

SOUTH DAKOTA CHRONIC WASTING DISEASE ACTION PLAN



**SOUTH DAKOTA DEPARTMENT OF GAME, FISH AND PARKS
PIERRE, SOUTH DAKOTA**

**WILDLIFE DIVISION REPORT 2019-01
APRIL 2019 (1ST Draft)**

This document is for general and strategic guidance for the South Dakota Department of Game, Fish and Parks and serves to identify what we strive to accomplish related to the management of chronic wasting disease. This plan will be utilized by Department staff and the Commission and will be formally evaluated at least every 10 years. Plan updates and changes, however, may occur more frequently as needed.

ACKNOWLEDGEMENTS

This plan is a product of substantial discussion and input from many wildlife professionals. In addition, comments and suggestions received from landowners, hunters and other stakeholders were considered and incorporated where appropriate.

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Department Mission

We provide sustainable outdoor recreational opportunities through responsible management of our state's parks, fisheries, and wildlife by fostering partnerships, cultivating stewardship and safely connecting people with the outdoors.

Department Vision

We will conserve our state's outdoor heritage to enhance the quality of life for current and future generations.



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ACRONYMS

AFWA	Association of Fish and Wildlife Agencies
AIB	South Dakota Animal Industry Board
ARSD	South Dakota Administrative Rule
ATA	Archery Trade Association
BHNF	Black Hills National Forest
BMP	Best Management Practice
CDC	Centers for Disease Control and Prevention
CSP	Custer State Park
CWD	Chronic Wasting Disease
CWDSG	Chronic Wasting Disease Stakeholder Group
DENR	South Dakota Department of Environment and Natural Resources
ELISA	Enzyme-Linked Immunosorbent Assay
DOT	South Dakota Department of Transportation
FS	Forest Service within the USDA
GFP	South Dakota Department of Game, Fish and Parks
HCP	Herd Certification Program
IHC	Immunohistochemistry
MOU	Memorandum of Understanding
n	Sample Size
N	Population Size or Estimate
SAH	South Dakota Sportsmen Against Hunger
SDCL	South Dakota Codified Law
SD	South Dakota
SDSU-ADRDL	South Dakota State University Animal Disease Research and Diagnostic Laboratory
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WICA	Wind Cave National Park

GLOSSARY

The following words or terms are found within this action plan or other popular articles and peer-reviewed publications related to chronic wasting disease.

Age Structure: the distribution of animals by age within a population. Often expressed as relative numbers of animals by given age categories, such as fawns, yearlings, mature animals or by individual ages: 0, 1, 2, 3, 4, ... years of age.

Agent: the active and efficient cause of a disease; usually refers to a germ such as a virus, bacteria or prion.

Antemortem: occurring or performed before death.

Anthropogenic: referring to environmental change caused or influenced by people, either directly or indirectly.

Asymptote: a line that continually approaches a given curve but does not meet it at any finite distance.

Bovine spongiform encephalopathy (BSE): a transmissible spongiform encephalopathy (see below) affecting cattle, caused by a prion. Transmission between cattle normally takes place when cattle are fed meat and bone meal originating from cattle that were affected by BSE.

Captive cervid herd: a herd of deer or elk that is confined and managed as a herd of domestic animals would be.

Central nervous system: the brain and spinal cord.

Cervidae, Cervids: a mammal of the family Cervidae, which includes white-tailed deer, mule deer and elk.

Clinical signs: something abnormal, relevant to disease in an animal, detected and possibly measured by an observer. Animals are considered to have clinical signs instead of "symptoms."

Culling: the intentional removal of animals from a population for a purpose that improves the status of the base population. Generally, culling is accomplished via lethal removal by governmental employees or contracted agents.

CWD-positive: the designation for an animal that has been determined to have been infected with the CWD prion.

CWD endemic area: geographic area in which animals affected with a certain disease would normally be expected to be found. For the purpose of this document, this is a county or hunting unit where CWD has been confirmed in wild cervids. As of January 2019, South Dakota's known CWD endemic areas would include the counties of Custer, Fall River, Lawrence and Pennington.

Data Analysis Unit: as an aggregate of management units that is large enough to account for auto-correlated biotic and abiotic factors and processes that uniformly influence vital rates.

Deboning: removing cuts of meat from the attached bone.

Disease distribution: the patterns in which cases of disease are found, e.g., geographically, over certain time periods, gender or age of diseased animals, etc.

Environmental Contamination: the process whereby prions shed from carcasses, urine, feces, and saliva bind to the soil and plants and remain infectious to cervids.

Exposure: being subjected to an infectious agent.

Free-ranging: refers to animals that are not confined to a high fence and are able to move freely across the landscape.

Lambda: the rate of change to population abundance over time.

Lymphoid tissue: portions of the body that house lymphocytes (certain cells involved in the immune response). Lymphoid tissue can be diffuse in nature, as in certain parts of the intestine; or it can be focused in small organs distributed throughout the body called lymph nodes.

Monitoring: efforts to track changes and prevalence of a disease (e.g., CWD) within a population over time.

Neurological: pertaining to the function of the brain, spinal cord, and nerves.

Obex: the section of brainstem between the brain and the spinal cord frequently used to test for CWD.

Pathogen/Pathogenic: a germ capable of creating damage to a body function or organ, resulting in illness or disease.

Population dynamics: a branch of knowledge concerned with the sizes of populations and the factors involved in their maintenance, decline, or expansion.

Postmortem: occurring or performed after death.

Presence: the documentation of CWD in a given population or hunting unit.

Prevalence/Prevalence rate: the percentage of cervids in a population or hunting unit that are infected with CWD at a point in time, or over a specified time period.

Prion: A form of a protein molecule that is closely associated with cells in the nervous system and in lymphoid tissue. When abnormal prions come in contact with normal cellular proteins, they can convert them to the abnormal form. Prions are the smallest and most basic of all infectious agents. They are very resistant to enzymes, chemicals, heat, and normal disinfecting procedures.

Retropharyngeal lymph nodes: lymph nodes (see above) located in the back of the upper throat of the animal. In harvested deer, they are frequently used as a sample for CWD testing.

Scrapie: transmissible spongiform encephalopathy that exclusively affects sheep and goats.

Shedding: the release or excretion of an infectious agent (prions) from the body of an infected host (live cervid or dead carcass).

Surveillance: efforts to detect the occurrence of a disease, such as CWD, within a specific species and geographic area where the disease is not already known to occur.

Tallow: hard and fatty substance made from rendered animal fat that at times is mixed with venison or other processed meat.

Venison: the meat from deer, elk or other members of the deer family.

Vital Rates: a collective term used to describe the demographic parameters (rates of birth, growth, maturation, survivorship, fertility, fecundity, and mortality) averaged over groups of individuals that affect changes in the size and composition of a population.

Transmissible spongiform encephalopathies (TSE's): diseases that are caused by abnormal forms of prions that convert normal cellular proteins to more abnormal prions. The net effect of this conversion is the formation of plaques of protein in nervous or lymphoid tissue (usually the brain), which eventually create spaces or "holes" in that tissue. "Spongiform" refers to the sponge-like appearance of this tissue under a microscope, while "encephalopathy" refers to the resulting abnormal function of the brain.

Zoonotic: an infectious disease that can be transmitted between animals and people under natural conditions.

EXECUTIVE SUMMARY

Thousands of South Dakota residents and visitors enjoy the opportunity to view, photograph, or hunt deer and elk across South Dakota's diverse landscape. In southwestern South Dakota, however, some deer and elk are dying from an illness known as chronic wasting disease (CWD). Unlike a virus or bacteria that can kill numerous individuals in a short time period, animals inflicted with CWD can appear healthy for months, though all succumb to this fatal disease.

Chronic wasting disease is a fatal brain disease of cervids (deer, elk, and moose) that is caused by an abnormal prion protein. Animals infected with CWD may show progressive loss of weight and body condition, behavioral changes, excessive salivation, increased drinking and urination, appear lethargic, loss of muscle control and eventual death. Chronic wasting disease is always fatal for the afflicted animal. The disease cannot be diagnosed by observation of physical symptoms because many cervid diseases affect the animals in similar ways.

The first detection of CWD in wild deer in South Dakota occurred in Fall River County during the 2001 hunting season. Since then, CWD has continued to be detected and is known to exist in free-ranging deer and elk in Custer, Fall River, Lawrence and Pennington counties, including Custer State Park (CSP) and Wind Cave National Park (WICA). Surveillance efforts have not detected its presence in free-ranging cervids in other areas of South Dakota, although testing has not occurred or is limited in many areas. CWD has also been detected in neighboring states and across the nation. CWD poses serious problems for wildlife managers, and the implications of long-term management for free-ranging deer and elk could be significant.

The objective of the "South Dakota Chronic Wasting Disease Action Plan" is to provide guidance and transparency regarding the management of CWD to wildlife managers and the public. In the development of this action plan, South Dakota Department of Game, Fish and Parks (GFP) and members of the CWD Stakeholder Group were challenged to think long-term to reduce the spread of CWD and ensure that thriving deer and elk populations are here 50-100 years from now. It will take support and engagement of many stakeholders for this action plan to be successful.

When discussing and considering CWD management for both wild and captive cervids, numerous items come into consideration and it becomes quite clear as to the complexity surrounding the management of this disease. For many, changes to normal operating procedures will likely be needed to reduce the natural and anthropogenic spread of CWD prions; this will not come easy for some. As a result, communication and outreach to the public will serve as the foundation and it will be critical to have an informed public and that understands such management actions and their expected benefits.

The South Dakota Department of Game, Fish, and Parks manages wildlife and associated habitats for their sustained and equitable use, and the benefit, welfare and enjoyment of the citizens of this state and its visitors. South Dakota's deer and elk resources demand prudent and increasingly intensive management to accommodate numerous and varied public demands and growing impacts from people. This action plan is intended to guide the decision-making process for the GFP Department and Commission over the next ten years, but should be considered a working document that will be amended as new biological and/or social data provide opportunities to improve the management of CWD in South Dakota. Furthermore, this plan will serve as the foundation to inform and educate the sportsmen and women, landowners and other publics of South Dakota.

South Dakota Chronic Wasting Disease Action Plan

PURPOSE OF ACTION PLAN

The South Dakota Chronic Wasting Disease Action Plan was developed to provide guidance for the South Dakota Department of Game, Fish and Parks (GFP) and GFP Commission regarding the management and public outreach efforts related to chronic wasting disease (CWD). When discussing and considering CWD management for both wild and captive cervids, numerous items come into consideration and it becomes quite clear as to the complexity surrounding the management of this disease. While not an exhaustive list, some stakeholders that must be considered include the following: general public, hunters, landowners, wildlife managers, taxidermists, game processing facilities, captive cervid industry, conservation organizations, disease laboratories and other government agencies.

Chronic wasting disease was first confirmed in South Dakota nearly 20 years ago. So, many might ask, “why is chronic wasting disease now a priority for the South Dakota Department of Game, Fish, and Parks?” This is a legitimate question. The answer and justification is complex, but can primarily be attributed to the following: new research findings and the suggested negative impact to deer and elk population growth rates; updated and concerning prevalence rates from elk within Wind Cave National Park (WICA) and Custer State Park (CSP); the need to ensure viable populations of deer and elk; and the importance of deer and elk to hunters and their critical role with contributions to wildlife management. As a result, GFP has identified the following strategy through its Department Strategic Planning process: *“Enhance the department’s efforts to manage chronic wasting disease in deer and elk across the state and launch a strategic communications plan to educate and inform public about the safety, risks and any new regulations”*.

Monitoring and managing CWD will be a long-term project for GFP, hunters, and other stakeholders. It’s important to view these CWD-related concerns not only now or within the next five years, but 50 to 100 years into the future for deer and elk populations, hunters, landowners, and others. The public should recognize that with the current knowledge and understanding of this disease, CWD could have significant biological, economic and social implications for generations to come.

The South Dakota Department of Game, Fish and Parks has been granted authority over the management of fish and wildlife. The South Dakota Legislature has granted the South Dakota Animal Industry Board (AIB) authority over nondomestic mammals and the management of CWD in captive cervids. The South Dakota Department of Environment and Natural Resources (DENR) has authority and oversight of air, land and water, including waste management and landfills. Applicable codified laws and administrative rules directly or indirectly related to the management of CWD are provided in Appendices 1, 2 and 3.

Budget authority and staffing needs have been outlined to implement this “draft” action plan on an annual basis and are provided in the *Budget and Staff Needs* section of this action plan. These needs could change as more information is obtained relating to the distribution of CWD within South Dakota, as new research findings become available or public support/opinion change related to management actions or expectations.

Guiding Principles

The following statements have guided the development of the CWD management goal, objectives and management strategies and reflect the collective values of GFP in relation to the management of CWD in South Dakota:

- that CWD is an infectious disease that is transmitted between cervids by direct contact with infectious saliva, urine and feces.
- that CWD can also be transmitted through environmental contamination, and once established in an area may never be eradicated.
- that there is no current evidence that CWD can infect humans.
- that wildlife, including white-tailed deer, mule deer and elk, contribute significantly to the quality of life in South Dakota and therefore must be sustained for future generations.
- that healthy cervids play an important role in the rangeland and forest ecosystems.
- in management of healthy cervids in accordance with biologically sound principles, while considering social tolerances.
- in providing accurate and timely information to the public concerning CWD issues and how CWD could impact future recreational opportunities in South Dakota.
- that the future of healthy cervid populations in South Dakota depends on a public that appreciates, understands and supports CWD management.

Goal Statement

To determine presence/absence of CWD, reduce the spread of CWD, and have an informed public that understand, support and participate with CWD management practices to ensure viable deer and elk populations for future generations.

Objectives

The following objectives have been identified to achieve the goal statement listed above:

Short-term (<15 years)

- To provide accurate, timely and targeted information through GFP communication platforms to all publics, agency partners and GFP staff and incorporate public involvement as necessary regarding CWD in South Dakota.
- Develop stakeholder support for CWD management strategies and objectives.
- Monitor and evaluate the risk and impact of CWD in wild white-tailed deer, mule deer and elk herds in South Dakota.
- Promote best management practices (BMPs) and, where deemed necessary, implement regulations to reduce the spread of CWD in free-ranging and captive cervids in South Dakota.
- Work with local, state, tribal and federal government agencies to monitor and manage CWD within South Dakota.

Long-term (>15 years)

- Maintain stakeholder support and transparently communicate management strategies and objectives used to mitigate spread and risks associated with CWD.
- Evaluate how recreational opportunity is affected by CWD limiting population growth and age-structure of cervids in endemic areas.

- Maintain intrinsic value, including recreational opportunities and hunting heritage associated with wild cervids, despite increasing numbers of sick animals and the potential for reduced recreational opportunities.

Management actions and strategies to achieve these objectives are provided within the *Preventive Measures; Surveillance; Management Response of Detection; and Communication and Outreach* sections of this action plan. There are examples of some simple changes hunters and other members of the public can consider and implement, while others would require substantial changes to the normal behavior and way of doing business. Education and outreach to the public will serve as the foundation for successful implementation of this action plan

Providing the public with examples of BMPs is critical and an immediate management action. Where the promotion of BMPs is likely not enough to address identified concerns, new or modified regulations are presented that should be considered by the GFP Commission or dictate changes to GFP protocols. For each suggested regulation change, supportive information is included to inform the public and stakeholders on the justification for such a recommendation. This will assist the public with providing feedback on the draft action plan and the GFP Commission in their decision making process with formally adopting the action plan, promulgating administrative rules, and if necessary, working with the state legislature on new or revised codified laws.

The following is a timeline of events moving forward to finalize and implement this action plan:

April 2:	Make draft action plan available for public comment
May 5:	End of public comment period on 1st draft
April—mid-May:	Offer meetings with organizations and other stakeholders on draft action plan and solicit public comment
May 13:	CWD stakeholder group meeting
May 14:	Internal CWD Workgroup
June 6-7	GFP Commission Meeting— present summary of modifications incorporated from public comment and provide 2nd draft to Commission for review and additional public comment
July 8-9:	GFP Commission Meeting—ask GFP Commission for adoption of final draft and present Department recommendations related to applicable administrative rules
September 5-6:	GFP Commission Meeting—ask GFP Commission to finalize proposed rule changes and follow-up with implementation of action plan

INTRODUCTION

Disease Biology

Chronic wasting disease is a fatal neurological disease that affects members of the cervid family including deer, elk, reindeer and moose. It is caused by an abnormal protein called a prion. This abnormal protein is structurally similar to other proteins, but doesn't carry out the same function of normal proteins. Once the abnormal prion is replicated in the brain, essential physiological functions of the brain are compromised, resulting in death. Animals in the late stages of infection with CWD show

progressive loss of weight, poor body condition, behavioral changes, excessive salivation, increased drinking and urination, loss of muscle control and eventual death. Animals that appear perfectly healthy may also be infected with CWD and do not show the symptoms of the disease. While researchers have observed the transmission of CWD prions to cervids through contaminated saliva and blood (Mathiason et al. 2006), the infection pathway of the pathogenic protein is not fully understood at this point. However, CWD contaminated environments are also believed to be a pathway to infection of cervids (Miller et al. 2004; Pritzkow et al. 2015). CWD is always fatal for the infected animal.

Deer as young as 16 months old can show clinical signs of the disease which would suggest that this would be a minimum incubation period (Williams 2005). Elk with CWD have an incubation period of 1.5 to 3 years before they become clinically affected; with most succumbing <12 months after the initial clinical signs appear, though some may survive with clinical signs >12 months (Miller et al. 1998). Maximum incubation periods in free-ranging, naturally exposed cervids are difficult to determine due to the inability to determine when exposure occurred, but average incubation periods probably range from 2-4 years (Williams 2005). In South Dakota, the youngest deer documented with CWD was a six month old hunter harvested fawn that was diagnosed through laboratory testing. Chronic wasting disease is a disease that cannot be diagnosed by observation of physical symptoms because many cervid diseases affect the animals in similar ways. In wild cervids, the only practical method of testing for this disease is postmortem sampling of infected tissue. Tissues collected from cervids include the retropharyngeal nodes and/or the obex that are submitted to an accredited diagnostic laboratory for testing. Samples from South Dakota are sent to the Animal Disease Research and Diagnostic Laboratory (ADRDL) at South Dakota State University (SDSU).

Schuler et al. (2005) investigated the collection of tonsillar follicles on live deer in WICA and found that sampling of tonsillar material was effective at diagnosing CWD if the correct tissue was collected. Wolfe et al. (2007) also recognized the effectiveness of sampling tonsillar follicles in determining if CWD infection was present, but recognized the practical limitations of testing wild free-ranging deer, as the practice of capturing, anesthetizing and precisely sampling individual deer limits the broad use of this method. Wolfe et al. (2007) evaluated the use of rectal lymphoid tissue sampling for CWD diagnosis in white-tailed and mule deer and found that sample quality should be considered when interpreting data from the biopsies. The evaluation of this method of testing for CWD was supported by Wolfe et al. (2007). Geremia et al. (2015) noted that biopsy of rectal lymphoid tissue provided a useful, but imperfect live-animal test for CWD in mule deer as it would be difficult and expensive on free-ranging animals. The use of tonsillar biopsy and rectal lymphoid tissue sampling are alternative methods of testing for CWD on live and dead cervids, but needs to be evaluated in individual sampling schemes.

In North America, CWD has been detected in wild cervids in several states and Canadian provinces. Figure 1 displays the current known distribution of CWD; with ongoing testing occurring in numerous states and provinces, this information can change on a regular basis.

