunts during summer 2002. Approximately 1,500 deer have been harvested and sampled; 13 additional CWD(+) cases have been identified from the 601 results reported. As of 1 October 2002, 31 CWD(+) deer had been identified from 1,200 deer tested in this affected area of south-central Wisconsin,, which translated into a prevalence rate of approximately 2.5%. By 24 October, the number of CWD(+) deer in the Zone had risen to 40.

Eradication efforts and sampling/testing of deer from the CWD affected area will continue through extended fall 2002 hunting seasons in the Eradication Zone. A 40-mile radius buffer zone (the "CWD Management Zone") has been identified around the Eradication Zone; the goal for this zone is to significantly reduce deer densities (to 10 deer/square mile) to help with disease control. Extended fall hunting seasons and liberal licenses will be used. Additionally, Wisconsin plans to sample and test at least 500 deer from every county (or county cluster where deer densities are lower) during fall 2002, a total of 40,000-50,000 deer.

## **Michigan**

In Michigan, *captive* cervids (deer and elk) are considered livestock, and consequently, fall under the regulatory jurisdiction of the Michigan Department of Agriculture(MDA). This agency is responsible for licensing, registration, and inspection of the state's 900-1,000 captive cervid facilities, which includes approximately 25,000 deer and elk. The shifting of complete regulatory authority for all captive cervid facilities to the MDA occurred relatively recently (June 2000). Michigan's estimated 1.8 million *free-ranging* white-tailed deer and elk are the management responsibility of the Michigan Department of Natural Resources (MDNR). The MDNR and the Department of Environmental Quality are still responsible for assessing the impact of new facilities on free-ranging wildlife and their habitat and for assuring that no free-ranging animals are enclosed within the fenced pastures of new operations. If a captive cervid

escapes, the official response may involve a joint effort of the MDA and the MDNR to capture the animal. If free-ranging animals are directly involved, then the MDNR assumes primary enforcement responsibility.

### *CWD Surveillance Program and Management Policy*

To date, all tests for CWD in captive cervids have been negative. Similarly, the MDNR has been conducting targeted surveillance for “suspect” free-ranging deer and elk for several years, and all have tested negative for CWD. Additionally, the MDNR has collected about 450 brain stems from hunter-harvested deer during 1998-1999; again, all were CWD(-). While the MDNR continued targeted surveillance, it did not continue random surveys (i.e., brain stem samples from hunter-harvested deer) during 2000 or 2001.

Collectively, the MDNR, MDA, and the Michigan Natural Resources Commission (policy-making body) have taken the following steps to attempt to prevent CWD introduction into free-ranging and captive cervids in their state:

- 1) Prohibited supplemental deer feeding in the Upper Peninsula (UP), beginning with the 4 UP counties bordering Wisconsin and including the remaining 11 counties by May 2003. Supplemental feeding is already banned in the Lower Peninsula. The objective of these bans is to discourage high deer densities that are artificially supported by feeding and to reduce nose-to-nose contact and the risk of disease transmission.
- 2) Established a 50-mile buffer zone around Michigan’s borders. If a CWD(+) deer or elk is detected within this buffer, all baiting and feeding activities in the adjacent peninsula will be banned immediately.
- 3) After detection of CWD in Wisconsin, a ban on all cervid imports from Wisconsin was implemented (as of 6 March 2002). Subsequently, a 1-year ban was enacted, effective 26 April 2002, on *all* imports of deer and elk to privately-owned cervid operations.
- 4) Further, for captive cervid operations, the state requires mandatory herd inventory reporting, fence inspections, standards for fence construction, and record-keeping for all animal movements.

In August 2002, the MDNR and the MDA released Michigan’s Surveillance and Response Plan. Surveillance efforts will include ongoing “targeted” surveillance, as well as “active” surveillance ---- healthy appearing deer harvested by hunters. By these means, Michigan plans to test approximately 6,000 free-ranging deer and elk statewide during the next 3 years. Although Michigan plans to sample all of its 83 counties, priority will be assigned according to epidemiological factors: number of privately-owned cervid facilities, presence of cervid research facilities, and geographic location.

The MDA's Surveillance Plan includes targeting potential risk imports of the past: (1) Animals identified by the USDA as possibly CWD-exposed. These have all been traced and tested negative for CWD. (2) Wisconsin cervids imported over the past 3 years, before that state's discovery of CWD, have all been identified and located, and will be purchased and CWD-tested. (3) All deaths of captive cervids at least 16 months old will require CWD-testing in accordance with herd plans developed by MDA's State Veterinarian office. (4) CWD is a "reportable disease per the state's animal health laws;" consequently anyone *suspecting* CWD in an animal must report it to the MDA immediately.