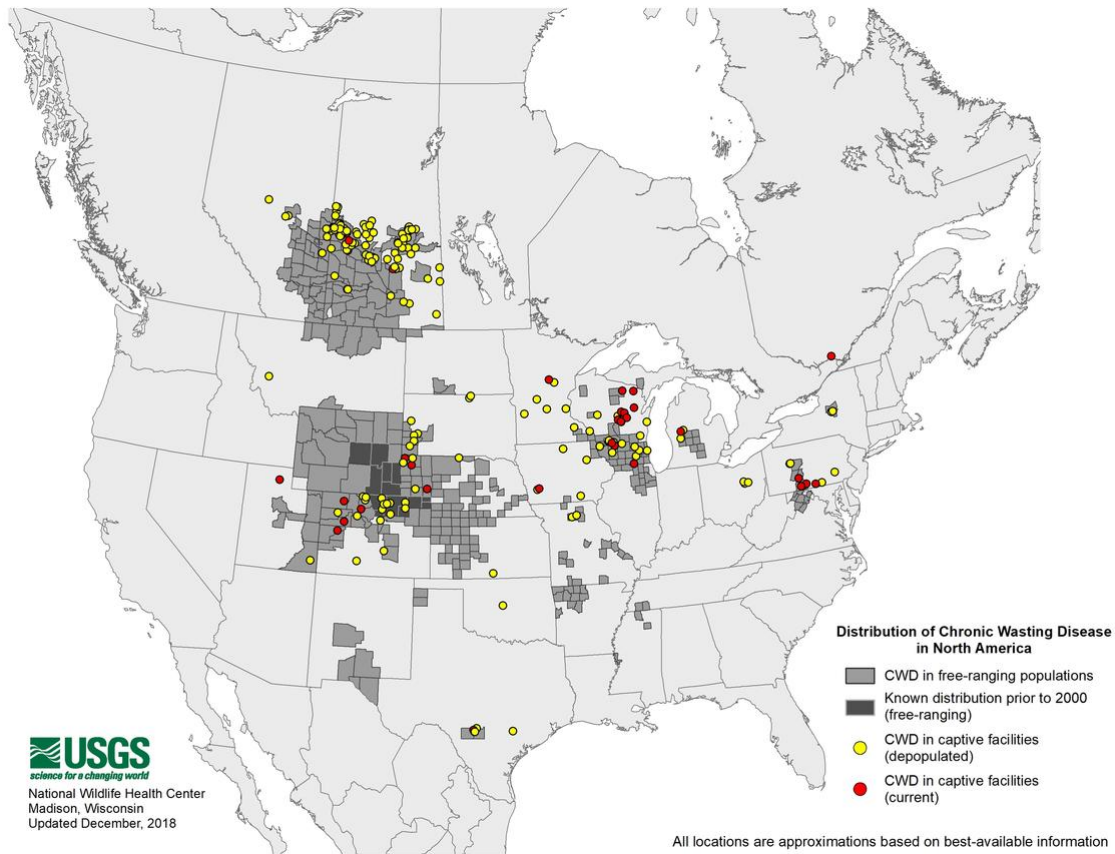


Figure 1. Distribution of chronic wasting disease in North America, December 2018 (USGS National Wildlife Health Center, <https://www.usgs.gov/media/images/distribution-chronic-wasting-disease-north-america-0>).

History of Chronic Wasting Disease in South Dakota

In South Dakota, CWD was discovered in seven captive elk facilities during the winter of 1997 and in another captive elk herd in 2002. These herds were located in Custer, McPherson and Pennington counties. After the disease was discovered, research was initiated in cooperation with SDSU to determine the extent and prevalence of CWD in wild cervid populations. Jacques (2001) tested a total of 519 white-tailed deer, 128 mule deer and 368 elk for CWD from 1997-1999 and found no CWD infected free-ranging cervids in the sampled areas. CWD was first discovered in the wild when a white-tailed deer in Fall River County tested positive during the 2001 deer hunting season. The first CWD infected free-ranging elk was found in WICA in 2002 (Figure 2).

Sampling strategies utilized by GFP include hunter harvest, vehicle kills, GFP removals or culling, municipal removal programs and statewide sampling of any cervid from anywhere in the state that exhibits the outward signs of the disease. The majority of samples collected for CWD testing have come from hunter harvested deer and elk, in particular from southwestern South Dakota where the disease has been found in wild deer and elk. As of December 2018, a total of 13,818 white-tailed deer, 6,165 mule deer, 7,566 elk and 2 moose have been tested (Table 1; Figure 3).

From 2001-2019, CWD has been confirmed in 135 white-tailed deer, 89 mule deer, and 201 elk within the counties of Custer, Fall River, Lawrence and Pennington (Table 1; Figures 4, 5 and 6). These include 2

white-tailed deer, 8 mule deer and 131 elk from within the boundaries of WICA, and 7 white-tailed deer and 28 elk from within CSP. An [interactive map](#) displaying the current known distribution of CWD by species in South Dakota can be found at <https://gfp.sd.gov/chronic-wasting-disease/>.

The South Dakota Department of Game, Fish and Parks coordinates CWD testing with the SDSU ADRDL in Brookings, South Dakota. Results are typically available within 7-10 days. South Dakota State University Animal Disease Research and Diagnostic Laboratory use what is called an enzyme-linked immunosorbent assay (ELISA) to determine samples as a suspect positive. Suspect positives are then subject to an additional ELISA test using the same tissue or adjacent lymph nodes. If further testing or confirmation is needed, samples are analyzed using an immunohistochemical (IHC) assay at the United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service, National Veterinary Services Laboratory in Ames, Iowa. Some samples preserved with formalin are sent to Colorado State University, Veterinary Diagnostic Laboratories.



Figure 2. Timeline of events related to chronic wasting disease in South Dakota.

Table 1. Total number of CWD samples and CWD infected white-tailed deer, mule deer, elk and moose in South Dakota, 1997-2018. Years are defined as July 1 - June 30.

Year	White-tailed Deer		Mule Deer		Elk		Moose	
	# Sampled	# Positive	# Sampled	# Positive	# Sampled	# Positive	# Sampled	# Positive
1997-1998	107	0	27	0	1	0	0	0
1998-1999	251	0	37	0	160	0	0	0
1999-2000	161	0	65	0	209	0	0	0
2000-2001	0	0	2	0	0	0	0	0
2001-2002	307	1	212	0	169	0	0	0
2002-2003	912	6	632	7	609	1	0	0
2003-2004	1,208	2	608	1	682	4	0	0
2004-2005	1,241	4	753	3	700	4	0	0
2005-2006	1,616	4	867	4	769	6	0	0
2006-2007	1,318	3	615	4	608	4	0	0
2007-2008	1,465	9	603	6	490	4	0	0
2008-2009	1,273	8	499	13	394	14	0	0
2009-2010	1,041	13	476	8	405	7	1	0
2010-2011	1,135	17	339	8	253	8	0	0
2011-2012	970	18	242	11	197	15	1	0
2012-2013	114	6	28	1	140	12	0	0
2013-2014	56	8	8	3	145	13	0	0
2014-2015	30	4	19	6	129	12	0	0
2015-2016	31	4	19	4	187	15	0	0
2016-2017	82	5	56	0	645	50	0	0
2017-2018	272	12	15	0	459	25	0	0
2018-2019	228	11	43	10	215	7	0	0
TOTAL	13,818	135	6,165	89	7,566	201	2	0

CWD Testing Statewide

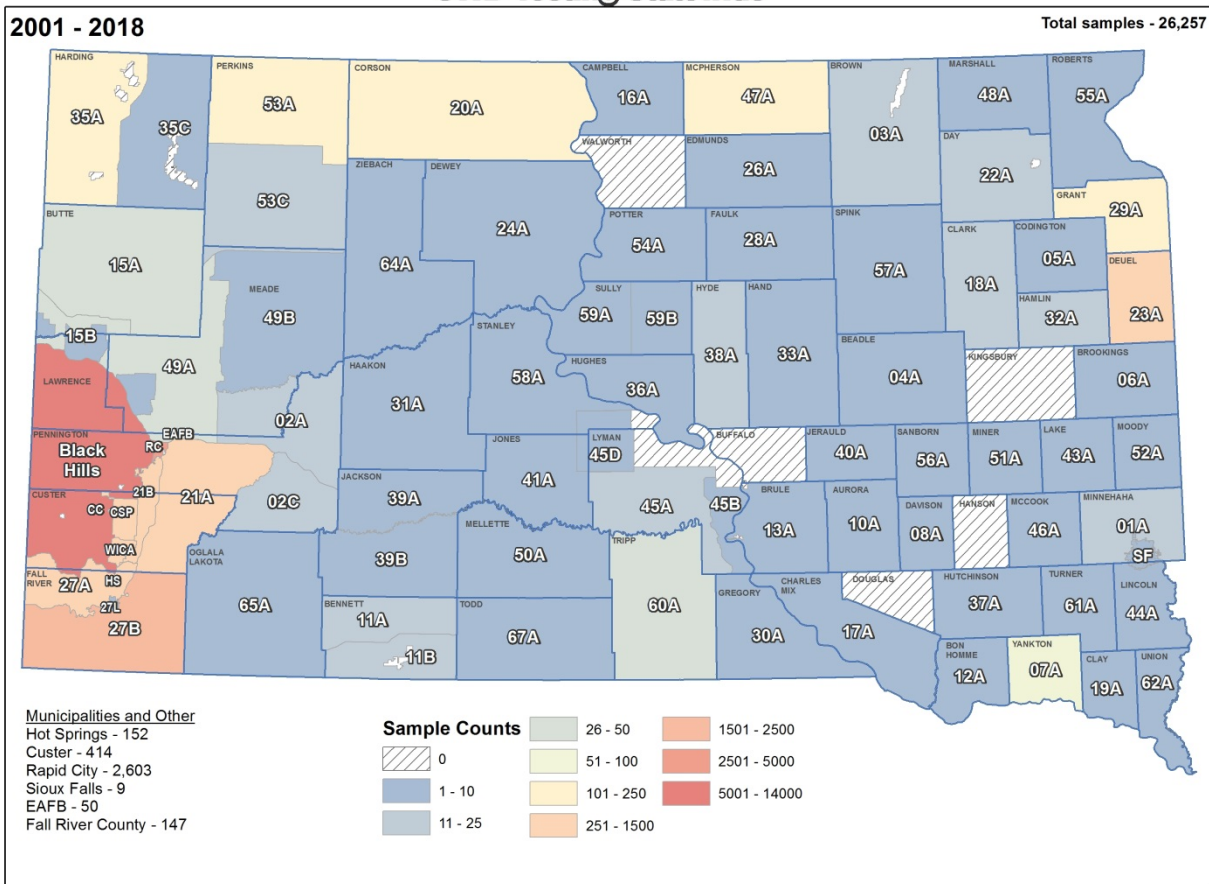


Figure 3. Chronic wasting disease surveillance by hunting unit, 2001-2018.

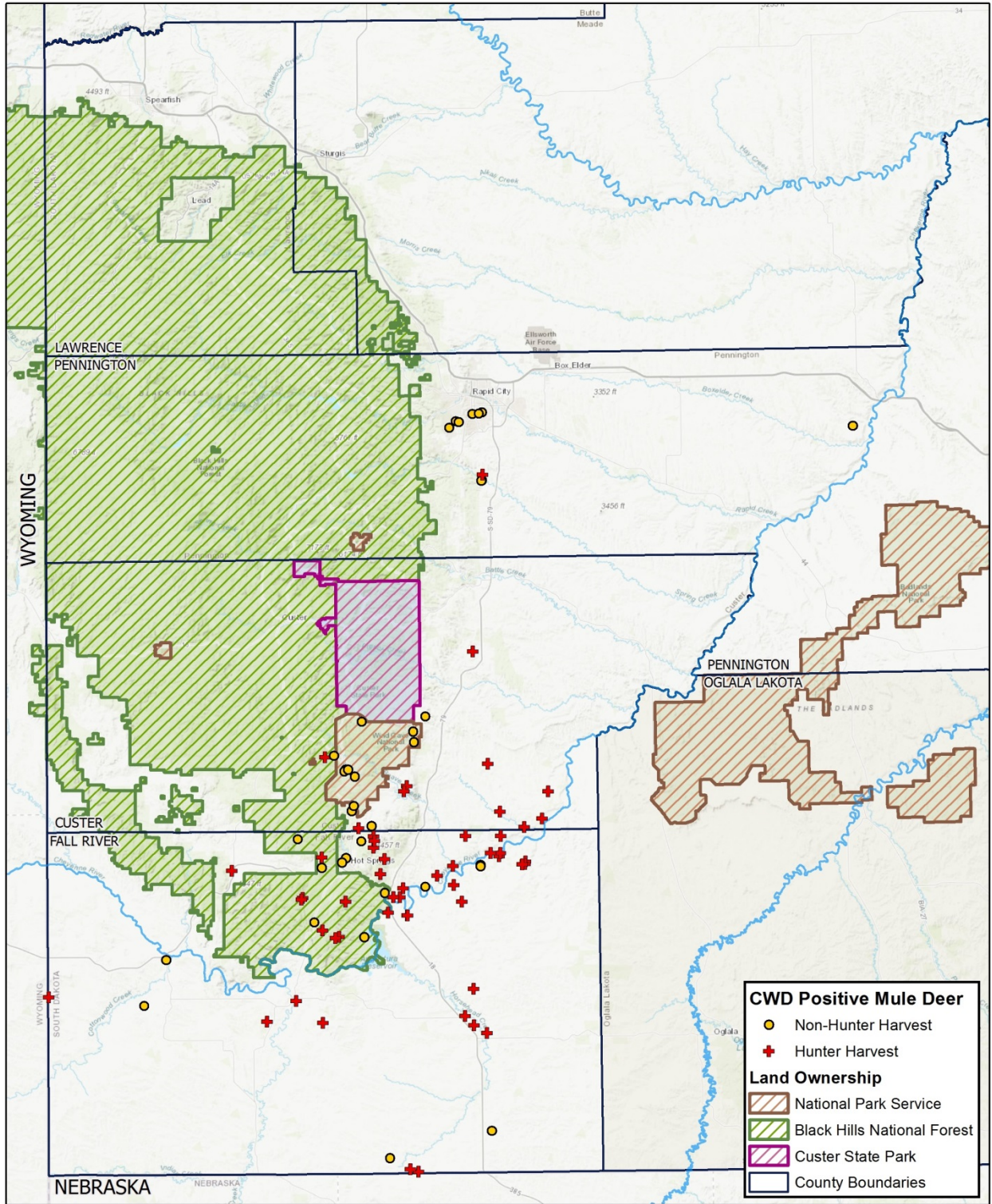


Figure 4. Locations of chronic wasting disease infected wild mule deer in South Dakota, 2001-2018.

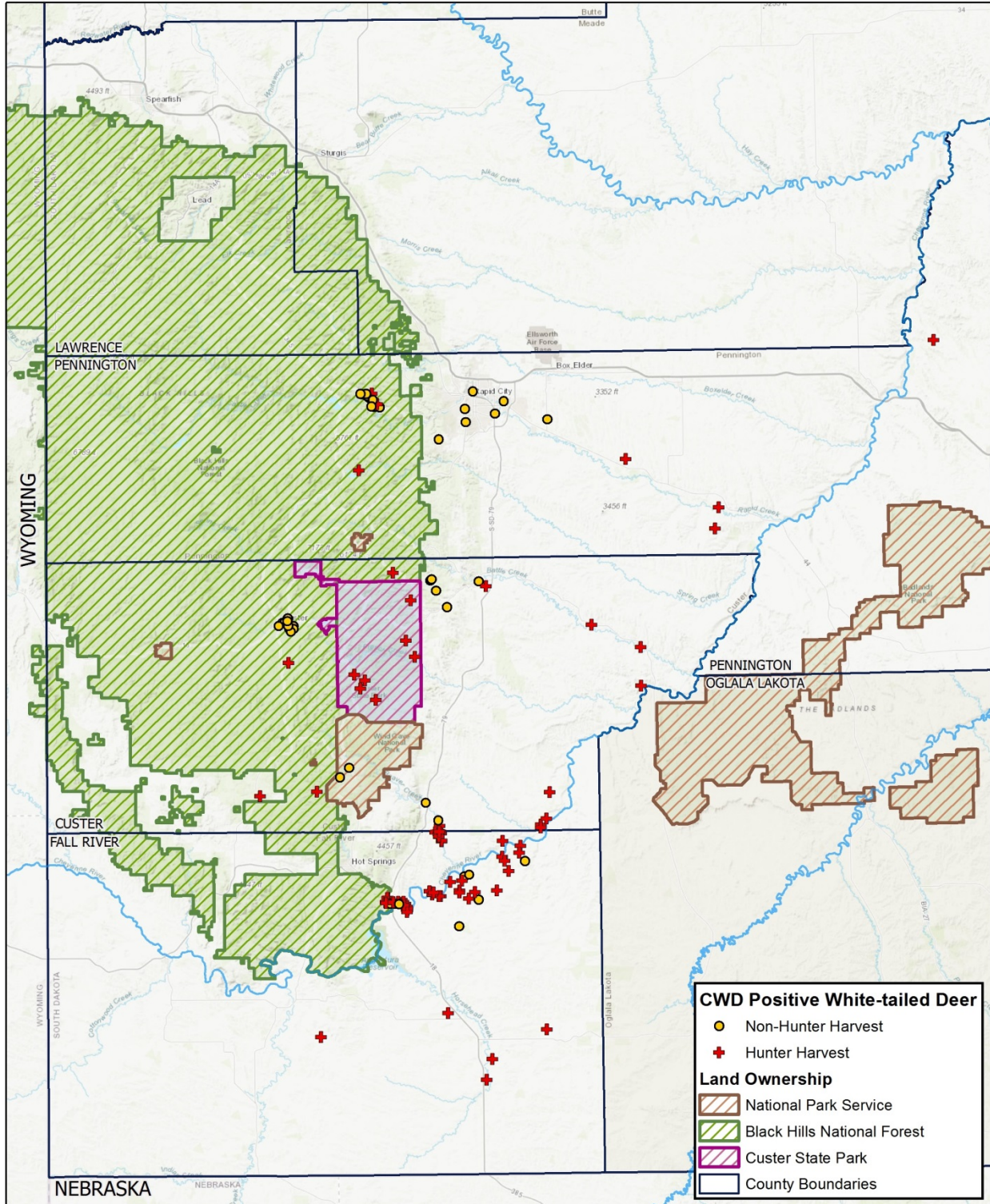


Figure 5. Locations of chronic wasting disease infected wild white-tailed deer in South Dakota, 2001-2018.

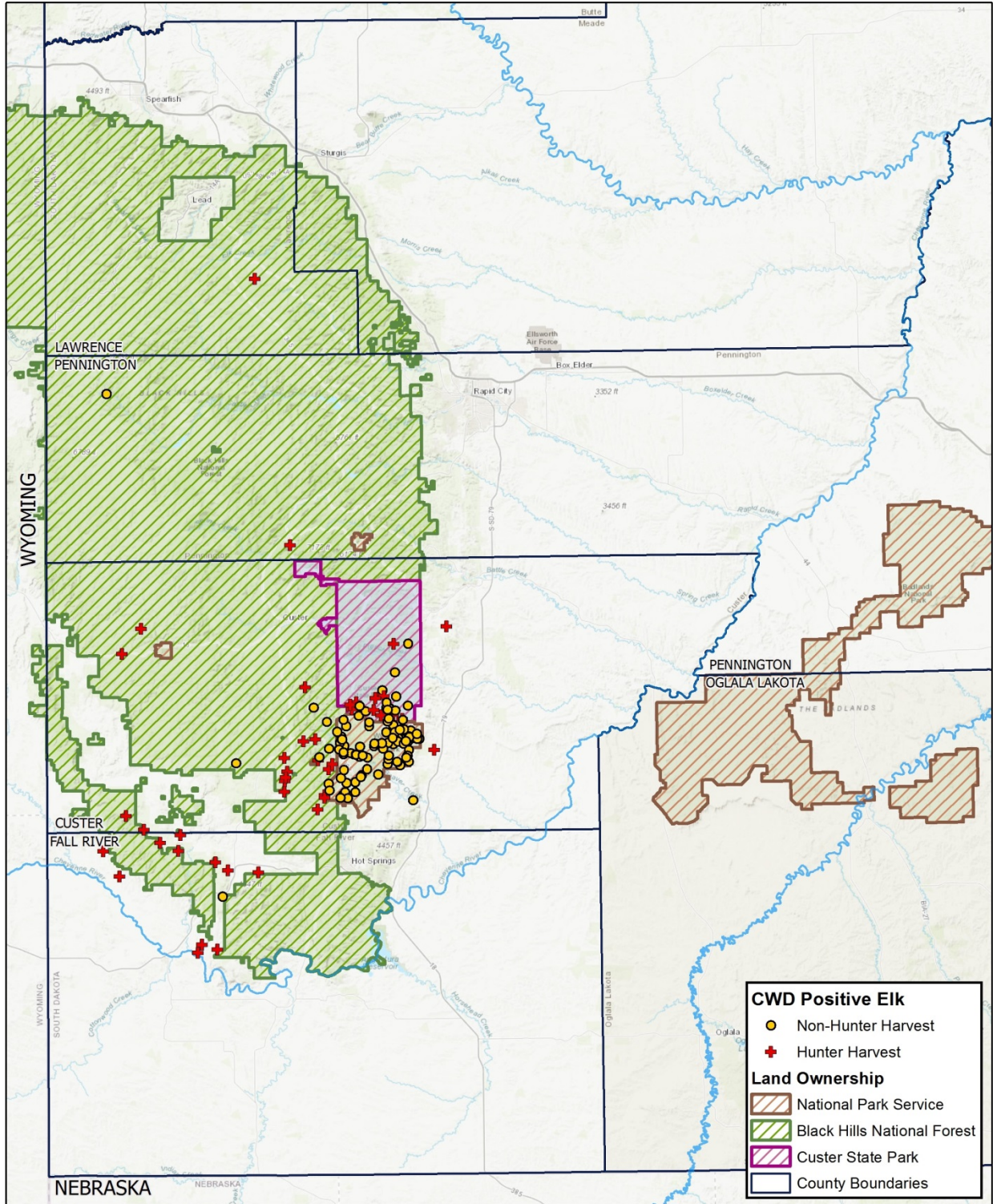


Figure 6. Locations of chronic wasting disease infected wild elk in South Dakota, 2001-2018.