The state's Response Plan to CWD should it be detected, will include a coordinated multi-agency (and institutional) effort to identify the spatial distribution of the disease, determine its prevalence, limit disease transmission, and eradicate it if possible, while keeping their public informed. Generally, depending on whether captive or free-ranging cervids are affected, actions may involve quarantines; depopulation or culling and CWD-testing; maintaining low densities of free-ranging cervids for prolonged periods of time in affected areas; increased surveillance and restrictions on movement of carcasses of free-ranging cervids; restrictions on baiting and feeding near affected areas; and banning of rehabilitation of cervids statewide.

## **Other States and Canadian Provinces**

A summary of CWD incidence in captive and free-ranging cervids, CWD surveillance programs, and CWD management policies was not included for all states or Canadian provinces. However, since 1989, CWD infection of captive elk also has been reported for Oklahoma, Montana, Kansas, Alberta, as well as in 39 herds in Saskatchewan. Evidence indicates that all of the positive captive elk in Saskatchewan were traced back to one Canadian herd that had imported CWD-infected elk before 1990 from a U. S. herd that was subsequently diagnosed with CWD. Additionally, CWD-infected *free-ranging* mule deer (a cluster of 3, and 2 recently detected 120 miles from that foci) in Saskatchewan have also been reported, as has a CWD(+) mule deer in New Mexico and a white-tailed deer in Illinois. Wyoming has confirmed its first cases of CWD in free-ranging mule deer west of the Continental Divide and will continue testing brain stems from hunters in the affected areas.

## **Sources of Information**

The basis for this document is information derived from interviews with and documents from the following: Russ Bay (DVM, Veterinary Diagnostic Laboratory, University of Minnesota), Kimberly Blackford (Minnesota Board of Animal Health), Scott Bradley (Conservation Officer, Minnesota Department of Natural Resources), Jim Collins (DVM, Veterinary Diagnostic Laboratory, University of Minnesota), Lynn Creekmore (DVM, USDA Veterinary Services), Wayne Cunningham (DVM, Colorado Department of Agriculture), Ron

Fowler (Wildlife Program Administrator, Division of Wildlife, South Dakota Department of Game, Fish, and Parks), Douglas Hoort (DVM, Michigan Department of Agriculture), Rick Kahn (Terrestrial Field Operations Manager, Colorado Division of Wildlife), Terry Kreeger (DVM, Wyoming Game and Fish Department), Julie Langenburg (DVM, Wisconsin Department of Natural Resources), Joseph Marcino (Fish and Wildlife Pathologist, Minnesota Department of Natural Resources), Michael Miller (DVM, Colorado Division of Wildlife), Bruce Morrison (Nebraska Game and Parks Commission), Kristina Petrini (DVM, Minnesota Board of Animal Health), Dan Obrien (DVM, Michigan Department of Natural Resources), D. O'Conner (DVM, Wisconsin Department of Agriculture), Steve Schmitt (DVM, Michigan Department of Natural Resources), Elizabeth Williams (DVM, Department of Veterinary Services, University of Wyoming), and a number of others.

## **APPENDIX C. MINNESOTA BOARD OF ANIMAL HEALTH'S CWD SURVEILLANCE PROGRAM FOR ELK**

The Minnesota Board of Animal Health's CWD Surveillance Program consists of 4 basic elements (copied from BAH 2001): herd inventory, surveillance, herd status levels, and herd additions.

**Herd inventory** requires that (1) the first inventory be completed prior to program entry, (2) annual inventories are conducted 9-15 months from the entry date, and (3) a veterinarian licensed and accredited in Minnesota must conduct all inventories.

**Surveillance** requires that (1) the brain of all cervids (elk, deer, etc...) at least 16 months of age that die or are slaughtered are to be submitted by a veterinarian to the University of Minnesota Veterinary Diagnostic Laboratory for CWD testing (appropriate samples will be forwarded to an accredited laboratory, e.g., as in Ames, Iowa), and (2) a copy of the laboratory report must be submitted with the annual herd inventory.

**Herd status levels** are: Level A, first year of participation; Level B, second and third years of participation; Level C, fourth and fifth years of participation; and Level D, at the end of the fifth year of participation.