Long-term Concerns for Cervid Populations

Researchers have found a reduction in overall population growth in areas with high CWD prevalence rates. In Colorado, Miller et al. (2008) found that survival of prion infected mule deer females (0.53) when compared to uninfected mule deer females (0.82) was markedly lower and that CWD can negatively affect mule deer populations on a local level. In Wyoming, DeVivo (2015) noted the same trend with prion infected mule deer survival (0.32) being lower when compared to uninfected mule deer survival (0.76). Dulberger et al. (2010) reported a prevalence rate of 21% in female mule deer in Colorado with a population growth rate of 0.97 compared to an estimated population growth rate of 1.04 in the uninfected portion of the population. DeVivo (2015) found that average annual CWD prevalence ranged from 21-27% in a mule deer herd in Wyoming which equated to a modeled population growth rate of 0.81 and a corresponding 19% annual decline in the population. Findings suggested that with CWD absence, the modeled population growth would be stable at $\lambda = 1.0$ with further suggestions that the effect of CWD on adult survival was important in shaping population growth rates and CWD contributed to the observed mule deer population decline (DeVivo 2015). Edmunds (2013) found an annual estimated CWD prevalence rate of 23.8% in a white-tailed deer population in Wyoming and this equated to a population growth rate of 0.89 or a 10.4 % annual decline in the population. To produce a growth rate of ≥ 1.0 , or a sustainable population, would require the elimination of female harvest (Edmunds 2013).

South Dakota has estimated CWD prevalence rates of 2.3% in white-tailed deer and 4.3% in mule deer in southwestern South Dakota, excluding WICA and CSP. These prevalence rate estimates are based on volunteer hunter harvested samples and are current to 2012; thus current prevalence rates are unknown and could be much higher. Due to reduced license allocation from lower deer populations and the loss of federal funding for CWD surveillance, sample size on deer species since 2012 is not adequate for accurate prevalence rate analyses. If surveillance efforts consider the need for prevalence rates and management actions are identified for a prevalence rate threshold, more sampling may be needed to establish an updated prevalence rate in selected areas of the state.

Dulberger et al. (2010) noted that CWD infected mule deer in Colorado recruited 0.95 fawns per doe and uninfected mule deer recruited 1.34 fawns per doe, but this difference in recruitment did not have an overall effect on population growth. DeVivo (2015) found that fawn recruitment was similar between CWD-negative (average = 0.48) and CWD-positive mule deer (average = 0.56), and that mean annual pregnancy of CWD-negative and CWD-positive females was similar (0.99 and 0.94, respectively). In contrast to Colorado results, DeVivo (2015) found that CWD caused significant overall declines in the southern Converse County mule deer herd in Wyoming. As with the mule deer population in Wyoming, Edmunds (2013) found that there was no difference in pregnancy of white-tailed deer between CWD-negative and CWD-positive females (0.95 and 0.92, respectively), and that recruitment of fawns was not significantly different between CWD positive or negative deer, thus pregnancy and recruitment results indicate CWD does not compromise reproduction in female white-tailed deer. Edmunds (2013) also found that CWD at high prevalence in white-tailed deer in Wyoming was found to significantly lower annual survival of adult deer and was directly implicated as the main cause of decline in this population.

Although research has not been conducted on South Dakota cervids in regards to the effect of CWD on population growth, research on white-tailed and mule deer in Wyoming suggest that there is a negative effect on population growth of both species that have high prevalence rates (DeVivo 2015; Edmunds 2013). Research conducted in Colorado suggests that prevalence rates of 13% can reduce survival rates of cow elk and decrease elk population growth (Monello et al. 2014). Based on current sampling efforts,

the preliminary prevalence rates of elk in WICA and CSP currently surpass this 13 % threshold. Variable CWD prevalence, duration of epidemics, species of interest and other extrinsic factors influence the severity of CWD on population declines (DeVivo 2015). Active surveillance aids in determining the distribution and prevalence of CWD and can be used to elucidate changes over time (Conner et al. 2007). Localized population reduction, regulating translocation of deer and banning baiting and feeding have all been attempted to slow the spread of CWD (Campbell and VerCauteren 2011).

Captive Cervids

Captive cervid farming is an expanding for-profit market across North America with over 10,000 individual breeding operations nationwide (QDMA 2012; Figure 7). Figure 7 provides the most recent and known available information on the estimated number of captive cervid farms by state across the nation. Captive cervid operations include both native and non-native species (Adams et al. 2016). The primary objectives of for-profit captive game farming operations are to produce animals for breeding stock, to produce large antlered for shooting facilities trophies (through selective breeding, artificial insemination and regimented feeding programs), and for the production of antlers, hides, scents, velvet and venison (Miller and Miller 2016). The captive cervid farming industry is one of the fastest growing industries in rural areas of the United States and is now a multi-million dollar industry (Anderson et al. 2007). Within North America, captive cervid farming and shooting operations have increased to a level that traditional wildlife management, jurisdiction and regulatory authority are being challenged (Boone and Crockett 2015).

Several organizations, most notably The Wildlife Society (2009), QDMA (2012) and the Boone and Crockett Club (2015), have taken stances and developed position statements on captive cervid farming, all citing concerns with this growing industry. A primary concern with captive cervid farming is the violation of several components of the North American Model of Wildlife Conservation, in particular the privatization of a public trust resource (Organ et al. 2016). Additional concerns are threatened wildlife health through increased risk of disease spread and transmission, not using science for the basis of managing wildlife, unregulated killing which may not be for legitimate reasons and creating a negative public image and perception of hunting. Issues impacting deer hunting and management were identified during the 2014 North American Whitetail Summit and the captive deer industry was ranked fifth in this list of greatest concerns (Adams and Ross 2015).

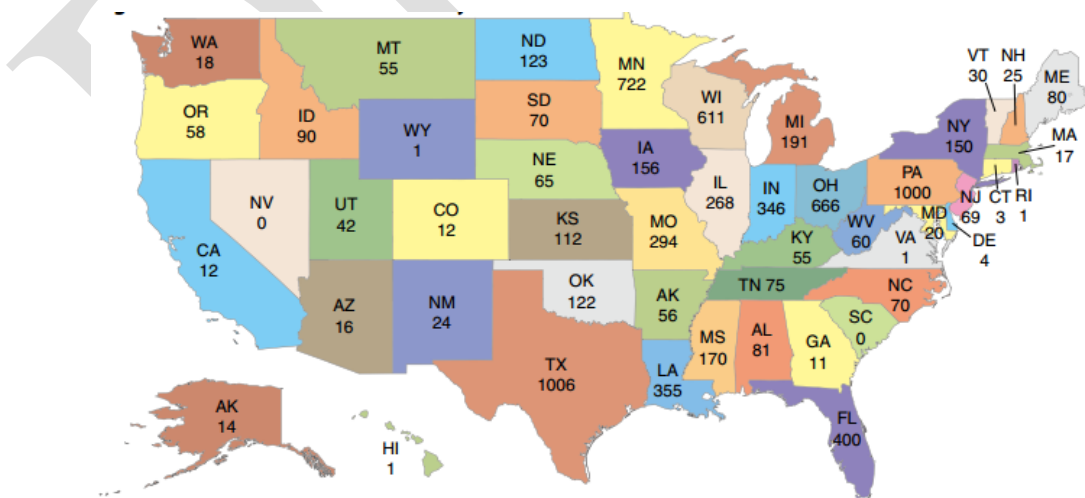


Figure 7. Estimated number of captive cervid farms per state (Anderson et al. 2007).

Within South Dakota, individuals may possess captive cervids if the proper permits are obtained through the South Dakota Animal Industry Board (AIB). Details on the possession, importation, interstate and intrastate movement regulations can be found in South Dakota Administrative Rule (ARSD) 12:68:18 (Nondomestic Animal Control). Specifically, in regards to free-ranging wildlife, a person may not confine or allow the confinement of free-ranging wildlife. Before the issuance of a permit under this chapter, AIB in cooperation with the Department of Game, Fish and Parks, may inspect the facility for the presence of free-ranging wildlife. Any free-ranging wildlife must be removed by the applicant to the satisfaction of AIB before the issuance of the permit. A permittee must immediately notify AIB upon the ingress of free-ranging wildlife of the mammalian class into a permitted facility. The South Dakota Animal Industry Board, in cooperation with GFP shall take whatever action it considers necessary in accordance with the provisions of SDCL § 40-3-25 to dispose of such free-ranging wildlife. Facilities may not be constructed for purposes of confining captive nondomestic mammals in such a manner as to interrupt the normal migration patterns of free-ranging wildlife as determined by AIB in consultation with GFP (ARSD § 12:68:18:03.07). Captive cervid facilities in South Dakota were first permitted in 1993. At that time, there were 19 facilities; currently, there are 45 individual permitted captive cervid facilities in South Dakota (Figure 8). In 2003, South Dakota had a high of 67 permitted facilities. Of the 45 current permitted facilities, 30 contain elk, 14 contain white-tailed deer and three contain mule deer (M. Miller, personal communication; Figures 8, 9 and 10). Current facilities range in size from 1-170 animals, with one exception where a facility contains 676 animals comprised of 95% elk and 5% white-tailed deer (M. Miller, personal communication).

The risk of disease transmission between captive and wild cervids is a real concern shared by state wildlife agencies across the country. As a result of finding CWD in captive cervids, new legislation was passed in 1998, giving AIB statutory authority over CWD surveillance of captive cervids (SDCL § 40-5-8.6). Testing for CWD was mandatory on all captive cervids that died in South Dakota from 1997-2012 (ARSD § 12:68:25:03). Since 2012, following 15 years of mandatory CWD testing, AIB now administers a voluntary Cervidae CWD Herd Certification Program (HCP) approved by the USDA, and in accordance with the CWD HCP Standards. Since 1997, there have been 6,676 farmed cervids tested for CWD in South Dakota and 130 tested positive (125 elk, 5 white-tailed deer). In fiscal year 2018, there were 29 herds enrolled in this HCP and 75 animals were tested with no positive cases of CWD (AIB 2018).

Recently, a captive elk tested positive in Clark County in March of 2019; the last CWD infected captive cervid was detected in 2002. At this time, AIB has quarantined this captive elk facility and another facility that served as an origination source for this herd. Discussions are occurring between AIB and GFP regarding CWD surveillance in free-ranging deer near these captive elk facility.

South Dakota Department of Game, Fish and Parks and AIB are currently revising a memorandum of understanding (MOU) that identifies the role of each agency and how both can coordinate efforts, when and where applicable, to manage CWD in both captive and wild cervid populations.

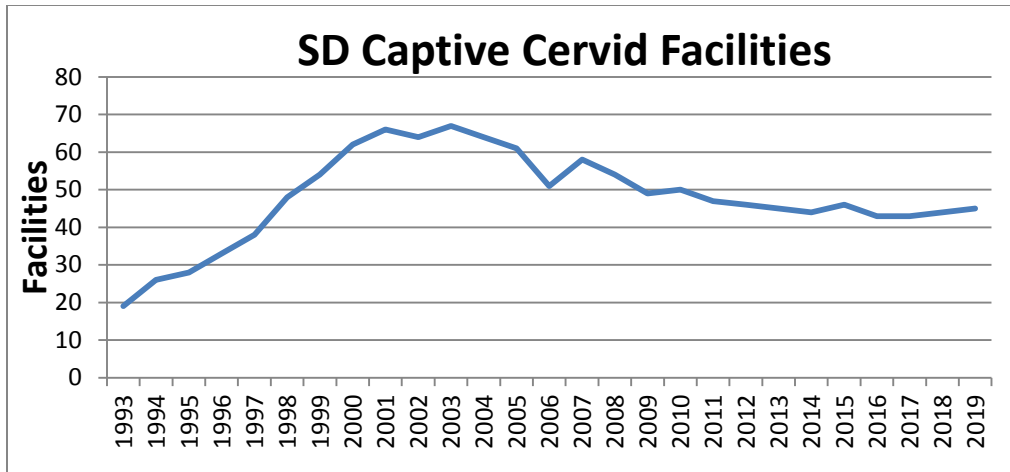


Figure 8. Captive cervid facilities in South Dakota, 1993-2019.

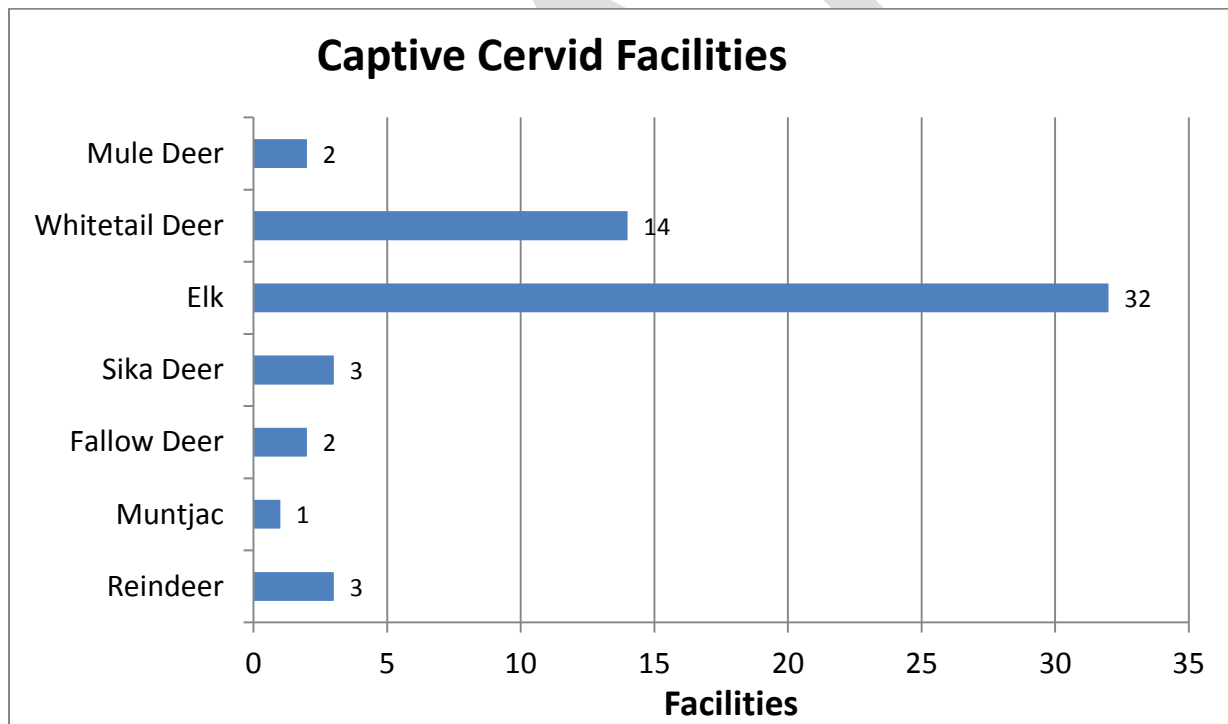


Figure 9. Number of captive cervid facilities per species in South Dakota, 2019. Facilities may contain more than one species.

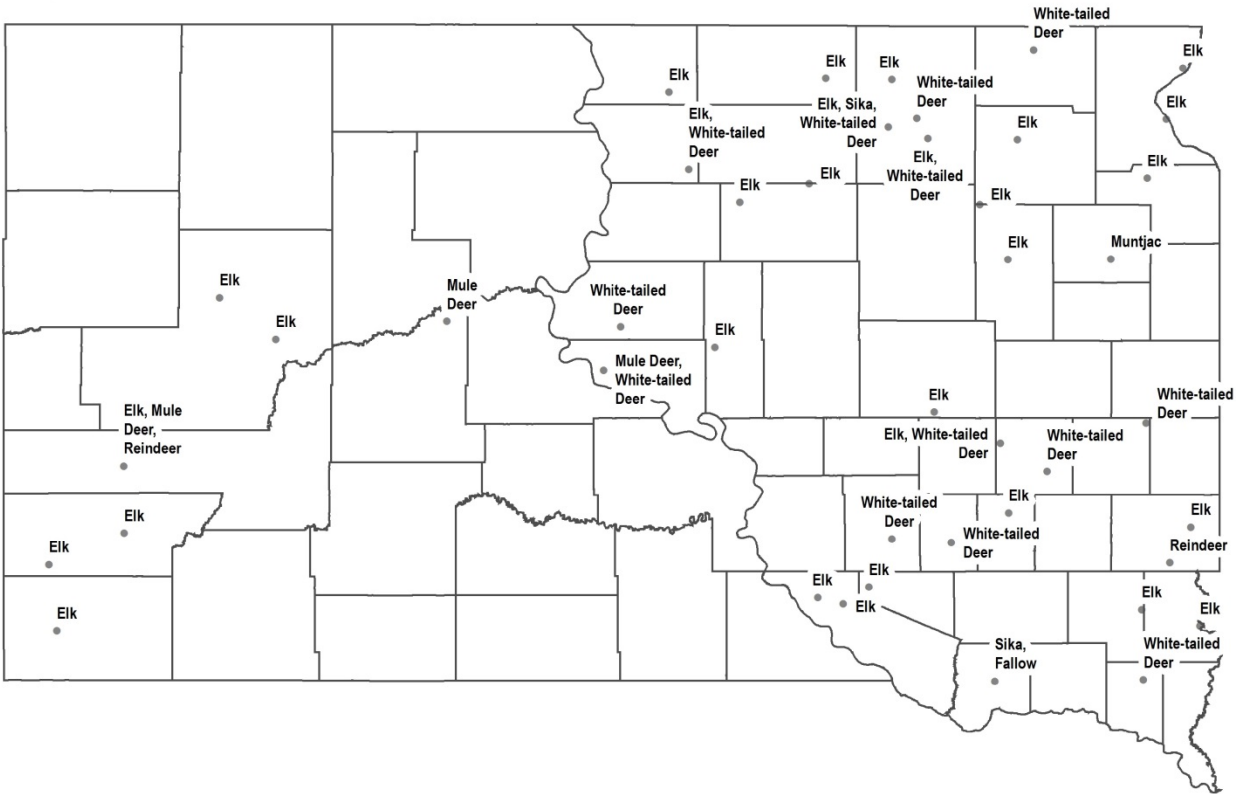


Figure 10. Captive cervid facility locations in South Dakota, 2019.