**Herd additions** are allowed only from herds of equal or greater status. Addition of an elk from a herd of lower status, reduces the herd receiving that individual to that lower status.

All costs associated with herd inventory, surveillance, and laboratory analyses for CWD are at the owner's expense. Although the current CWD Surveillance Program was initially designed for elk only, the BAH does have captive deer and deer/elk operations enrolled and participating in the program. Further, captive deer or elk operations do not have to be registered with the BAH to voluntarily enroll in the program. If a BAH-registered captive cervid operation includes deer and is enrolled in the CWD program, then the brain of *any cervid* at least 16 months old that dies or is slaughtered must be submitted for CWD testing. Also, BAH requirements and jurisdiction apply regardless of where CWD infection is detected. The determining factor is not species, but rather whether the disease is considered a threat to livestock. Consequently, if an elk or deer on a game farm registered with the DNR is diagnosed with CWD, then the BAH has the responsibility and authority to act, ranging from quarantining the herd/facility of the infected animal to complete depopulation. Of course, a primary weakness in current management systems, particularly for the DNR-registered game farms, is whether deer exhibiting signs of CWD infection will be detected, reported, and tested.

Currently, the BAH does not strongly encourage enrollment into their CWD Surveillance Program by captive deer operations for the following reasons:

- 1) there have been no reported cases of CWD infection in captive deer; therefore the *perceived* threat of infection is less than for elk,
- 2) the deer farming industry is not showing support for a CWD monitoring program, and
- 3) funds and personnel are insufficient to implement and enforce an expanded CWD Surveillance Program that includes the captive white-tailed deer game farms of Minnesota.

## **APPENDIX D. NATIONAL CHRONIC WASTING DISEASE SURVEILLANCE PROGRAM**

In 1998 and 1999, the United States Animal Health Association (USAHA) passed resolutions to endorse development of a federal CWD monitoring/surveillance program. In late 1999, representatives from numerous agencies and interest groups, including Veterinary Services of the USDA's Animal and Plant Health Inspection Service (APHIS), state Departments of Agriculture, Departments of Wildlife, federal and state diagnostic laboratories, producer associations (e.g., North American Elk Breeders Association) and others met to formulate an initial draft of this program. In late 2000, USAHA endorsed continued development of the earlier draft and a final version has now been proposed for approval. The goal of the National CWD Program "... is to eradicate CWD from captive *elk* herds in the U. S." Most of the state CWD surveillance programs already in existence apply to all cervids, and even though aspects of many of these CWD programs were considered in formulating the national program, the latter applies only to captive elk and elk hybrids. Though states may apply the federal program's "... surveillance methods to all cervids, the monitoring, reporting, certification, and indemnification aspects of the national program apply only to captive elk." Standards of state programs must be at least as stringent as standards of the national program. USDA/APHIS will permit interstate movement of captive elk only from herds enrolled in a CWD certification program.

### **Generally, technical elements of herd certification in the National CWD Program include:**

- (1) fencing effective for reducing the risk of transmission between captive and free-ranging cervids;
- (2) approved or certified collectors of brain stem samples (i.e., obex of medulla oblongata) for testing;
- (3) annually verified herd inventories, separate registration and maintenance of herd subunits that are managed independently;
- (4) animal identification by 2 approved forms (one being an ear tattoo);
- (5) precise geographic identification of operation premises;
- (6) laboratories certified for CWD-testing by the National Veterinary Services Laboratory in Ames, Iowa; and
- (7) 60 months required as the quarantine period, as well as the time-frame for trace back/trace forward investigations.

Standardized herd designations, terminology, and definitions of the National CWD Program are important to assuring thorough and uniform understanding of the numerous requirements of the certification process, herd designation, herd investigations and herd plans, which are critical to minimizing the risk of CWD transmission with movement of captive animals between operations. A herd plan describes the necessary actions to be taken by a captive elk (cervid) operator in response to identification of a suspect, CWD positive, or exposed herd and is based on a comprehensive epidemiological investigation and risk assessment by state/federal officials. Elements of a herd plan may include whole herd depopulation, quarantine, reproductive control, selective culling and testing of animals, continued surveillance, fencing, and others. Standardized terminology and definitions are provided below (from USAHA document, 2001); detailed explanations of herd designations may be provided upon request.