Human Health

Public health officials and the Center for Disease Control (CDC) in Atlanta, Georgia have found no link between CWD and any neurological disease in humans. The CDC provides information on CWD at <https://www.cdc.gov/prions/cwd/index.html>. There is no scientific evidence that CWD can be naturally transmitted to humans, or to animals other than cervids. As a general precaution it is a good idea for people to avoid contact with any wild animal that appears sick, regardless of the cause of the illness. To minimize the risk of exposure to CWD, the CDC recommends that hunters should avoid eating meat from deer and elk that look sick or that test positive for CWD. Hunters should also consider having their deer or elk tested for CWD before consuming the meat if the animal was harvested from an area where CWD has been detected, hereafter referred to as “*known CWD endemic areas*”. Some additional precautions to take when processing a deer or elk are to wear gloves, bone-out the meat from the animal, preferably where the animal was harvested, and minimize handling of the brain and spinal cord tissues. If your deer or elk is commercially processed, consider having it processed individually to avoid mixing venison from other animals that may have been harvested from a known CWD endemic area.

The South Dakota Department of Game, Fish and Parks will continue to consult with the CDC and the South Dakota Department of Public Health to ensure accurate information is being disseminated to our public and hunters regarding public health topics related to CWD and the consumption of venison.

PUBLIC INVOLVEMENT

Effective decision-making by wildlife agencies necessitates the need to consider public perceptions and opinions, in addition to potential responses to management policies. Along with biological and harvest data, public involvement is an important component in developing and implementing wildlife management plans in South Dakota. Public participation helps ensure decisions are made in consideration of public needs and preferences. It can help resolve conflicts, build trust and inform the public about wildlife management in South Dakota. Successful public participation is a continuous process, consisting of a series of activities and actions to inform the public and stakeholders, as well as obtain input regarding decisions which affect them. Public involvement strategies provide more value when they are open, relevant, timely and appropriate to the intended goal of the process.

When it comes to public involvement, one-size does not fit all. Every situation is different and each approach to a specific situation will be unique. No single citizen or group of citizens is able to represent the views of all citizens. Multiple avenues for public involvement and outreach were used in the development of the South Dakota Chronic Wasting Disease Action Plan. These approaches are designed to involve the public at various stages of plan development and to ensure opportunities for participation are accessible to all citizens.

Stakeholder Group

A stakeholder for the purpose of this action plan is defined as a person, group, or organization with an interest in the management of CWD in South Dakota. Because of the impacts CWD can have on cervid populations and associated hunting opportunities sought after by many South Dakota residents and our visitors, GFP believes it is important to have a diverse representation of stakeholders to provide input for the management of CWD in South Dakota. The formation and input from this stakeholder group, however, does not inhibit GFP from obtaining and incorporating additional input or opinions from others on the management of CWD in South Dakota.

The South Dakota Chronic Wasting Disease Stakeholder Group (CWDSG) included representation from the following: hunters, private landowners, commercial game processors, taxidermists, captive cervid owners, Sportsmen Against Hunger, conservation organizations, public land managers and other state and tribal agencies. Those who served on the CWDSG during this planning process can be found on page i of this action plan. A CWDSG charter (Appendix 4) was shared with all stakeholders and described the purpose, objectives, authority, roles and responsibilities of this group.

The CWDSG held two meetings in Pierre, SD; one on November 28, 2018, and another will be held on May 13, 2019. Information and supportive data were provided by GFP, AIB and WICA to ensure all members were knowledgeable about the topics and issues discussed and deliberated by the group. Key topics and issues discussed by the CWDSG included the following: overview of disease, disease transmission, disease impacts to big game populations, known distribution of disease in South Dakota, captive cervid regulations, disease research and management in WICA, carcass transportation and disposal, public communication and outreach of disease, game processing, taxidermists, baiting and feeding of wildlife, scents and lures and disease surveillance.

While individual views and opinions vary amongst the broad representation of this stakeholder group, all were in agreement that CWD is a concern and that disease management should be elevated to better inform our public and reduce the spread of CWD to ensure viable populations of deer and elk are

available for future generations. Meeting agendas, meeting notes and presentations can be found at <https://gfp.sd.gov/chronic-wasting-disease/>.

Public Meetings and Input

The term *public meeting* is used as an umbrella term for all types of meetings including but not limited to public hearings, open houses or workshops. Game, Fish and Parks uses a variety of public meeting formats designed to be accessible by all members of the public and to provide meaningful opportunities for public involvement. One formal involvement opportunity is through the GFP Commission. As part of the rule setting process, the GFP Commission holds a formal public hearing at each meeting where it takes public testimony regarding proposals that create, delete or modify existing administrative rules. In addition to the public hearing process, the GFP Commission also reviews Department management plan drafts, related public comments and formally adopts plans for implementation. In addition to the public hearing, the GFP Commission also provides an open forum for members of the public to speak to the GFP Commission on any matter related to the Department or under the authority of the GFP Commission.

In addition to these formal involvement opportunities, GFP provided informal opportunities for public participation. Seven public open houses were conducted across the state in an effort to inform and have discussions with as many interested individuals as possible (Table 2). The open houses were advertised to the public through a variety of outlets and were designed to both inform the public about key aspects of the action plan via a formal presentation and the use of break out stations where the public had individual or small group discussions on topics such as the following: 1) biology, history and long-term concerns of CWD; 2) preventive measures to reduce the spread of CWD; 3) disease surveillance efforts; and 4) communication and outreach efforts.

The “draft” South Dakota Chronic Wasting Disease Action Plan is located on the South Dakota Game, Fish and Parks website where other wildlife management plans are stored at <https://gfp.sd.gov/management-plans/>. Additional information on CWD in South Dakota, including how hunters can submit their own sample, can be found at <https://gfp.sd.gov/chronic-wasting-disease/>. Public comments can be submitted to CWDActionPlan@state.sd.us or mailed to 523 E. Capitol Ave., Pierre, SD 57501.

Table 2. Public open houses related to the management of chronic wasting disease.

Date	Location
March 12, 2019	Aberdeen—Best Western Ramkota
March 13, 2019	Sioux Falls—University Center
March 18, 2019	Rapid City—GFP Outdoor Campus
March 19, 2019	Hot Springs—Mueller Center
March 25, 2019	Wall—Wall Community Center
March 26, 2019	Pierre—Capitol Lake Visitors Center
March 27, 2019	Huron—Crossroads Hotel & Huron Event Center

During the public comment period and before the GFP Commission takes formal action to adopt this action plan, GFP staff will reach out to various stakeholders and accommodate as many in-person meetings with such individuals or organizations as possible. These smaller venues provide great opportunities for in-depth discussion, question and answer sessions, and to solicit and receive input.

PREVENTIVE MEASURES

Since there is currently no known cure for CWD, proactive actions that include preventive measures to reduce the spread of CWD are a high priority. Having an informed public on the issues and concerns of CWD and its unknown long-term influence on deer and elk populations in South Dakota is the foundation of this action plan. Where the implementation of best management practices (BMPs) is considered less than desirable to meet an identified need to reduce the spread of CWD, new or modified regulations are suggested for consideration. The final version of this action plan including BMPs and potential regulations, will need to be shared using a variety of methods to our public and both resident and nonresident hunters.

Best Management Practices

The South Dakota Department of Game, Fish and Parks is a member of the Association of Fish and Wildlife Agencies (AFWA), which represents fish and wildlife agencies across the country. In September, 2018, AFWA passed a resolution adopting the AFWA's "Best Management Practices for Prevention, Surveillance, and Management of Chronic Wasting Disease" (Gillin and Mawdsley 2018). The full technical report can be found at https://www.fishwildlife.org/application/files/9615/3729/1513/AFWA_Technical_Report_on_CWD_BMPs_FINAL.pdf; a summary of the technical report can be found at https://www.fishwildlife.org/application/files/5215/3729/1805/AFWA_CWD_BMPS_12_September_2018_FINAL.pdf (Appendix 5).

The Association of Fish and Wildlife Agencies BMPs for CWD were developed by wildlife biologists and disease specialists, veterinarians and agency leaders from those states with first-hand experience with CWD in their respective deer and elk populations. In addition, these BMPs were developed from peer-reviewed publications from biological and social research, field-tested methods and past experiences. Developed with the best information available at the time, these BMPs will be periodically reviewed by AFWA members and updated as necessary. The South Dakota Department of Game, Fish and Parks provided comments and suggested edits on the development of these BMPs and many are found within this action plan as suggested practices and regulations for wildlife managers and the public that could be considered by the GFP Commission for rule proposals to best manage CWD in South Dakota.

Carcass Transportation and Disposal

Chronic wasting disease can be spread among cervids by both direct contact between animals and exposure to environments contaminated with CWD prions, the abnormal protein that causes the disease. The unnatural dispersal of CWD-infected cervid carcasses from the location of harvest within a known CWD endemic area to a hunter's home, taxidermist, game processor, etc. in a portion of the state or country not known to have CWD, is a significant concern. Interstate (between states) and intrastate (within a state) carcass transportation, along with the proper disposal of carcasses, is discussed below.

In regards to proper carcass disposal, for those hunters, taxidermists and game processors whose waste management provider does not accept carcass remains or do not reside within close proximity to a permitted landfill, GFP is considering options such as the availability of large waste containers, etc. being positioned in strategic locations to address this issue.

Interstate Transportation

South Dakota currently has no restriction on the interstate transport of high-risk cervid carcass parts (brain, spinal column and other body parts known to contain prions) entering or traveling through the state. A majority of the continental states currently have some level of interstate transport regulations (Figure 11). Not restricting the importation of whole cervid carcasses and high-risk carcass parts into South Dakota risks spreading CWD into areas of South Dakota where CWD has not been confirmed.

Rules Governing Interstate Transport of High-risk Cervid Carcass Parts^{1,2}

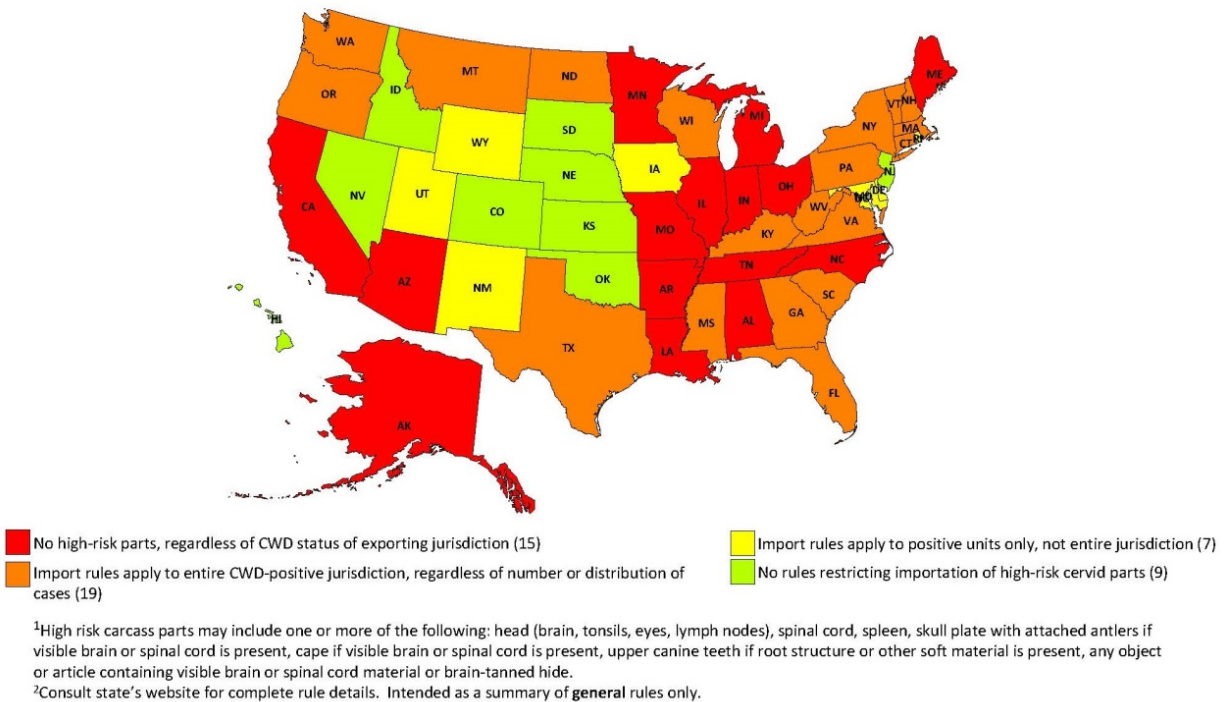


Figure 11. Interstate transport rules of high-risk cervid carcass parts, July 2018 (cwd-info.org).

The following are suggestions for consideration to reduce the spread of CWD coming into South Dakota via anthropogenic movement of cervid carcasses:

New Regulations for Consideration

- Importation of whole cervid carcasses and high-risk carcass parts into South Dakota is restricted from other states, regardless of CWD status of the exporting state. Only the following portions of hunter-harvested cervid carcasses may be brought into South Dakota: cut and wrapped meat; quarters or other portions of meat with no part of the spinal column or head attached; antlers, hides or teeth; finished taxidermy mounts; and antlers attached to skull caps that are cleaned of all brain tissue.
 - **EXCEPTIONS:** Hunters could enter the state with a whole carcass if directly delivered to a licensed taxidermist, commercial processor, or to the hunters

domicile within 24 hours of entering South Dakota AND dispose of all remaining carcass parts and other tissues taken from another state with a waste management provider or permitted landfill. Those carcasses only traveling through South Dakota would be exempt from this regulation.

- Create administrative rules that would establish the penalty and fines associated with the improper interstate transportation and disposal of carcasses.
 - ✓ Action: would require changes to South Dakota administrative rules via GFP Commission for big game transportation and carcass disposal for hunters, taxidermists and game processing facilities.
 - ✓ Supportive Information: provides a level of benefit in minimizing the spread of CWD via the anthropogenic movement of carcasses; South Dakota currently has no restriction on the interstate movement of carcasses. These suggested regulations still present a risk of CWD contaminated material being transported into South Dakota.

Intrastate Transportation and Disposal

The same concern for a positive CWD deer or elk carcass entering South Dakota from another state holds true for a positive CWD deer or elk carcass being transported from a known CWD endemic area within South Dakota to an area where CWD has not yet been confirmed. For example, thousands of hunters (resident and nonresident) annually hunt deer and elk in the Black Hills of South Dakota, a known CWD endemic area. While many of these licensed hunters reside within counties already contaminated with CWD, others are traveling from every corner of South Dakota and across the country for the opportunity to hunt deer and elk in the Black Hills (Figure 12). As a result, there are thousands of carcasses being transported across the landscape by hunters that have the potential to spread and contaminate the environment with CWD prions by improperly disposing of carcasses (e.g. dumping carcasses in shelterbelts, road rights-of-way, wetlands, uncovered pits).

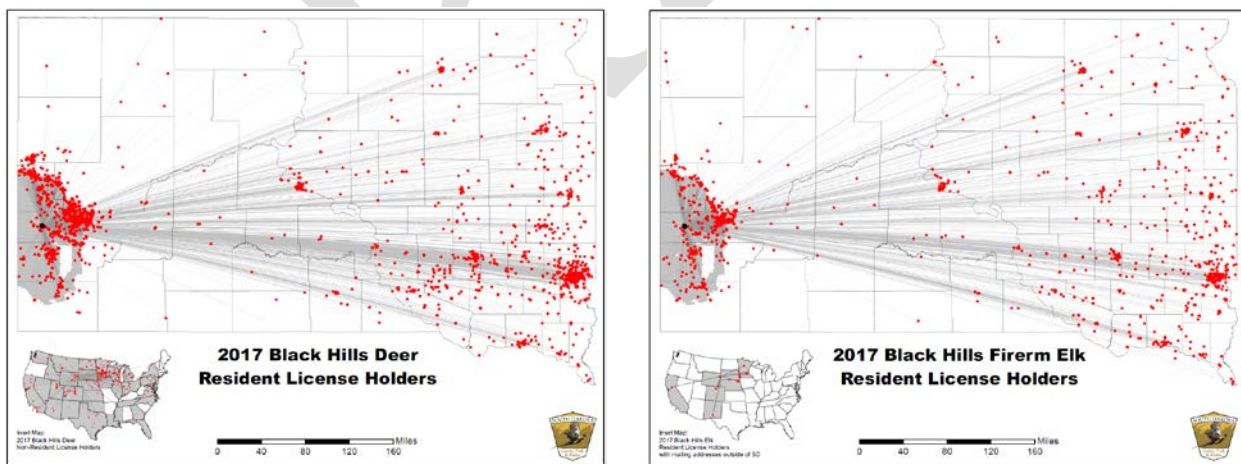


Figure 12. Physical address of licensed hunters during the 2017 Black Hills firearm deer and elk hunting seasons.

Exposure to an area where a CWD-positive carcass has decomposed could be enough to cause infection in cervids (Saunders et al. 2012). Because of this risk, it is important that the carcasses of cervids possibly infected with CWD, including all bones and other waste from butchering (mainly the head and

spinal column), be disposed of in a way that protects uninfected cervids from exposure. While there are some disposal methods that have the potential to destroy prions, such as incineration at 1,800°F or digestion in sodium hydroxide, these methods are cost-prohibitive and not practical for most people (Hughson et al. 2016). Therefore, proper disposal in permitted landfills (e.g. buried), or restricting movement of potentially CWD-infected material is recommended.

Appropriate disposal of carcasses by hunters using a waste management provider or permitted landfill is not only ethical and the right thing to do; it is a practice that helps reduce the risk of CWD exposure and establishment into geographic areas currently not known to have CWD. The DENR has the regulatory authority of waste management (Appendix 3) and is assisting GFP CWD efforts by providing information and locations of permitted landfills to make available to the public (Figure 13). If a permitted landfill is not located near your residence, please contact your waste management provider to learn more on proper disposal options. Many waste management providers allow carcasses to be disposed of in the dumpsters provided to their customers. Hunters, taxidermists, meat processors and others can find a permitted landfill on this [interactive map](#), along with their physical location and phone number.

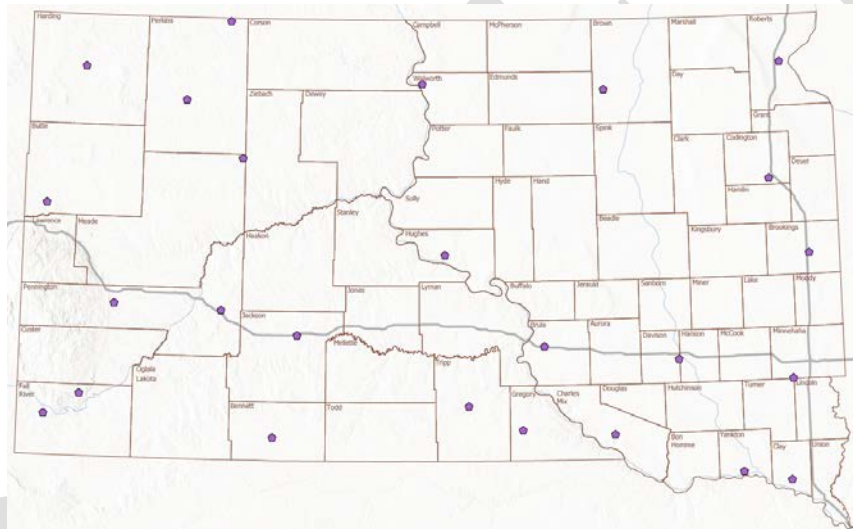


Figure 13. Distribution of licensed regional and restricted use landfills currently authorized to accept carcasses in South Dakota.

The following are suggestions for consideration to reduce the spread of CWD in South Dakota via the anthropogenic movement of carcasses:

New Regulations for Consideration

- Require the following two options for hunters to transport a harvested deer or elk out of a known South Dakota CWD endemic area:
 - Only cut and wrapped meat; quarters or other portions of meat with no part of the spinal column or head attached; antlers, hides or teeth; finished taxidermy mounts; and antlers attached to skull caps that are cleaned of all brain tissue.
 - Whole cervid carcasses and high-risk carcass parts from harvested cervids may be transported from known CWD endemic areas only if the carcass is directly delivered to a licensed taxidermist, commercial processor, or to the hunters domicile **AND** shall dispose of all remaining carcass parts and other tissues taken from a known CWD endemic area with a waste management provider or

permitted landfill. Game processors licensed by USDA or AIB shall dispose of carcasses as required by the conditions associated with such license.

- Create administrative rules that would establish the penalty and fines associated with the improper intrastate transportation and disposal of carcasses.
 - ✓ *Action*: would require changes to South Dakota administrative rules via GFP Commission for big game transportation and carcass disposal for hunters, taxidermists and game processing facilities.
 - ✓ *Supportive Information*: provides a level of benefit in minimizing the spread of CWD via the anthropogenic movement of carcasses; South Dakota currently has no restriction on the intrastate movement of carcasses. These suggested regulations reduce the risk of CWD contaminated material being transported and being improperly disposed outside of a known CWD endemic area.

Best Management Practices

- When transporting a cervid carcass from areas where CWD has not been confirmed, only transport the following: cut and wrapped meat; quarters or other portions of meat with no part of the spinal column or head attached; antlers, hides or teeth; and antlers attached to skull caps that are cleaned of all tissue. If the whole carcass is removed from the location of harvest, dispose of all unused cervid carcass parts in a trash container offered by a waste management provider or at a permitted landfill (Figure 12).

Feeding

Inslerman et al. (2006) define feeding as the act of intentionally placing any food for use by wildlife on an annual, seasonal or emergency basis and baiting as the act of intentionally placing food attractants to manipulate the behavior of wild animals. Feed is defined as any material used to feed or attract wild animals for non-hunting purposes including recreational and supplemental feeding except when used to feed birds and small mammals. In South Dakota, the use of salt to attract big game is prohibited (SDCL § 41-8-16). Furthermore, the use of a bait station is prohibited from August 15 to February 1, and from March 15 to May 31, inclusive, to attract any big game animal. A bait station is a location where grains, fruits, vegetables, nuts, hay, minerals, or any other natural food materials, commercial products containing natural food materials, or by-products of such materials are placed or maintained as an attractant to big game animals for the purpose of hunting. The use of scents alone does not constitute a bait station (ARSD § 41:06:04:03).

Severe winters can cause many people to be concerned about the welfare of wildlife and their ability to survive winter months. Deer and elk adapt to survive winter by growing a thick coat of hair, increasing fat accumulation in the summer and fall, reducing metabolism in winter, utilizing thermal cover, exhibiting migration strategies and substantially reducing activity (Marchinton and Hirth 1984, DelGiudice et al. 2002). South Dakota Department of Game, Fish and Parks currently does not conduct winter feeding and discourages the public from feeding deer and elk. When persistent severe winter conditions concentrate deer or elk onto private property, GFP may utilize short-stop baiting as a strategy to keep deer or elk off private lands and away from stored livestock feeds. Short-stop bait typically consists of corn or alfalfa hay. Because of the many issues associated with feeding wildlife, GFP uses short-stop baiting as a last resort to address depredation issues when other management techniques are not successful or practical.

Feeding of deer and elk can have negative impacts. Baiting and feeding practices likely change movement patterns, migration strategies and concentrate animals at the feeding site (MDWG 2013). Feeding can alter normal avoidance behavior toward humans and human activities. When deer and elk are concentrated into an area, it can attract predators and subsequently predation can increase. Feeding can contribute to overpopulation particularly in localized areas. This overpopulation can lead to over browsing of the natural vegetation creating a lack of available forage and thus starvation (Williamson 2000).

High-carbohydrate browse can be important to get through the winter because these foods produce quick energy and body heat; however, sudden changes to diet may be harmful and in some cases fatal. Introducing corn to very hungry deer or elk when there is very little other food available can make it difficult for the animal to digest the corn. Deer and elk stomachs are adapted to digest certain types of food in winter. They are ruminants that have a four part stomach with microbes that help digest forage intake. In winter, the microbes within the stomach are different from the microbes in spring, summer and fall. Deer and elk require a period of time to acquire the microbes necessary to digest certain types of food. They do not have the ability to change quickly with a sudden introduction of high-carbohydrate food. This can cause acidosis (grain overload) or enterotoxemia (overeating disease) which can make the animal sick and in some cases can cause death (Wobeser and Runge 1975).

Repeated use of feeding areas poses a long-term risk of disease transmission. When diseases such as chronic wasting disease (CWD) or bovine tuberculosis are present in populations, high contact rates at baiting or feeding areas facilitate disease transmission (Inslerman et al. 2006). Chronic wasting disease is transmitted between animals by direct contact with infectious saliva, urine and feces (Saunders et al. 2012). Infected animals can transmit CWD while outwardly not appearing to be sick. Further, CWD can be transmitted indirectly from contaminated items in the environment such as soils where it can persist for decades. Allowing the feeding of wildlife in CWD endemic areas will likely cause the disease to persist and spread.

While a regulation to prohibit the feeding of big game species year round in known CWD endemic areas (excluding bird feeding and normal agricultural practices) and to prohibit baiting year round for big game species at a statewide level was considered, these are not a recommendation at this time. These topics need further evaluation and the legal authority regarding the feeding of wildlife will be further investigated. In addition, the Department will continue to work with city and county governments on the feeding of wildlife, in particular big game species, due to disease-related issues, overpopulation within urban areas and human-wildlife conflicts.

The following is a suggestion for consideration to reduce the spread of CWD in South Dakota via the anthropogenic concentration of cervids:

Modified Regulation for Consideration

- At minimum, modify the current baiting rule prohibition from “from August 15 to February 1, inclusive, and from March 15 to May 31, inclusive” to “from August 1 to February 1, inclusive, and from March 15 to May 31, inclusive”.
- ✓ *Action:* would require a change to South Dakota administrative rules via GFP Commission. A Department recommendation will likely be provided to the GFP Commission in May and finalized in June to become effective for the 2019 hunting seasons.

- ✓ *Supportive Information*: this suggestion for consideration is a result of the archery deer start date from the third Saturday of September to September 1 that was modified for the 2018 archery deer season. Provides a minimal benefit in minimizing the anthropogenic concentration of cervids and spread of CWD.

Best Management Practices

- Due to the reasons already provided above, encourage the public through an aggressive media campaign to not feed wildlife (excluding bird feeding). Develop and market information related to the downsides of feeding wildlife.
- For areas where deer or elk could be attracted to bird feeders, avoid placing bird feed on the ground or at a height of less than six feet above the ground.

Urine-based Scents and Lures

As keepers of the public trust, GFP must be cognizant of any threats to our wildlife resources and CWD has the potential to have some very significant long-term impacts on our deer and elk herds. Although urine-based lures are seemingly a low-level threat, they are something that must be considered nonetheless. This is a topic that has gained some attention in recent years, and states and provinces across North America have had varied responses to the use of urine-based lures.

Deer urine used in attractants is collected at commercial deer farms. Urine is collected in catch pens where it is virtually impossible for urine to be completely pure and not be free from feces and even saliva (Spitznagel 2012). Within months of animal being infected with CWD, they are known to be able to begin shedding prions in the saliva, urine, and feces (John et al. 2013). Due to the long incubation period, it is impossible to tell when a deer begins shedding prions (Henderson et al. 2015). As a result, urine may be collected from deer actively shedding prions but not displaying clinical symptoms. Urine is one of the lowest risk sources for prions from an infected animal, whereas meat is much more of a risk and brain and spinal cord tissues are most infectious; natural urine-based products still poses a threat to wild cervid populations (Henderson et al. 2015, Plummer et al. 2017). One single prion may be all it takes to infect an individual animal (Fryer and McLean 2011). Experts on CWD transmission maintain that being cautious is advisable as any potential source of CWD contamination to local cervid herds is not worth the risk.

Prions are capable of binding to soil particles and have been shown to be taken up into plants (Johnson et al. 2006; Pritzkow et al. 2015). This allows prions to contaminate the environment for years after they are introduced. Current observations suggest that prions may persist in the soil for an unknown, extended period of time. Humic acid found within soil organic matter can affect the ability of CWD prions to bind to the soil, thus allowing some plants to uptake the prion and make available to grazing animals, such as deer and elk (Kuznetsova et al. 2018). It is unknown at this time how these findings relate to the wide variety of soil types, their organic matter and level of humic acid found within South Dakota soils.

The precautions that many urine suppliers are taking appear comforting, but are still not a guarantee to consumers. Many of the scent manufacturers (approximately 30) participate in the Archery Trade Association's (ATA) Deer Protection Program, which seeks to ensure that the ATA member scent manufacturers and their product suppliers do everything possible to prevent the spread of CWD in the United States. Source herds must participate in the USDA's HCP which is administered by each State. The program ensures CWD testing for every deer, 12 months or older, that dies within participating

facilities and also that CWD has never been found on those premises. They also adhere to strict compliance with documentation of cervid importation and exportation from their facilities, among other measures. Products on retail shelves associated with this program will bear an official ATA Seal of Participation.

There is no regulatory oversight of urine-based products by state or federal agencies and thus no way to confirm if the urine sold as deer lure and applied to the landscape is free of CWD prions. Therefore, it cannot be determined that a urine-based product is safe prior to it going on the shelves, and it is not practical to follow up on determining where potentially infected urine was used after it was purchased.

Multiple states have banned the use of deer urine lures, including Alaska, Arkansas, Arizona, Michigan, New Mexico, Pennsylvania, Vermont, Virginia, and Tennessee, among others. While most states do not restrict the use of these products at this time, others have found middle ground in advising against the use. States such as Maine, Maryland and New York provide guidance suggesting the use of synthetic lures instead, and to not put urine-based lures directly on the ground or vegetation or where deer can come in direct contact with the product. Much remains unknown about the relationship between prions, deer urine and the spread of CWD.

The Association of Fish and Wildlife Agencies provide BMPs related to CWD and warn against any threats of transmitting and establishing CWD in new areas (Gillin and Mawdsley 2018). It is suggested to eliminate the sale and use of natural cervid urine-based products such as scent lures, scents, pour-ons, sprays, etc., as compliance should completely reduce the risk of importing CWD in this manner. A potential alternative to a complete ban on urine products is to allow only products into the state that originate from states or provinces that rigorously test and where there have been no detections of CWD. A safer alternative is to use fully synthetic scent products. It is generally believed that synthetics work as well as natural urine-based products. There may still be some risk here, however, as there is no oversight guaranteeing that a product is 100% synthetic. Education is one of our strongest allies in the fight against CWD. Regardless of any actions that may be enacted on this topic, the more the public is informed, the more effective the efforts will be in limiting the spread of this troubling disease.

GFP will continue to investigate the practices used by urine-based distributors and review research findings related to the topic. For now, the following are best management practices to reduce the spread of CWD in South Dakota via the introduction of prions by urine-based scents and lures:

Best Management Practices

- Use full synthetic urine-based products
- If using natural urine-based products, practice the following:
 - avoid the application of products onto the ground or plants
 - use a scent-wick type system placed above ground and remove from your hunting area after hunting
 - when not used, keep products enclosed in a container
 - dispose all products into container provided by waste management provider or a permitted landfill

Translocation of Cervids

Natural dispersal and migrations of wild deer and elk contribute to the spread of disease (Conner and Miller 2004; Miller and Williams 2004; Miller et al. 2000; Miller et al. 2006; Potapov et al. 2016). As such, disease will spread across the landscape on its own, but wildlife agencies must take responsibility for limiting unnecessary movements of these animals in the name of wildlife health. It is well documented that human-induced movements of captive and wild cervids has resulted in broad geographic expansion and distribution of CWD and anthropogenic movements can both increase the rate at which CWD can be spread and facilitate introductions into new areas (Williams et al. 2002; Belay et al. 2004). Translocating cervids without a reliable antemortem test for CWD presents too great a risk for wildlife agencies to ignore.

Translocation of wild animals in response to depredation or overcrowding is occasionally suggested as a solution, but can cause some conflicts amongst landowners, municipalities, and wildlife agencies. Examples of potential reasons for translocating deer are the following: 1) removal of animals from areas of overabundant deer where lethal control may not be currently acceptable, 2) desire for more deer in areas where deer densities are abnormally low, 3) rehabilitated animals, and 4) other social reasons.

Regulated hunting, or other lethal control measures when warranted, is the preferred method used by GFP when dealing with populations of wildlife that are over objective. Some members of the public maintain that live capture and translocation is more humane than lethal removal, but that is debatable (Craven et al. 1998; Messmer et al. 1997; Stout 1997). Wild animals are easily stressed when in confinement and in the presence of humans and can die as a direct result of translocation activities. Numerous studies have shown that live capture and translocation is more expensive, relatively inefficient and does not significantly extend the life span of individual animals that are relocated (Ishmael and Rongstad 1984; O'Bryan and McCollough 1985; Withman and Jones 1990). Additionally, many times over it has been shown that survival rates of translocated white-tailed deer are much lower than those of resident deer, suggesting little benefit to populations receiving translocated animals (Beringer et al. 2002). Many species of wildlife have the ability to reproduce very quickly suggesting that translocation activities would need to occur on a regular basis to achieve and maintain population objectives. Given the reduced survival and low productivity of translocated animals, there is little benefit to be had for populations in low density areas where animals are released. Due to the limited benefit and recurring nature of these types of translocations, they can quickly become cost prohibitive (Beringer et al. 2002; Massei et al. 2010).

The Association of Fish and Wildlife Agencies recommends prohibiting cervid rehabilitation activities as it involves the translocation and/or release of wild animals (Gillin and Mawdsley 2018). AFWA also states that a BMP is to eliminate the risk of anthropogenic movements of CWD by prohibiting the movement of any and all live cervid translocations. Most states have banned the interstate movement of any wild member of the cervid family, and potential intrastate movements conducted by wildlife agencies pose a real threat to spread diseases within the boundaries of a given state.

Risk of disease transport, stress on animals, low survival rates, prohibitive costs and little value to augmented populations are all reasons to avoid translocations. Natural dispersal and migrations of wildlife will cause diseases to spread but translocations have too great a potential to exacerbate the movement of disease.

The following are suggestions for consideration to reduce the spread of CWD in South Dakota via the translocation of cervids:

Develop GFP Policy and AIB Collaboration

- Since there is no reliable antemortem (i.e. live) test for CWD, it is recommended that GFP develop a policy that prohibits the translocation of free-ranging cervids, which includes supportive information and alternative tools to address such management issues or requests.
 - ✓ Action: Develop a GFP policy that will provide guidance and assistance with responding to such requests.
- South Dakota Department of Game, Fish and Parks will continue to collaborate with AIB on topics related to the management of CWD and finalize a memorandum of understanding.

Game Processing

Licensure of game processors depends on the amount of amendable product (e.g., beef or pork) added to the wild game. The South Dakota Animal Industry Board administers the South Dakota Meat Inspection Program, and maintains “at least equal to” designation with the USDA’s Food Safety Inspection Service. The Animal Industry Board or USDA license and regulate South Dakota meat processors which add amendable products (>30% tallow or >3% protein) to wild game. Figure 14 shows the location of approximately 100 different game processing facilities across South Dakota as of December 2018. Establishments which process wild game without adding these amendable products in those amounts do not require licensure by either entity and thus are not currently regulated. Anthropogenic movement of prions from carcasses or trophy heads represents a high risk for CWD introduction if CWD-positive parts are moved across the landscape and not properly discarded. Thus it is important that commercial processors dealing strictly with wild game, as well as home processors, are not over looked when considering BMP’s or additional regulations.

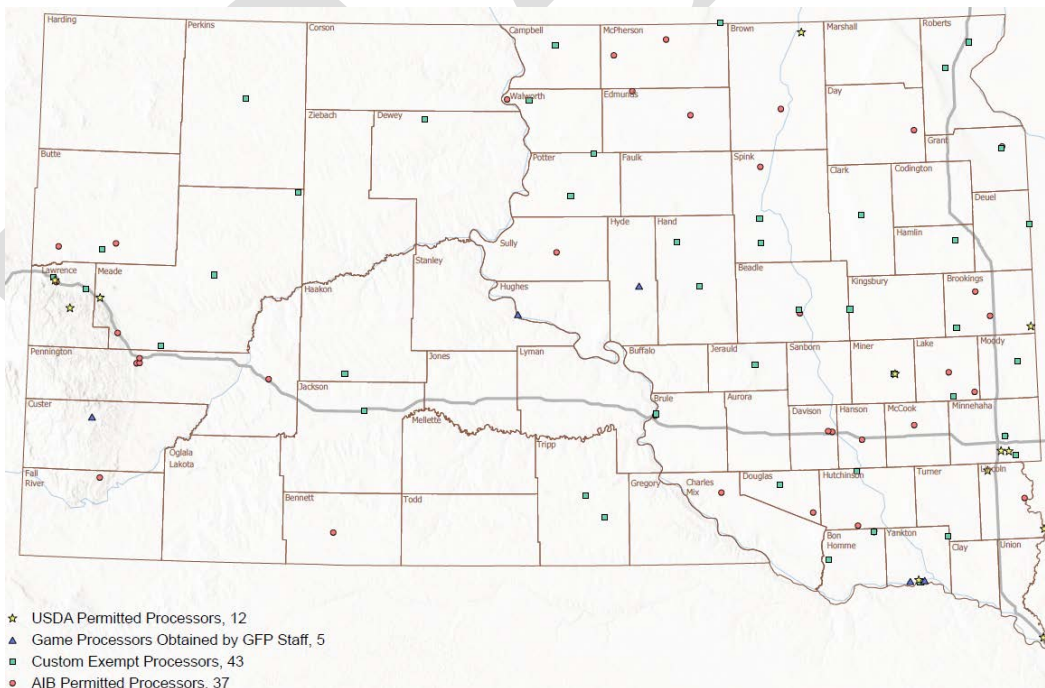


Figure 14. Distribution of known commercial game processors that could potentially process venison in South Dakota.

All game processors can help prevent or slow the spread of CWD by educating themselves and their employees about the disease and to follow proper carcass disposal procedures. Currently, GFP has the legal authority to require wildlife processing facilities to properly dispose of remaining cervid carcasses (ARSD 41:06:03:10). The South Dakota Department of Game, Fish and Parks will provide information regarding proper disposal techniques and a map of permitted landfills for each wildlife processing facility. The number and spatial distribution of known processors presents a unique opportunity to work together. Collaboration and ideas to assist with sampling efforts can be found in the *Surveillance* section of this action plan.

Sportsmen and women will be encouraged to do their part as well. GFP will provide information about CWD, proper carcass disposal and sample submission information to hunters via several different media platforms. Hunters need to be attentive and practice safe disposal of their harvested cervids, especially if the animal was taken in or near a known CWD endemic area.

The following is a suggestion for consideration to reduce the spread of CWD in South Dakota while processing and disposing of cervid carcasses:

New Regulation for Consideration

- Require any game processing facility (excluding those permitted by USDA or AIB) to properly dispose of all remaining deer and elk carcass parts with a waste management provider or at a state permitted landfill. Game processors licensed by USDA or AIB shall dispose of carcasses as required by the conditions associated with such license.
 - ✓ Action: would require changes to South Dakota administrative rules via GFP Commission.
 - ✓ Supportive Information: provides a benefit by reducing the chance of CWD prions being introduced into the environment via unused carcass parts. It is unknown how game processing facilities not permitted by USDA or AIB currently dispose of carcass parts. GFP will coordinate with the South Dakota Department of Revenue to inform those small businesses not permitted by USDA or AIB, yet whose state sales tax license would allow for the commercial processing of venison. Game processors licensed by USDA or AIB shall dispose of carcasses as required by the conditions associated with such license.

Best Management Practices

- All remaining deer and elk carcass parts from private processing facilities should be properly disposed with a waste management provider or at a state permitted landfill.
- Due to the reasons already provided above, encourage the public through an aggressive media campaign to properly dispose of remaining deer and elk carcass parts. Develop and market information related to the downsides of improper carcass disposal.