<b>Term</b>	<b>Definition</b>
Animal	Domesticated or captive white-tailed deer, mule deer, elk, or exotic deer.
Animal, CWD exposed	An animal that is, or has been in the last 5 years, part of a CWD positive herd.
Animal, CWD positive	An animal that has been diagnosed with CWD by means of an official CWD test conducted by a laboratory certified by USDA/APHIS.
Animal, CWD negative	An animal that has tested negative for CWD by means of an official CWD test conducted by a laboratory certified by USDA/APHIS.
Animal, CWD suspect	An animal for which laboratory evidence or clinical signs suggest a diagnosis of CWD.
Captive	Animals that are privately or publicly maintained or held for economic or other purposes within a perimeter fence or confined space. Animals that are held for research purposes are not included.
Certification	A program of surveillance, monitoring and related actions designed to provide a status to captive deer and elk herds relative to chronic wasting disease.
Cervid	All members of the cervidae family and hybrids including deer, elk, moose, caribou, reindeer, and related species.

Chronic wasting disease	A transmissible spongiform encephalopathy (TSE) of cervids.
Commingling	Animals that have direct contact with each other, have less than thirty (30) feet of physical separation, or that share management equipment, pasture, or water sources/watershed. Animals are considered to have commingling if they have had such contact within the last 5 years.
Enrollment date	The day, month, and year in which an owner's herd is officially enrolled in the CWD certification program by an appropriate State official.
Herd	A group of animals that are (a) under common ownership or supervision and are grouped on one or more parts of any single premises (lot, farm, or ranch) or (b) all animals under common ownership or supervision on 2 or more premises which are geographically separated but on which animals have been interchanged or had direct or indirect contact with one another.
Herd inventory	An official list of all of the animals belonging to a herd including verification of the official or approved animal identifications.
Herd plan	A written herd management agreement developed by the herd owner, state and federal veterinarians, and others approved by the respective federal, state, and tribal officials. A herd plan sets out the steps to be taken to eradicate CWD from a CWD positive, exposed, or suspect herd.
Herd, CWD positive	A herd in which a CWD positive animal resided at the time it was diagnosed and which has not been released from quarantine.
Herd, suspect	A herd for which laboratory evidence or clinical signs suggest a diagnosis of CWD, but for which laboratory results have been inconclusive or not yet conducted.
Herd, exposed	A herd in which a CWD positive or exposed animal has resided 60 months prior to the diagnosis.
Herd, trace back	An exposed herd in which a CWD positive animal resided in any of the 60 months prior to the diagnosis.
Herd, trace forward	An exposed herd that has received exposed animals from a positive

	herd within 60 months of the diagnosis of CWD in the positive herd.
Hold order	A temporary order issued by a state or federal official prohibiting movement of animals from a premise.
ID, official	A form of identification approved by the USDA/APHIS administrator and the state chief animal health official.
Owner	An individual, partnership, company, corporation or other legal entity that has legal or rightful title to an animal or herd of animals.
Premises	The ground, area, buildings, water sources, and equipment commonly shared by a herd of animals.
Premises plan	The section of a herd plan which outlines actions to be taken with regard to possible environmental contamination due to a CWD positive or exposed herd.
Quarantine	An order issued by a state or federal official prohibiting movement of animals for a given period of time from a premises.
Status date	The day, month, and year on which the respective state official approves a change in the status of a herd in regard to CWD.
Test, official CWD	A CWD test approved by the USDA/APHIS administrator.

The following regulations of the National CWD Surveillance Program are more specifically addressed in other documentation (may be provided upon request):

- (1) herd certification standards as regards fencing, surveillance, biological sampling, annual verified herd inventories, mandatory reporting of death, sold animals, and interstate movements of captive elk, official and unique animal identifiers, premise locations, herd status, positive diagnosis of CWD, and development and implementation of a herd plan;
- (2) options for disposition of CWD positive, exposed, or suspect herds; and
- (3) minimum requirements for interstate movement of captive elk.

**APPENDIX E. DOCUMENTS ADDRESSING THE POSITION OF THE  
MINNESOTA POLLUTION CONTROL AGENCY ON DEER AND ELK  
CARCASS DISPOSAL RELATIVE TO CWD**

**November 4, 2002**

**TO: Minnesota's 30 Mixed Municipal Solid Waste Landfill Operators  
SKB Rosemount Industrial Landfill Operator  
Minnesota's 6 Waste Combustor Operators**

**RE: Disposal of Deer Carcasses**

I am writing to provide you with information from the Minnesota Pollution Control Agency (MPCA) about issues associated with disposal of deer carcasses. We hope that this information assists you in making decisions about whether to accept deer carcasses at your facility.