Taxidermy

The number of taxidermists varies across the state with the highest densities being east of the Missouri River (Figure 15). By statute, the GFP Commission has the authority to administer taxidermist licenses (SDCL 41-6-33) and to develop requirements needed to be met in order to obtain a taxidermist's license. As of December 2018, there were 197 taxidermists in South Dakota. The number and spatial distribution of taxidermists presents a unique opportunity to work together. Collaboration and ideas to assist with sampling efforts can be found in the *Surveillance* section.

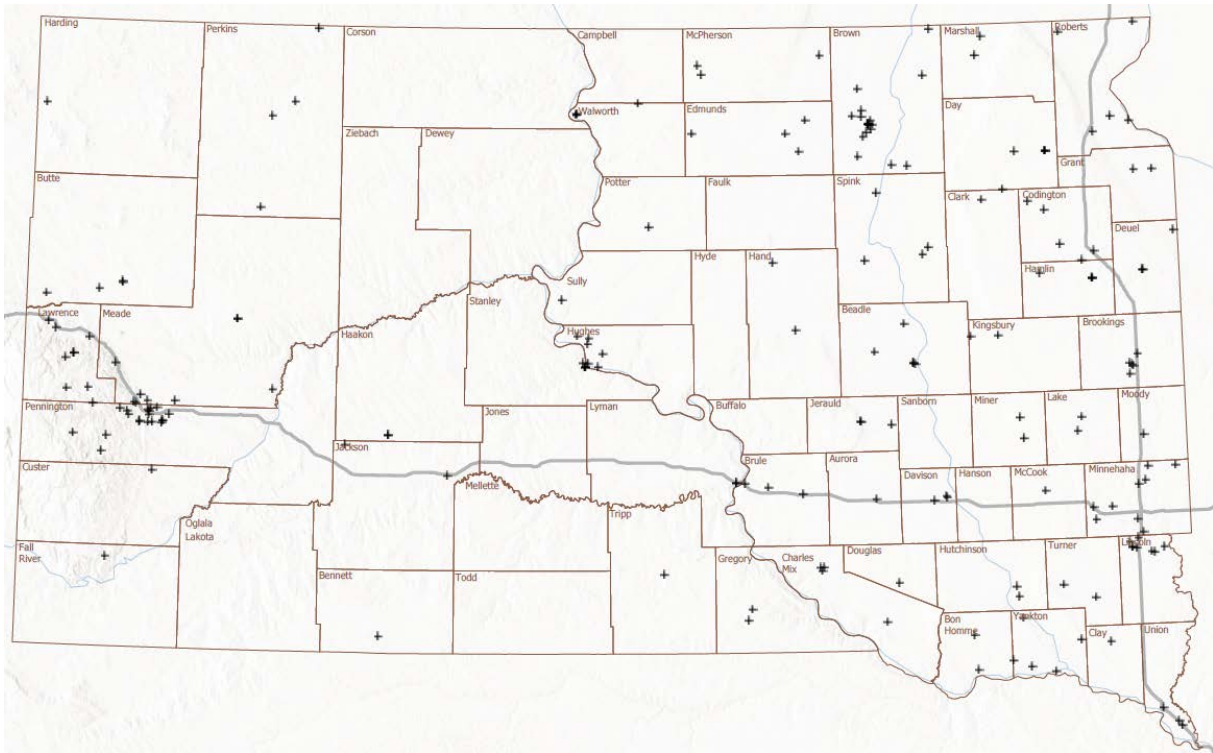


Figure 15. Distribution of licensed taxidermists in South Dakota, 2018.

Currently there is no regulation in place requiring taxidermists to follow certain carcass disposal methods. As a way to prevent the spread of CWD and possibly other diseases, GFP staff will work with the GFP Commission and SD Taxidermy Association to consider the necessary regulations for carcass disposal at a permitted landfill.

Taxidermists acquire cervid carcasses and parts for taxidermy from South Dakota and other states across the nation. Therefore, ongoing and regular communication will be important to keep them updated on new CWD endemic areas. The South Dakota Department of Game, Fish and Parks discourages methods of disposal that could leave prions on the landscape, such as open pits, compost, discarded on the ground or fed to animals.

The following is a suggestion for consideration to reduce the spread of CWD in South Dakota via the proper disposal of carcass remains from licensed taxidermists and those individuals who practice their own taxidermy:

New Regulation for Consideration

- Require licensed taxidermists to properly dispose of all remaining deer and elk carcass parts with a waste management provider or at a state permitted landfill.
 - ✓ *Action:* would require changes to South Dakota administrative rules via GFP Commission.
 - ✓ *Supportive Information:* provides a benefit by reducing the chance of CWD prions being introduced into the environment via unused carcass parts. It is unknown how licensed taxidermists currently dispose of carcass parts.

Best Management Practices

- All remaining deer and elk carcass parts from those who practice their own taxidermy should be properly disposed with a waste management provider or at a state permitted landfill.
- Due to the reasons already provided above, encourage the public through an aggressive media campaign to properly dispose of remaining deer and elk carcass parts. Develop and market information related to the downsides of improper carcass disposal.

Urban Areas

Deer can be found within and adjacent to many urban areas throughout South Dakota. Some municipalities are dealing with a number of complaints from citizens advising them of damage and public safety issues caused by deer. City officials deal with deer-vehicle collisions, deer damaging landscaping and gardens, deer attacks on pets and deer acting aggressively towards humans. In an elevated effort to address these issues, some municipalities contact GFP for assistance. The South Dakota Department of Game, Fish and Parks works with city officials to develop deer management plans to address issues within city boundaries. The South Dakota Department of Game, Fish and Parks has worked with several municipalities to conduct deer surveys within city limits since 1995. The goal of these surveys is to monitor population fluctuations within the city.

As deer populations increase, some municipalities have sought kill permits from GFP to allow the removal of antlerless deer within city limits. The South Dakota Department of Game, Fish and Parks requires that an urban deer management plan that incorporates public input and the prohibition of feeding deer by residents within city limits be in place before GFP will authorize lethal control. Other techniques used across the United States such as trap and relocation, birth-control, fencing, and compensation are all non-lethal techniques that can be used to manage urban deer with varying levels of success; most wildlife agencies do not support the use of trap and relocation due to high mortality rates, high financial costs, and potential risk of spreading disease (Ishmael and Rongstad 1984; Messmer et al. 1997; Urbanek et al. 2011). The South Dakota Department of Game, Fish and Parks share these concerns and does not use trap and relocation, compensation or birth-control. Habitat modifications, planting different kinds of landscaping, fencing and repellents are also techniques used to deter deer damage, but have limited success or low citizen support to implement (DeNicola et al. 2000).

Kill permits are issued on a limited basis from GFP and have thus far been issued to the cities of Custer, Hot Springs, Pierre, Rapid City, Sioux Falls, Sturgis and Whitewood. One of the requirements of the kill permit is that all meat be donated to local food pantries or needy individuals. Although there have been no documented instances of CWD crossing any species barriers, the CDC recommends that meat not be consumed from CWD positive animals. Chronic wasting disease was first detected within city limits in South Dakota in Rapid City in 2002. Since then, GFP has opportunistically been testing deer through sick surveillance and testing of deer culled for urban deer population management. To date, CWD positive deer have been found within the city limits of Custer, Rapid City and Hot Springs. Beginning in 2018, CWD testing of all deer was a requirement for all city kill permits.

The following are best management practices to reduce the spread of CWD within South Dakota via anthropogenic concentration of cervids and to assist with CWD surveillance efforts:

Best Management Practices

- If a regulation that prohibits the feeding of wildlife (excluding bird feeding and normal agricultural practices) year round is not implemented, encourage city governments to implement and enforce ordinances that prohibit the feeding of wildlife within city limits.
- As part of the kill permit issued by GFP to municipalities to remove deer, require CWD tests from all cervids removed prior to distribution of venison. This not only ensures that donated venison is not CWD positive, but assists with GFP with surveillance efforts. GFP will obtain samples from all removals and pay for associated lab fees for testing.

Donation of Venison

Each year hunters donate thousands of pounds of venison to needy people and families across South Dakota. This donation process is facilitated through South Dakota Sportsmen Against Hunger (SAH), a non-profit corporation which works with game processors across the state, as well as Feeding South Dakota. From July 1, 2017 – June 30, 2018, there were 218 antlerless deer and 217 male deer donated through SAH. Currently, GFP is committed to financially assisting SAH financially with operation and game processing costs up to \$50,000 annually. If some level of CWD testing of donated deer and elk to SAH is decided, GFP would directly pay testing expenditures or provide additional funding to SAH to compensate for the costs associated with testing.

The following are recommendations for consideration to reduce the chance of CWD contaminated venison entering the food supply through donations or food pantries:

Best Management Practices

- At minimum, CWD testing should be required for any deer or elk harvested from a known CWD endemic area; OR
- Mandatory CWD testing of any deer or elk donated to SAH.

Summary of New Regulations for Consideration

Where the promotion of best management practices is likely not enough to address identified concerns to reduce the spread of CWD, new or modified regulations should be considered. Below is a summary of the regulations for consideration by the GFP Commission as already described in the *Preventive Measures* section of this action plan:

- New regulations
 - Importation of whole cervid carcasses and high-risk carcass parts into South Dakota is restricted from other states, regardless of CWD status of the exporting state. Only the following portions of hunter-harvested cervid carcasses may be brought into South Dakota: cut and wrapped meat; quarters or other portions of meat with no part of the spinal column or head attached; antlers, hides or teeth; finished taxidermy mounts; and antlers attached to skull caps that are cleaned of all brain tissue.
 - **EXCEPTIONS:** Hunters could enter the state with a whole carcass if directly delivered to a licensed taxidermist, commercial processor, or to the hunters

domicile within 24 hours of entering South Dakota AND dispose of all remaining carcass parts and other tissues taken from another state with a waste management provider or permitted landfill. Those carcasses only traveling through South Dakota would be exempt from this regulation.

- Require that all carcass remains from deer or elk harvested from a known endemic area within South Dakota be properly disposed of with a waste management provider or permitted landfill. This would apply to hunters, taxidermists and game processors not licensed by USDA or AIB. Game processors licensed by USDA or AIB shall dispose of carcasses as required by the conditions associated with such license. Hunters would have the following two options:
 - Only cut and wrapped meat; quarters or other portions of meat with no part of the spinal column or head attached; antlers, hides or teeth; finished taxidermy mounts; and antlers attached to skull caps that are cleaned of all brain tissue.
 - Whole cervid carcasses and high-risk carcass parts from harvested cervids may be transported from known CWD endemic areas only if the carcass is directly delivered to a licensed taxidermist, commercial processor, or to the hunters domicile AND shall dispose of all remaining carcass parts and other tissues taken from a known CWD endemic area with a waste management provider or permitted landfill. Game processors licensed by USDA or AIB shall dispose of carcasses as required by the conditions associated with such license.
- Establish the penalty and fines associated with the improper interstate and intrastate transportation and disposal of carcasses.
- Modified Regulations
 - At minimum, modify the current baiting rule prohibition from “from August 15 to February 1, inclusive, and from March 15 to May 31, inclusive” to “from August 1 to February 1, inclusive, and from March 15 to May 31, inclusive”.

SURVEILLANCE

Presence/Absence and Monitoring Prevalence Rates

The goal of surveillance strategies in South Dakota is to determine the likely spread of CWD to new units where the disease has not been detected in wild, free-ranging cervids. Assuming natural movement of CWD by wild cervids will provide the most predictable disease spread across the landscape, high surveillance sampling goals will be established for units with no known CWD positive wild cervids that are within the expected dispersal distance of a known, wild CWD positive cervid (Table 3, Figure 16). These units will be classified as tier 1 units. Annual sample size goals ($n = 138$) in tier 1 units will result in a 75% probability of detecting at least 1 positive cervid at 1% prevalence rates, and sampling will be repeated for 3 consecutive years ($n = 414$) to obtain >98% probability of detecting CWD at 1% prevalence rates (Table 4). These probabilities assume the sample is representative of the whole population in the sample unit. Sampling efforts for tier 1 units will end once the minimum sample size is reached or a CWD positive cervid is detected, whichever comes first. Annual sample size goals can be decreased for units with lower populations, but will only notably decrease when unit populations are below ~300-500 animals (Figure 17). Secondary, optional prioritization, with low surveillance sampling goals (tier 2), will consider increased risk of CWD contamination based on known cervid migration or movement corridors, or high carcass importation rates from units with CWD positive animals (Tables 4

and 5). High and low surveillance strategy sample size goals will combine all cervids with a goal of monitoring spread of the disease in wild animals, regardless of species (Table 4). Meeting sampling goals will be optimized with targeted surveillance (Table 5).

Surveillance in units that are not classified as Tier 1 or 2, including known CWD endemic areas of wild cervids, will continue baseline surveillance. Without pre-determined research design and management objectives, prevalence rates will not be quantified. If research objectives require prevalence rates or a management strategy will be implemented based on prevalence rate thresholds (i.e., implement management strategy X if prevalence exceeds Y%), prevalence will be estimated by collecting a representative sample with desired levels of precision. In the event CWD is detected in a captive cervid facility, GFP will coordinate with AIB to determine surveillance strategies, which should focus sampling efforts near the contaminated facility.

Table 3. CWD disease status unit classification and recommended surveillance strategies.

Unit Class	Surveillance Strategy	Comments
Known Positives		
Wild	Baseline surveillance	Areas with ≥ 1 wild positive cervid (CWD endemic areas)
Captive	Sample near source	Determine surveillance after coordination with AIB
No Positives		
Tier 1 units	High surveillance	Units ≤ 25 miles ^a of wild positive cervid
Tier 2 units	Low surveillance	Other priority units determined to be at elevated risk ^b
Tier 3 units	Baseline surveillance	Rest of state—Opportunistic sampling

^a Based on mean yearling white-tailed deer dispersal distance from studies in IL, MD, MT, PA, and WI (Long et al. 2005; Lutz et al. 2016; Nixon et al. 1994; Nixon et al. 2007; Peterson et al. 2017; Rosenberry et al. 1999; Skuldt et al. 2008).

^b Criteria could include units near major cities where hunters may be more likely to transport carcasses from known CWD endemic areas (e.g., Sioux Falls) or units where landscape features (e.g., river drainages) or known migration routes may facilitate natural movement from known CWD endemic areas.

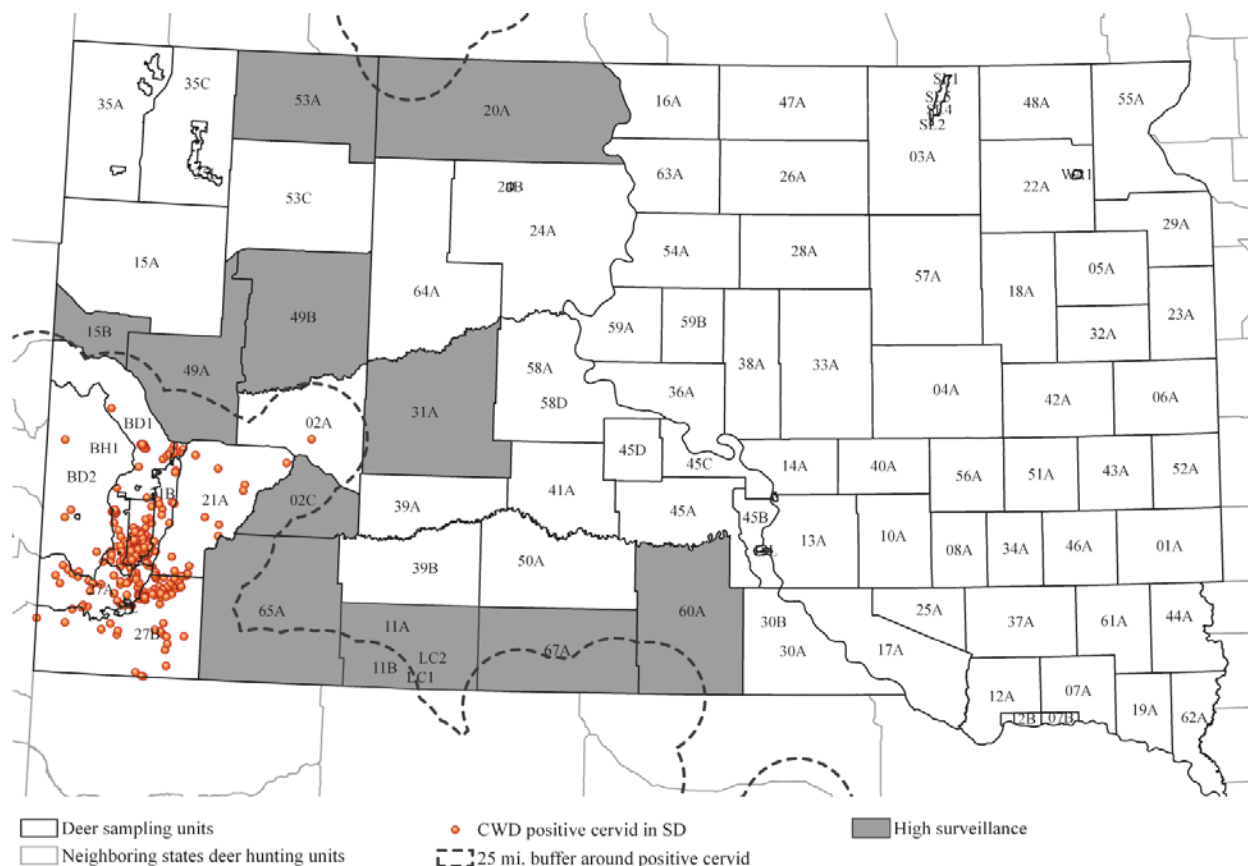


Figure 16. Proposed high surveillance deer sampling units (gray shaded polygons) ≤ 25 miles of known CWD positive wild cervid.

Table 4. Surveillance strategies with sample size goals and detection probabilities based on simple random sampling, representative of entire area, and assuming 100% test sensitivity ($\frac{\ln(1-detection\ probability)}{\ln(1-prevalence)}$; Jennelle et al. 2018). Three year detection probabilities assume independent detection probabilities each year ($1 - \prod_{y=1}^{total\ years} (1 - detection\ probability_y)$). Failure to collect representative sample (e.g., majority of samples from a small proportion of areas in the unit) will decrease confidence in detection of disease.

Surveillance Strategy	Points ^a /year	Detection Probability		
		Per year 1% prevalence	Repeated 3 years 1% prevalence	Repeated 3 years 0.1% prevalence
High	138	75.0%	98.4%	33.9%
Low	69	50.0%	87.5%	18.7%

^a Sample sizes will decrease in units with smaller populations using finite population correction factor (Figure 16). Targeted surveillance towards individuals with higher probability of CWD will decrease sample size requirements to meet same probabilistic goals (e.g., suspect positives, harvested adult males; Table 5).