With the deer hunting firearms season fast approaching, you may receive inquiries about the disposal of wastes from deer processing. The Chronic Wasting Disease (CWD) issue has caused concern about how to properly handle and manage deer wastes so that human health, the wild deer herd, and the environment are protected.

The MPCA has been working with the Minnesota Department of Health (MDH), the Minnesota Department of Natural Resources (DNR), the Minnesota Board of Animal Health (BAH) and the Department of Agriculture (MDA) in planning for the potential management of CWD should it be discovered in Minnesota's wild deer herd.

The MPCA and the MDH have reviewed the available research regarding CWD and waste disposal. Based on that review and what others are doing, we believe that incineration above 1100° F is the preferred method. However, given the large number of deer carcasses that will need to be disposed of, we believe that disposal at a Lined Mixed Municipal Solid Waste (MSW) or Ash Landfill or at the SKB Rosemount Industrial Landfill, are safe practicable alternatives to incineration. We also believe that disposal using these options would greatly reduce the risk of spreading CWD to other deer, should CWD be found in Minnesota. Direct burial of deer that test positive for CWD is not appropriate at this time.

My staff have been in contact with several disposal facilities already on this matter and are working with them to modify their Industrial Solid Waste Management Plans (ISWMP) so that those facilities can accept this waste material. I have instructed my staff to prepare draft language for inclusion in ISWMP's that is available for you if your facility is interested in accepting this type of waste. Please contact your MPCA regional solid waste compliance person

if you want to obtain this language. A list of MPCA staff to contact is included below in this letter.

**November 4, 2002**

**(Page 2)**

**Minnesota's 30 Mixed Municipal Solid Waste Landfill Operators**  
**SKB Rosemount Industrial Landfill Operator**  
**Minnesota's 6 Waste Combustor Operators**

The Wisconsin DNR completed an analysis that discusses the risks associated with land filling of deer that have CWD. This assessment was prepared by the Wisconsin DNR with input from landfill engineers, wastewater and air management experts, veterinarians, and epidemiologists from several agencies. They also received input from prion experts in Europe and other states. MPCA and MDH staff have reviewed this information and find that it is thorough and represents the latest information on this subject. The assessment is available at web site, [www.dnr.state.wi.us](http://www.dnr.state.wi.us)

For further information about the emerging CWD issue, here are some other web sites that can be reviewed:

[www.dnr.state.mn.us](http://www.dnr.state.mn.us)  
[www.bah.state.mn.us](http://www.bah.state.mn.us)  
[www.health.state.mn.us](http://www.health.state.mn.us)  
[www.cvm.umn.edu/cahfs](http://www.cvm.umn.edu/cahfs)  
[www.aphis.usda.gov](http://www.aphis.usda.gov)

In summary, we believe that incineration above 1100° F, disposal in a Lined MSW or Ash Landfill, or the SKB Rosemount Industrial Landfill are acceptable options for disposal of deer carcasses that present very minimal risk.

For questions about this letter, or about your Industrial Solid Waste Management Plan, please call:

Brainerd	Curt Hoffman	(218) 828-6198
Detroit Lakes	Roger Rolf	(218) 846-0774
Duluth	Tim Musick	(218) 723-4708
Metro	Katie Koelfgen	(651) 297-8506
Rochester	Mark Hugeback	(507) 280-5585
Willmar	Don Nelson	(651) 296-8621

Sincerely,

Karen A. Studders  
Commissioner

KAS:mh  
November 4, 2002  
(Page 3)

**Minnesota's 30 Mixed Municipal Solid Waste Landfill Operators**  
**SKB Rosemount Industrial Landfill Operator**  
**Minnesota's 6 Waste Combustor Operators**

Enclosure: List of Lined Mixed Municipal Solid Waste and Ash Landfills, Lined Industrial Landfills and Waste Combusters that can be approved to accept deer carcasses or deer ash.

cc: County Solid Waste Officers  
Commissioner Allen Garber, DNR  
Commissioner Gene Hugoson, MDA  
Commissioner Jan Malcolm, MDH  
Dr. Bill Hartman, BAH

**Attachment A**

*Mixed Municipal Landfills that can accept deer carcasses or deer ash.\**

Lined Mixed Municipal Landfills
Blue Earth/Ponderosa SLF
Brown County SLF
Burnsville SLF
Clay County SLF
Cottonwood Co SLF
Crow Wing County SLF
East Central SLF
Elk River SLF
Fergus Falls SLF
Greater Morrison SLF

Kandiyohi County SLF
Lyon Co SLF
Mar-Kit SLF
Nobles Co SLF
NE Otter Tail Ash LF
NRG Becker Ash LF
NSP Red Wing Ash LF
NSP Wilmarth Ash LF
Olmsted-Kalmar LF
Pine Bend SLF
Polk County LF
Pope-Douglas Ash LF
Red Wing Ash LF
Renville SLF
Rice County SLF
Spruce Ridge SLF
Steele County SLF
St. Louis County SLF
Superior FCR LF
WLSSD SLF

*Lined Industrial Landfills that can accept deer carcasses or deer ash.\**

<b>Lined Industrial Landfills</b>
SKB Industrial LF

*Incinerators that can accept deer carcasses or deer ash.\**

<b>Waste Combustor Facilities</b>
City of Red Wing
Olmsted County
Perham
Pope-Douglas County
HERC
City of Fergus Falls

*\* Operators must request, and the MPCA must approve, modifications to their*

*Industrial Solid Waste Management Plan.*

**November 5, 2002**

**To: Mixed Municipal Solid Waste Landfill Operators  
Select Industrial Landfill Operators**

**RE: Disposal of Deer Carcasses**

On November 4, 2002, Minnesota Pollution Control Agency Commissioner Karen Studders sent you an informational letter on Chronic Wasting Disease (CWD) and the landfilling of animal carcasses. Carcasses and ash waste from the incineration of carcasses is considered an industrial solid waste if it is generated by any commercial processing or by a Minnesota Department of Natural Resources deer culling operation. If your facility is planning on accepting this type of waste, your Industrial Solid Waste Management Plan (ISWMP) will need to be amended. Enclosed is suggested minimal language you may include in your amendment. You may include additional protections or strategies specific to your facility. This plan does not supersede the previously permitted ISWMP for the facility, but may be added as an amendment to the ISWMP. The suggested language addresses the acceptance and disposal procedures for deer and elk carcasses and for carcass ash waste that may or may not be infected with CWD. Isolated carcasses, which are put into the normal residential Mixed Municipal Solid Waste stream by hunters, are considered household wastes and are not managed through the ISWMP.

If your facility will be accepting these types of waste, please contact your regional Solid Waste Program staff listed below. Plan amendments will be given expedited review by staff.

Brainerd Region	Curt Hoffman	(218) 828-6198
Detroit Lakes Region	Roger Rolf	(218) 846-0774
Duluth Region	Tim Musick	(218) 723-4708
Metro Region	Katie Koelfgen	(651) 297-8506
Rochester Region	Mark Hugeback	(507) 280-5585
Willmar Region	Don Nelson	(652) 296-8621

Sincerely,

Rodney E. Massey, P.E.  
Division Director  
Regional Environmental Management Division

REM:kr

cc: MPCA Regional Managers

**INDUSTRIAL SOLID WASTE MANAGEMENT PLAN**  
**GENERIC CONDITIONS FOR THE ACCEPTANCE OF**  
**DEER AND ELK CARCASSES OR CARCASS ASH WASTE**

The following plan is designed for implementation at permitted Mixed Municipal Solid Waste (MSW) Landfills and certain approved Industrial Landfills in the state of Minnesota. This plan does not supersede the previously permitted Industrial Solid Waste Management Plan (ISWMP) for the facility, but may be added as an Addendum to the ISWMP. The following Addendum addresses the acceptance and disposal procedures for deer and elk carcasses and for carcass ash waste that may or may not be infected with Chronic Wasting Disease (CWD). Carcass and ash waste is considered an industrial solid waste if it is generated by any commercial processing or by a Minnesota Department of Natural Resources deer culling operation. Isolated carcass wastes which are put into the normal residential MSW waste stream by hunters are considered household wastes and are exempted from management by an ISWMP.

If you, at a minimum, choose to add the following language into an Addendum to your ISWMP, approval from the Minnesota Pollution Control Agency (MPCA) to accept deer carcass wastes at your facility will be considered granted. You must also notify the MPCA in writing of this modification to your ISWMP upon making the decision to accept carcass wastes.