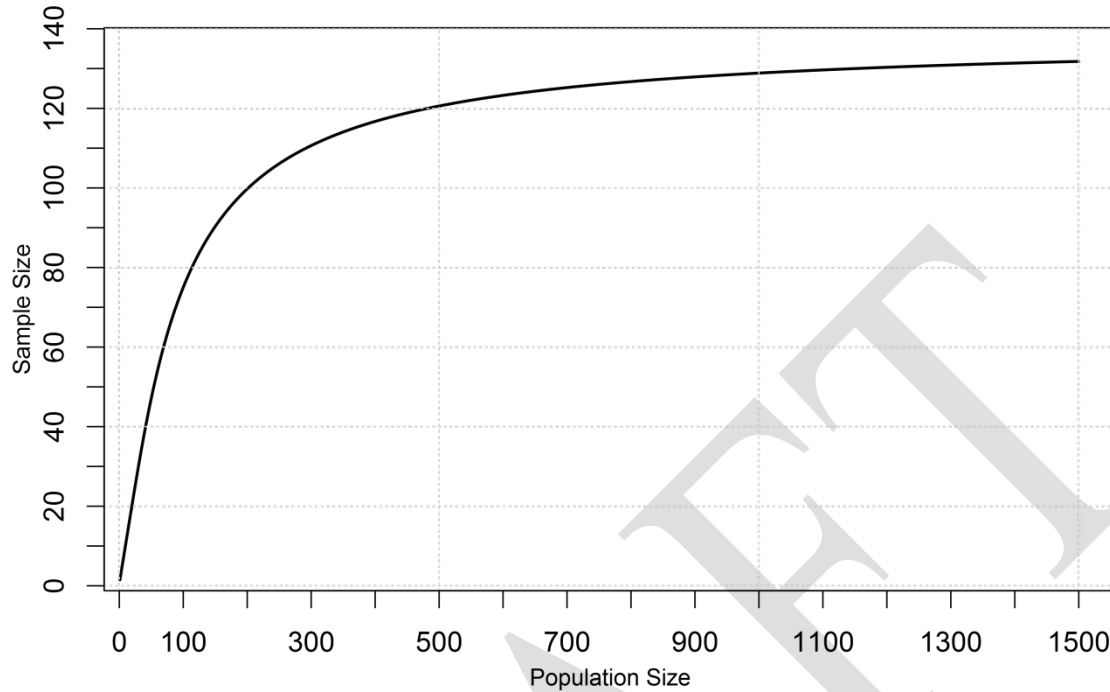


Figure 17. Annual sample sizes asymptote at 138, and will decrease in units with smaller populations using finite population correction factor $\left(\left(1 - \text{detection probability}^{\frac{1}{N * prevalence}} \right) \left(\hat{N} - \frac{\hat{N} * prevalence - 1}{2} \right) \right)$; Fosgate 2009).

Table 5. Targeted surveillance weights (R ; Jennelle et al. 2018) and approximate number of samples (n) needed to achieve 75% detection probability of finding ≥ 1 CWD positive if disease prevalence is $\geq 1\%$ (i.e., High surveillance strategy).

Mortality Source	R	n
Clinical suspect; community reported	33.333	4
Clinical suspect; hunter harvested	9.091	15
Found dead from unknown cause	7.317	19
Hunter-harvested ≥ 2.5 yr. old male	3.226	43
Hunter-harvested ≥ 2.5 yr. old female	1.304	106
Hunter-harvested 1.5 yr. old male	1.000	138
Hunter-harvested 1.5 yr. old female	0.850	162
Vehicle collision	0.216	639
Hunter-harvested 0.5 yr. old female	0.084	1,643
Hunter-harvested 0.5 yr. old male	0.001	138,000

Strategies for Meeting Sampling Goals

No minimum sample size goals will be required for units with baseline surveillance strategies, but sampling will continue with voluntary sample submission and testing of all cervid carcasses that displayed behavior or symptoms consistent with an unknown sickness before death (e.g., emaciated, drooling, disoriented).

For units with established sampling goals, GFP staff will attempt to collect representative sample sizes by sequentially implementing the following strategies:

- A. Contract sample collection from deer-vehicle-collisions.
 - Explore options with South Dakota Department of Transportation (DOT) and GFP to collect samples (hold carcasses from designated areas for GFP to retrieve) for CWD testing from deer/elk-vehicle collisions. Thousands of carcasses are annually removed from South Dakota highways and could provide an efficient method of collecting samples in selected areas under suitable weather conditions to increase the likelihood samples would be viable for testing purposes (Figure 18). Participating contractors would be compensated for this assistance.
- B. Contract sample collection from taxidermists.
 - An incentivized partnership with taxidermists around the state will help increase the number of samples needed for testing, especially in those areas where additional samples are needed. With the assistance of taxidermists, a larger sample of mature bucks can be tested that otherwise may not be available through other sampling efforts. Interested taxidermists could be trained to remove lymph nodes for testing, and to properly preserve, label and package the specimen for temporary storage until samples can be sent in for testing. Participating taxidermists will be compensated for this assistance.
- C. Contract sample collection from game processors.
 - GFP will work with willing game processors to attach an identification tag to deer or elk heads and to properly store until GFP collect those samples. Participating game processors will be compensated for this assistance.
- D. Facilitate volunteer sampling.
 - Head boxes near public facilities for processing deer and elk including a processing shelter or kiosk and options for carcass disposal.
 - Incentives for sample submission.
- E. Mandatory road checks.

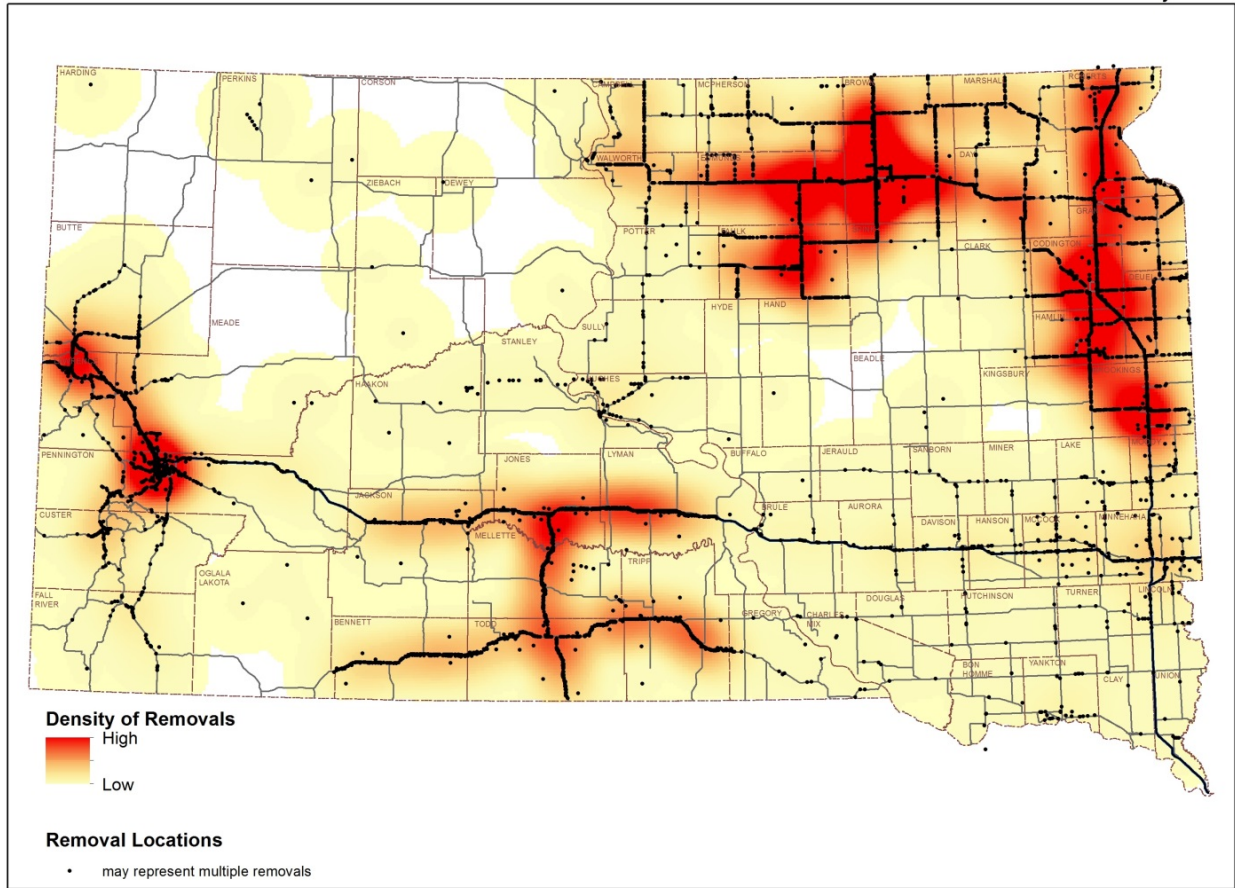


Figure 18. Distribution of deer and elk carcasses removed from state and federal highways by South Dakota Department of Transportation contractors, July 2015 – December 2018.

Hunter Submission for Testing

Hunters will serve as an essential partner in the successful implementation of this action plan. Currently, each successful elk or deer hunter shall submit samples for CWD testing for all elk and deer harvested from any CSP hunting unit. Moving forward, hunters with licenses to harvest deer in Tier 1 surveillance areas will be mailed information on how to submit voluntary CWD samples. Hunters who harvest deer or elk in Tier 2 or 3 surveillance areas can still have their animal tested for CWD. As a voluntary submission, hunters will be responsible for the cost of shipping and any professional sample collection costs unless a location is provided by GFP. The South Dakota Department of Game, Fish and Parks will pay for the testing cost of the sample at SDSU ADRDL. Results will be sent to both the hunter and GFP. These results will supplement GFP's surveillance effort across the state. The process for collecting samples from a harvested deer or elk and how to properly submit to SDSU ADRDL can be found at <https://gfp.sd.gov/cwd-testing/>.

In the event a hunter-harvested deer or elk tests positive, the hunter has two options: 1) retain the entire harvested animal; or 2) be given a choice to get their preference points and draw eligibility reinstated for the following year if the entire harvested animal (i.e., antlers, hide, carcass) is returned to GFP.

Tribal Surveillance

South Dakota contains nine Indian reservations, including the Cheyenne River, Crow Creek, Flandreau Santee, Lower Brule, Pine Ridge, Rosebud, Sisseton Wahpeton, Standing Rock and Yankton (Figure 19). Each is managed by a respective Native American tribe under tribal sovereignty and their respective tribal councils. Most tribes have a wildlife department that conducts various wildlife surveys, research, disease surveillance and make hunting recommendations to the tribal councils. With a combined land base of approximately 5,000,000 acres under tribal jurisdiction or approximately 10% of the total state land base, coordination between state and tribes on the management of CWD is crucial.

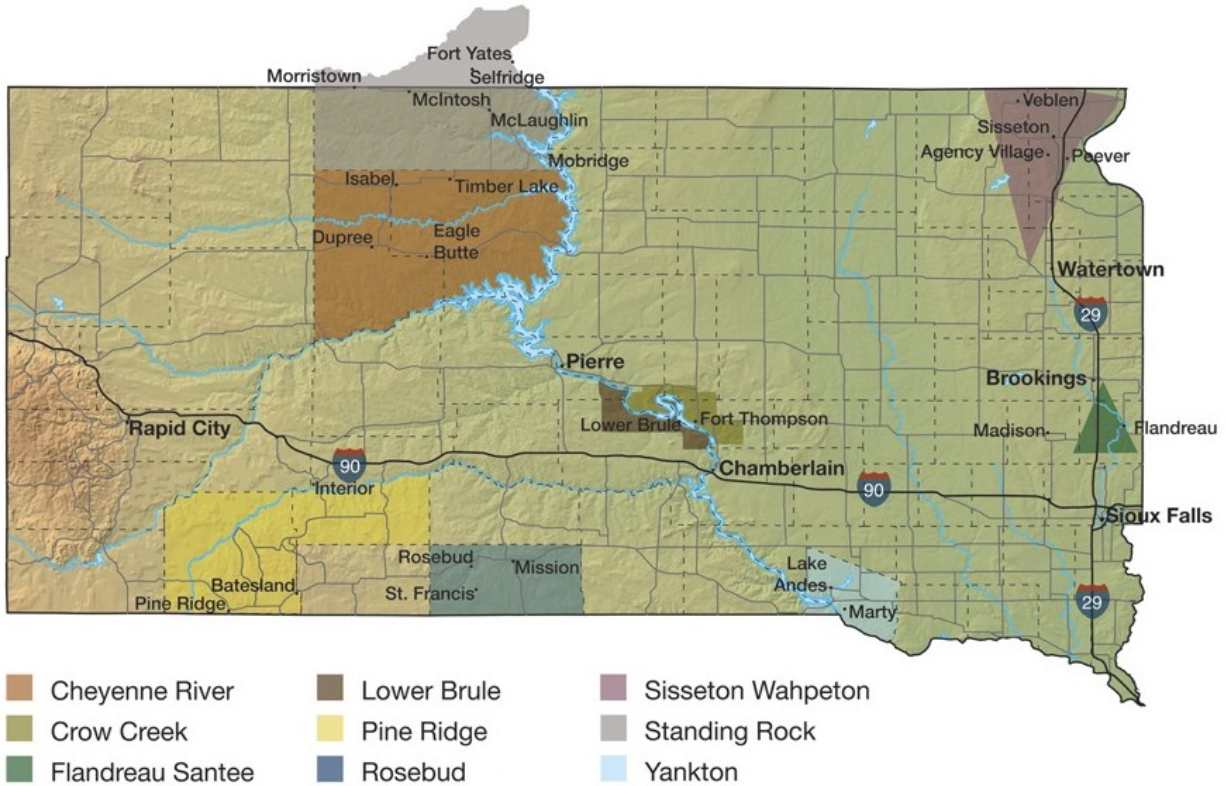


Figure 19. Tribal lands found in South Dakota. Source: South Dakota Department of Tribal Relations 2019.

In early 2018, GFP hosted a training day at the Rapid City GFP office to show interested members of wildlife management agencies of the Native American tribes of South Dakota how to pull samples from cervids for CWD testing. The testing focused on sample removal, storage and transport as well as steps to take following a positive test. Some tribes are examining their CWD response protocol and their current efforts are summarized in Table 6. As this action plan is implemented, continued coordination with the tribes will be necessary for successful implementation.

Table 6. Summary of tribal management efforts related to chronic wasting disease.

Tribes	Chronic Wasting Disease Management
Cheyenne River	Has conducted some sampling in the past, but no current sampling is being performed, outside of sick surveillance.
Crow Creek	Currently are not conducting any sampling or sick surveillance, but are planning to conduct sick surveillance in the future.
Flandreau Santee	Unknown, no response.
Lower Brule	Tests all mature elk that are harvested and send samples to Wyoming State Veterinary Laboratory for testing. Also tested voluntary hunter harvested deer for a few years in the past, and continues to conduct sick surveillance testing. Have sampled 290 elk, 99 mule deer and 75 white-tailed deer between 1998 and 2017, of which all tested negative for CWD.
Pine Ridge	Currently set up to opportunistically test hunter harvested animals for CWD, but have no plans to implement a plan involving surveillance testing.
Rosebud	Has sampled a few deer in the past when federal funding and supplies were available. Has developed a brochure on CWD and other wildlife diseases that is distributed to hunters.
Sisseton Wahpeton	Currently not conducting any sampling, but may conduct sick surveillance in the future.
Standing Rock	Initiated CWD testing in response to a CWD positive found in North Dakota in 2009. Initial testing was focused in North Dakota, but extended into Corson County in South Dakota. Followed up with testing voluntary hunter harvested deer at several collection locations in Corson County. Currently not conducting any sampling, other than some limited sick surveillance.
Yankton	Unknown, no response.

MANAGEMENT RESPONSE OF DETECTION

If CWD is discovered in a new management unit assumed to be the result of natural deer movement (Tier 1 units; Figure 15), the preventive measure regulations will follow those in other CWD endemic units. Alternatively, if CWD is discovered in a new unit, beyond expected natural movement of deer (i.e., non-Tier 1 and non-CWD endemic units), GFP will determine whether more intensive sampling is warranted based on a potential point source contamination where the disease may be isolated. For example, detection of CWD in an area expected to be disease free could be the result of unexpected cervid movement (e.g., escaped captive cervid, a single wild cervid dispersing >100 miles), and could be isolated to a few CWD positive individuals, providing an opportunity to remove CWD from the area. Although unlikely, these situations have occurred in New York and Minnesota, where very early detection followed by intensive sampling and deer removal resulted in no further CWD positive cervids. In these areas the disease was thought to be isolated to a very small number of animals, and removing diseased animals from the area was still possible. It is important to stress that removing CWD is extremely unlikely once CWD has been discovered in multiple cervids in an area, and GFP should not consider cervid reductions unless there is strong evidence the disease is geographically isolated to a very small area in which landowners and stakeholders are in agreement that additional cervid removal is warranted.

MANAGEMENT AND RESEARCH COORDINATION

While cervids do not recognize political boundaries, GFP will build upon established relationships with wildlife management agencies of adjacent states. Sharing potential or current CWD management actions and test results will be beneficial. In addition, states should explore collaborative research with objectives for developing spatially-explicit disease risk and spread models and guiding efficient spatial monitoring strategies. These would further inform sampling goals as a function of where samples are collected. Use ongoing cervid GPS-collar research projects to evaluate deer movement including resource use, seasonal-movement and migration distances and propensities and dispersal, when data are available. Collaboration with other state/tribal/federal agencies such as AIB and WICA, private landowners, hunters and other stakeholders will increase the likelihood of successfully implementing this action plan.

COMMUNICATION AND OUTREACH

A companion communications and outreach operations plan will further increase the awareness and education of CWD and the management of the disease in South Dakota. The communications and outreach plan is one piece of the overall wildlife disease management efforts in South Dakota.

Core messaging ideas will include, but are not limited to the following:

1. What is CWD and why should I care about it?
2. Chronic wasting disease management is good for deer/herd management – focusing on the longevity of herd health.
3. Absence of CWD management strategies will affect the age structure of our herds.
4. Tactics and potential for new rules of how to slow the spread – transportation restrictions, baiting and feeding, mandatory submission and other enforcement regulations.
5. Address long-term implications – what does this mean for the next generation?

Some of the more simplified messaging tactics may include:

1. It kills deer.
2. Protect your herd.
3. We need your help.
4. Submit your sample.
5. Chronic wasting disease does not go away.

A content calendar will serve as a guide to producing information and education to specific audiences throughout 2019 via targeted emails and social media, beginning with the public distribution of this action plan and the request for public comment on February 1. From there, information will be provided regarding the open house series in March and any proposed or final actions taken by the GFP Commission to implement changes to help slow the spread of CWD in South Dakota. Beginning in late April, the Department will break down myths and truths relative to CWD while increasing the awareness of what this means to those who feed deer and elk; to those who hunt these game species; and to those who process the meat. More specifically, these target audiences include: hunters (resident and non-resident), non-consumptive users, landowners, taxidermists, landfill managers, meat processors, food pantries/Sportsman Against Hunger, state agency partners (Animal Industry Board, Department of Health, Department of Transportation, Department of Environment and Natural Resources, Department of Agriculture, Governor's Office), tribal agencies, conservation and agricultural organizations, hunter

education students along with the captive cervid industry and clients. Department staff, GFP Commission and our state's legislators will also serve as internal audiences who will need to remain educated on the issues concerning CWD.

The main landing page for all things CWD in South Dakota is located on the GFP website at: <https://gfp.sd.gov/chronic-wasting-disease/>. Individuals will find frequently asked questions (Appendix 6), a glossary of terms, where the disease is located in South Dakota, what is being done and how individuals can help through submitting samples upon harvesting a deer or elk. New information will be added as it becomes available.

Social media marketing will serve as a secondary hub of information through Facebook, Twitter and Instagram. Sponsored Facebook ads will be developed for high priority areas identified: Custer, Deadwood, Hill City, Hot Springs, Keystone, Lead and Rapid City.

The South Dakota Department of Game, Fish and Parks' "PodCast and Blast" provides podcast topics related to current GFP issues, stories, outdoor topics and more. A podcast discussing deer management and CWD can be found by visiting <https://gfp.sd.gov/pages/podcast/> and clicking on Episode 7. Another podcast on CWD is slated for summer of 2019 upon introduction of any regulation changes or updates.

The online Hunt Planner tool and deer application process (both paper and online) will also provide content and need-to-know information prior to applying for the 2019 deer hunting seasons. Informing hunters of best management practices and any applicable rules related to inter and intrastate carcass transportation and disposal is a priority.

The South Dakota Conservation Digest will serve as another delivery platform. A direct mailer to approximately 35,000 landowners will be completed informing this target audience about how this wildlife disease impacts them as hunters and non-hunters.