**Pre-acceptance Procedures:**

- ◆ The facility must follow the usual procedures contained in its approved ISWMP for acceptance of any industrial solid waste, including any necessary notifications and basic pre-acceptance procedures.

**Acceptance and Handling Procedures:**

- ◆ The landfill operator must designate a specific area high in the fill for disposal of carcasses and carcass ash waste loads.
- ◆ Carcass ash waste may not be disposed of if wind speeds exceed ten (10) miles per hour at

the time of disposal.

- ◆ Loads of carcasses or carcass ash waste must be immediately covered with a minimum of one (1) foot of compacted MSW or other approved cover materials.
- ◆ The operator must minimize any unnecessary manual handling of the waste and must follow any appropriate safety precautions or plans. At a minimum, operators should consider use of rubber gloves and safety glasses if some manual handling of carcasses is needed.
- ◆ Once the carcasses or carcass ash are disposed of, the operator must make a notation on a facility map or diagram which contains the quantity disposed (in cubic yards, tons, or the total number of animals), along with the vertical and horizontal location within the fill phase.

## **APPENDIX F. CERVID IMPORT REQUIREMENTS FOR MINNESOTA (BAH)**

(Includes all members of the family Cervidae, including deer, elk, moose, reindeer, caribou)  
Revised March 2002

1. A permit must be obtained prior to the importation of any Cervidae.
2. All Cervidae imported into Minnesota must be accompanied by a Certificate of Veterinary Inspection (CVI) issued by an accredited veterinarian.
3. All Cervidae imported into Minnesota must be individually identified using one or more of the following: USDA metal eartag, Electronic ID, ear or lip tattoo with 4 or more digits, or NAEBA tag
4. Tuberculosis test requirement:
  - a. Movement from **accredited** herds
    - No further tuberculosis testing required for importation.
    - The TB accredited herd number must be written on the CVI.
  - b. Movement from **qualified** or **monitored** herd
    - Animal must have a negative TB test within 90 days of shipment unless the whole herd test (including the animal for movement) was conducted within 90 days of movement.
    - The TB qualified or monitored herd number must be written on the CVI.

c. Movement from **unclassified** herds

- Animal must be negative on 2 TB tests conducted not less than 90 days apart. Test dates and results must be written on the CVI.
- Second test must be done within 90 days of movement.
- Animals must be isolated from all other members of the herd during the testing period.

d. Movement of cervids from Michigan

Special restrictions and testing requirements apply. Call the Board of Animal Health at 651-296-2942.

e. Movement of cervids from Canada

Call the USDA office at 651-290-3691 and the Board of Animal Health at 651-296-2942 for requirements.

f. Movement of cervids into Minnesota TB accredited, qualified, or monitored herds

Herd additions must be from same or higher status or herd will lose its status unless additional testing is done before and after import. Call the Board of Animal Health if you have questions about herd additions to TB accredited, qualified, or monitored herds.

5. Brucellosis test requirement

a. All cervids > 6 months of age must have a negative Brucellosis test within 30 days of movement into Minnesota, unless originating from a Brucellosis certified herd.

6. **Chronic Wasting Disease Requirement**

a. No cervid originating from an area considered to be endemic for Chronic Wasting Disease will be allowed entry into Minnesota. This area includes:

**Wyoming:** Albany, Carbon, Converse, Laramie, Platte, Niobrara, Goshen, Platte

**Nebraska:** Kimball, Sioux, Banner, Scotts Bluff, Cheyenne, Deuel, Keith, Perkins, Chase

**Colorado:** Boulder, Gilpin, Larimer, Weld, Logan, Morgan, Phillips, Sedgwick, Washington, Eagle, Garfield, Grand, Jackson, Larimer, Moffit, Rio Blanco, Routt, Summitt

**South Dakota:** Fall River

**Wisconsin:** Dane, Iowa, Sauk, Columbia, Juneau, Jefferson, Rock, Green, Lafayette, Crawford, Grant, Richland, Walworth

**Illinois:** Boone, Stephenson, Winnebago

**Saskatchewan:** Must have approval from the BAH

b. No cervid can be imported that is from a herd that is infected or exposed to Chronic Wasting Disease, or that has purchased a cervid from an infected herd unless the herd has been cleared to the satisfaction of the Board.

c. All cervids imported must be from a herd that has been participating in a state recognized CWD surveillance program for at least 3 years. The CWD herd number and numbers of years in the program must be written on the CVI.