Other platforms for awareness delivery include a Facebook Live question and answer session as well as possible media days tentatively planned for Rapid City and Sioux Falls (later this spring) and a separate radio blitz that will also feature public service announcements as the 2019 deer hunting seasons approach. In addition, a South Dakota Public Broadcasting Focus program is planned for late May 2019 coupled with another show in June 2019 discussing how we can all help slow the spread for several conservation issues like CWD, aquatic invasive species and emerald ash borer.

BUDGET AND STAFF NEEDS

The cost of implementing this action plan is difficult to project. An estimated budget and staff needs can be found in Table 7. Cost related to outreach and education could easily increase, depending upon identified needs and methods selected to meet objectives. While the estimated annual costs seem reasonable, it's the long-term cost of CWD management that is likely to be significant. Fees for lab tests, contractual services, outreach and education platforms and staff time have been considered. Using existing staff and financial resources for CWD management obviously takes staff and resources away from other priorities and needs. These needs could change as more information is obtained related to the distribution of CWD within South Dakota, new research findings become available, or public support/opinion change related to management actions or expectations.

The cost of management activities related to CWD, including existing budgets and use of employees, can be significant for state wildlife agencies. Federal funding for CWD ended in 2012, thus many states and tribes were required to seek alternative funding sources, many of which were absorbed from other programs. The following is a quote from <http://congressionalsportsmen.org/policies/federal/chronic-wasting-disease> that describes current efforts to make federal funding available to state, federal and tribal wildlife agencies for management and research; “Bipartisan bills have been introduced in each house of Congress by Congressional Sportsmen’s Caucus Members. Rep. Ron Kind (WI) introduced the Chronic Wasting Disease Management Act (H.R.4454) to the House of Representatives in November of 2017, while Senator Jon Tester (MT) introduced the Chronic Wasting Disease Support for States Act (S.2252) to the Senate in December of 2017. Each bill aims to appropriate \$35 million to support state efforts to manage and control CWD. From this, both intend to allocate \$20 million to States, \$5 million to tribal agencies, and \$10 million to be retained for the rapid response fund. Although the bills’ additional appropriations to fund applied research differ, the intent and utility for progress remains consistent between the two. Through multi-agency cooperation between federal land management agencies and state and tribal agencies, these sister bills look to federally fund applied research that will aid with combatting CWD, while allowing for States to retain policy-making authority.”

In addition, companion legislation was recently introduced by Representative Ralph Abraham (LA) on January 29, 2019 “H.R.837—To authorize a special resource study on the spread vectors of chronic wasting disease in Cervidae, and for other purposes” and by Senator John Barrasso (WY) on February 7, 2019 “S.382—To authorize a special resource study on the spread vectors of chronic wasting disease in Cervidae, and for other purposes.” It is with great anticipation that federal funding for CWD management and research may again become available.

Table 7. Estimated annual budget and staff needs for implementation of chronic wasting disease action plan.

Management Action	Samples	Cost Per Sample	Total Annual Cost Estimate	Staff Hours	Cost Per Hour	Total Annual Staff Cost Estimate	Comments
Voluntary Hunter Lab Submissions	500	\$30	\$15,000	250	\$20	\$5,000	GFP cost to pay for voluntary lab tests. Staff needs include assistance to pull samples for hunters as needed.
Taxidermy Incentive for Lab Submissions	2,000	\$15	\$30,000	20	\$30	\$600	Staff needs related to contract administration.
Wildlife Processor Incentive for Lab Submissions	1,000	\$10	\$10,000	20	\$30	\$600	Staff needs related to contract administration.
Roadkill Removal Incentive for Lab Submissions	2,000	\$10	\$20,000	20	\$30	\$600	Staff needs related to contract administration.
Contractual Services to Collect Lab Submissions	5,000	N/A	\$10,000	20	\$30	\$600	Contractual services to collect samples from participating taxidermists, wildlife processing facilities, and roadkill removal contractors. Contract would be in place during the months of October - March to retrieve cervid heads and deliver to SDSU lab for testing. Assumes a contract in the amount of \$10,000. Cost could be decreased by using interns or seasonal staff vs. contractual services. Staff needs related to contract administration.
GFP Sick Surveillance	50	\$30	\$1,500	150	\$20	\$3,000	Cost per staff unit includes shipping and lab fees. Staff needs includes cost for staff time to collect and submit sample. Does not include vehicle mileage to obtain sample.
Urban Removals	300	\$30	\$9,000	150	\$20	\$3,000	GFP cost to pay for voluntary lab tests. Staff needs include assistance to pull samples.
CWD Surveillance Planning and Modeling				100	\$25	\$2,500	Continual planning and modeling for surveillance, etc.
Outreach and Education - Printed Media			\$10,000	40	\$25	\$1,000	Estimate only; details to be determined.
Outreach and Education - Digital Media			\$5,000	80	\$25	\$2,000	Estimate only; details to be determined.
Outreach and Education - Takeover Marketing			\$10,000	80	\$25	\$2,000	Estimate only; details to be determined.
TOTAL			\$120,500	930		\$20,900	Total Cost Estimate: \$141,400

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APPENDICIES

Appendix 1. South Dakota Animal Industry Board – current South Dakota codified laws and administrative rules applicable to nondomestic mammals and the management of chronic wasting disease.

SOUTH DAKOTA CODIFIED LAWS

- 40-3-25 Promulgation of rules for bringing nondomestic mammals into state.
- 40-3-26 Rules regulating breeding, raising, marketing, and transportation of certain captive nondomestic animals.
- 40-5-8.6 Authority to promulgate rules.

SOUTH DAKOTA ADMINSTRATIVE RULES

Chapter 12:68:03 (Livestock Diseases and Parasites)

- 12:68:03:05 Procedures for disposal of animal carcasses.

Chapter 12:68:15 (Meat Establishments)

- 12:68:15:07 Licensing period for meat establishments.
- 12:68:15:08 Application for meat establishment licenses.
- 12:68:15:09 Issuance of license.
- 12:68:15:10 Inspections of retail store meat processors.
- 12:68:15:11 Continuing education.

Chapter 12:68:25 (Chronic Wasting Disease in Cervidae)

- 12:68:25:01 Definitions.
- 12:68:25:02 Supervision of the cervidae CWD program.
- 12:68:25:03 Voluntary CWD herd certification program surveillance procedures.
- 12:68:25:04 Official cervid tests.
- 12:68:25:05 Investigation of cervid CWD surveillance identification affected animals.
- 12:68:25:07 Herd plan.
- 12:68:25:08 Identification and disposal requirements.
- 12:68:25:09 Cleaning and disinfecting.

- 12:68:25:10 Methods for obtaining certified CWD cervid herd status.
- 12:68:25:11 Recertification of certified CWD cervid herds.
- 12:68:25:12 Movement into a certified CWD cervid herd.
- 12:68:25:13 Movement into a monitored CWD cervid herd.
- 12:68:25:14 Recognition of monitored CWD cervid herds.
- 12:68:25:15 Recognition of certified CWD cervid herds.
- 12:68:25:16 Intrastate movement requirements.
- 12:68:25:17 Import requirements.
- 12:68:25:18 CWD control in free roaming cervids.

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Appendix 2. South Dakota Department of Game, Fish and Parks – current South Dakota codified laws and administrative rules applicable to the management of chronic wasting disease.

SOUTH DAKOTA CODIFIED LAWS

- 41-2-18 Rules for implementation of game, fish and conservation laws.
- 41-6-33 Taxidermist's license--Privileges--Records--Inspections--Violation as misdemeanor.
- 41-8-16 Use of salt to attract big game prohibited.

SOUTH DAKOTA ADMINISTRATIVE RULES

Chapter 14:03:01 (Parks and Public Lands)

- 41:03:01:35 Bait stations prohibited.

Chapter 14:06:03 (Possession, Processing and Transportation of Game)

- 41:06:03:01 Tagging required.
- 41:06:03:05 Game transportation permits.
- 41:06:03:06 Identification required for transportation of big game animal – Exception
- 41:06:03:10 Wildlife processing facility defined.
- 41:06:03:11 Records required for wildlife processing facilities.
- 41:06:03:12 Inspection of wildlife processing facilities.
- 41:06:03:14 Process of abandonment for game left at a wildlife processing facility.

Chapter 14:06:04 (Hunting Requirements and Prohibited Methods)

- 41:06:04:03 Methods prohibited.
- 41:06:04:19 Mandatory inspection of harvested elk.
- 41:06:04:21 Mandatory submission of samples for chronic wasting disease testing.

Chapter 14:09:11 (Taxidermists)

- 41:09:11:01 License fee and validity.
- 41:09:11:02 Definitions.
- 41:09:11:03 Records to be retained by taxidermist.
- 41:09:11:04 Immediate tagging of specimen -- Temporary removal of tag.
- 41:09:11:05 Transfer of specimens to another taxidermist.
- 41:09:11:06 Violation is cause for revocation of license -- Immediate return of specimens -- Exception.

Appendix 3. South Dakota Department of Environment and Natural Resources – current South Dakota codified laws and administrative rules applicable to the management of chronic wasting disease.

SOUTH DAKOTA CODIFIED LAWS

[Title 34A, Chapter 6](#) Solid Waste Management

SOUTH DAKOTA ADMINISTRATIVE RULES

Chapter 74:27:13 (Facility Operation)

[74:27:13:17](#) Special wastes.

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Appendix 4. South Dakota Chronic Wasting Disease Stakeholder Group Chapter.

Purpose – The SD Game, Fish and Parks (GFP) “Chronic Wasting Disease Stakeholder Group” is a diverse group of citizen stakeholders and other governmental agencies who have been asked to assist the Department of Game, Fish and Parks Staff and the Game, Fish and Parks Commission in conducting a review of the broad range of issues affecting deer and elk associated with chronic wasting disease (CWD) in South Dakota. The Chronic Wasting Disease Stakeholder Group will assist GFP Staff and the GFP Commission by offering insight, ideas, and alternatives that could be considered in regard to the Department and Commission positions on various CWD management goals, strategies, challenges and related regulations.

Objectives – The basic objectives of the Chronic Wasting Disease Stakeholder Group are to:

- Provide an additional link between the GFP Staff and the GFP Commission and the citizens we serve;
- Identify challenges and opportunities and develop ideas and suggestions regarding the range of issues affecting the management of chronic wasting disease and associated recreation in South Dakota; and
- Promote communication, increased awareness and mutual understanding between and among the Stakeholder Group members regarding the diversity of chronic wasting disease management challenges.

Scope of Authority – The Stakeholder Group will function in an advisory capacity only and will provide a discussion forum for members to share their personal perspective and the perspective of the group or organization they may represent on a diversity of issues related to the management of chronic wasting disease. Members who serve on the Stakeholder Group do so solely in a volunteer capacity. The Stakeholder Group is granted no authority over rule-making or rule enforcement on public or private land, has no budgetary authority or authority over personnel management, nor is it granted any authority over any state or federal agency or non-governmental organization. The Stakeholder Group was assembled as an additional citizen participation opportunity but is not designed to supplant or curtail any other type of citizen participation or public involvement opportunities that may be further utilized by GFP.

Organizational Structure and Stakeholder Group Membership - The Stakeholder Group is comprised of a diverse group of citizen stakeholders other governmental agencies who may represent a broad range of public and professional interests in the management of chronic wasting disease in South Dakota. Participants will attend structured meetings to hear GFP Staff presentations/background information and offer their ideas and perspectives on a variety of chronic wasting disease management topics. The Stakeholder Group meetings will be facilitated by GFP staff or a third party facilitator hired by GFP. The Stakeholder Group will formally meet once in late 2018 to assist GFP with the development of a draft CWD Action Plan, again in early 2019 to further discuss public comment on the draft CWD Action Plan, and be updated and engaged in the future as needed regarding implementation or revision of the CWD Action Plan.

Stakeholder Group Member Roles and Responsibilities – Working Group members will:

- Make a commitment to attend the scheduled Stakeholder Group meetings;

- Offer their thoughts and ideas and communicate with others in a respectful manner while maintaining an open mind with regard to the views and perspectives of other Working Group members, and;
- Serve as a sounding board and provide feedback and ideas to GFP Staff and the GFP Commission.

GFP Staff Roles and Responsibilities – GFP Staff will:

- Provide a diversity of information regarding chronic wasting disease management to the Stakeholder Group;
- Serve the role of facilitator for the meetings, including keeping order, achieving the meeting agenda and providing a comfortable working atmosphere for Working Group members to share ideas and opinions;
- Schedule and arrange meeting room facilities, including providing all necessary communication related to the meetings;
- Listen attentively and respectfully to all viewpoints; and
- Gather meeting notes and make them available to the public via the GFP website.

Meeting Guidelines and Communication – The purpose of the Chronic Wasting Disease Stakeholder Group is to provide a forum to promote understanding of management issues and challenges related to chronic wasting disease from diverse perspectives, therefore voting or other similar methods will not be used to formulate final group consensus on issues discussed.

- Additional Open House meetings, citizen surveys or other public involvement techniques may be used as a means to share information and gather additional public input on any proposed changes to management actions related to chronic wasting disease.
- Stakeholder Group members are encouraged to discuss and communicate with others about specific chronic wasting disease management issues discussed at the Stakeholder Group meetings.

Travel Expenditures – Travel expenses (lodging, per diem and vehicle mileage) for Stakeholder Group members will be reimbursed in accordance with State Reimbursement Rules for those members who are not reimbursed by another organization or agency.

Appendix 5. Summary of the AFWA best management practices for prevention, surveillance, and management of chronic wasting disease. Adopted by AFWA on September 12, 2018.



AFWA Best Management Practices for Prevention, Surveillance, and Management of Chronic Wasting Disease

INTRODUCTION

The Association of Fish and Wildlife Agencies (AFWA) Best Management Practices (BMPs) for the Prevention, Surveillance, and Management of Chronic Wasting Disease (CWD) were developed to provide guidance to fish and wildlife agencies as they address the growing threat of CWD to free-ranging cervid populations. The BMPs are based on the best available peer-reviewed science and field-tested methods, and represent the contributions of more than 30 wildlife health specialists, veterinarians, and agency leaders actively engaged in CWD issues across North America. The BMPs are intended to be adaptable as new information becomes available. They are not meant to be prescriptive or to mandate programs at the state, federal, tribal, or territorial level; they should be regarded as a set of recommendations for agencies to consider as they develop or revise their CWD programs.

The BMPs are arranged under the general headings of Prevention, Surveillance, Management, and Supporting Activities. A best practice is provided for each topic, where appropriate, as are alternative methods that do not mitigate risks as well as the best practice. Many practices fit into more than one of the above headings. Expanded information, additional practices, background, justification, and reviewed literature are available in the accompanying Technical Report.

PREVENTION of CWD Introduction and Establishment

- A. Live animal movement** is regarded as the greatest risk for CWD introduction to unaffected areas.
 - 1. Prohibit all human-assisted live cervid movements
 - 2. Alternatives:
 - a) Prohibit importation of all live cervids from CWD-positive states and provinces.
 - b) Allow movement/importation of cervids from herds that have been monitored for an extended period without detection of CWD or links to herds that have been affected or exposed.
 - c) Allow importation of captive cervids from herds certified as low risk for CWD by the USDA CWD Herd Certification Program (see below for more on captive cervids).
- B. Carcass movement** poses a risk for CWD introduction if unused parts from potentially infected carcasses are imported and disposed of improperly.

1. Prohibit importation from all states of intact cervid carcasses or carcass parts except boned out meat, clean hide with no head attached, clean skull plate with antlers attached, clean antlers, finished taxidermy specimens, and clean upper canine teeth.
 2. Alternatives:
 - a) Allow importation of quartered carcasses with no spinal column, head, or central nervous system tissue in addition to the permitted items above.
 - b) Prohibit importation, with certain standard exceptions, of intact or whole carcasses from states that have detected CWD in captive and/or free-ranging cervids.
 - c) Prohibit importation from specific zones in states where CWD has been detected.
- C. Products of cervid origin** may pose a risk for CWD introduction as well as an attractant that may congregate normally dispersed animals facilitating CWD transmission and/or establishment.
1. Natural products of cervid origin: Prohibit sales and use of products that include natural urine, feces, scrape material, deer pen soil or other items of cervid origin.
 2. Reproductive tissues and material: Prohibit importation of cervid origin reproductive tissues, semen, embryos, germplasm.
 3. Alternate practices: Allow sales and use of synthetic scent products; allow importation of products and reproductive materials only from facilities that are certified as low risk for CWD.
- D. Unnatural Concentration of Cervids** facilitates CWD transmission and establishment if the CWD agent is present.
1. Prohibit baiting and feeding of wild cervids; prohibit placement of minerals, granules, blocks, or other supplements for wild cervids; provide hay and other feed for domestic animals in a manner that does not congregate wild cervids; prohibit sales and use of other cervid attractants such as synthetic scent lures, foods, flavors, scents, pour-ons, sprays, etc.
 2. Alternate practices include restrictions on amounts of bait or feed as well as restrictions on baiting and feeding on a temporal and/or spatial basis.

SURVEILLANCE

A. CWD Testing for Cervids.

1. Use only USDA-approved laboratories and methods for CWD testing.
2. Test obex and medial retropharyngeal lymph nodes (MRPLN) collected from dead animals; positive and suspect results should be confirmed by the USDA's National Veterinary Services Laboratories. Minimally test MRPLN for deer and both obex and MRPLN for elk.
 - a) Antemortem testing may be useful in whole-herd screening of captive cervids or for sequential testing of individual free-ranging and/or

research animals. Current antemortem tests are not adequate to detect CWD on an individual animal basis.

- b) All suspect positive ELISA test and Western blot results should be confirmed with IHC (The Gold Standard test).

B. Surveillance for initial detection of CWD should be an ongoing activity. Early detection is critical to managing CWD effectively and especially for eliminating it when/if possible.

1. Surveillance efficiency may be enhanced by:
 - a) Targeting animals more likely to have CWD: clinically affected animals; road- or predator killed animals; mature animals, particularly males.
 - b) Spatial targeting via risk assessments based on proximity to affected cervids, unmonitored populations, captive cervids, or other risk factors.
2. Surveillance (and monitoring) should be undertaken at biologically relevant spatial scales and inferences drawn only in the appropriate spatial context in view of the highly patchy distribution of CWD in wild cervids. Consequently, agencies should refrain from drawing statistical conclusions such as “there is 95% certainty that CWD would have been detected if present at 2% prevalence or greater.”
3. See https://pubs.usgs.gov/of/2012/1036/pdf/ofr2012_1036.pdf for “*Enhanced Surveillance Strategies for Detecting and Monitoring CWD*”

C. Surveillance to “monitor” CWD in an affected population

1. Random sampling of harvested animals provides relatively unbiased estimates of infection rates and is the most efficient active sampling method for estimating prevalence or incidence in CWD enzootic populations. Comparisons over time or between locations should be based on a common denominator (e.g., harvested males aged 2 years or older) to assure that reliable inferences are drawn. Consider including vehicle-killed animal surveillance and looking for expansion of current disease foci as well as new disease foci.
2. Practices should include defining biologically relevant spatial units for data collection and evaluation; determining meaningful sample sizes for interpretation; identifying surveillance goals to guide sampling strategies over time; and working within existing management frameworks to maximize opportunities for sample collection while minimizing additional personnel and financial costs to the agency.

MANAGEMENT

A. CWD Response Plans should be developed before CWD is detected and implemented at the first report of CWD within the jurisdiction or within a previously defined distance from its borders, such as in a neighboring state. Plans should include the immediate response to detection as well as long-term management of the disease if it cannot be eliminated. An Incident Command System or other central coordinating group may facilitate the initial response.

1. Essential elements of the response plan should include action plans for each of

the following sections: Communications, diagnostics, surveillance, disease management, and research.

B. Initial Response to the First Detection should include:

1. A communications strategy should be designed to build support for response actions.
2. Sufficient testing capacity should be identified to support surveillance/monitoring activities.
3. Surveillance strategies should be implemented through consultation with epidemiologists to determine disease prevalence and geographic distribution of the affected area.
 - a) Actions may include special hunts by the public with mandatory CWD testing, culling by sharpshooters and other methods.
4. Disease management activities should begin with recognition that they may be necessary on a long-term basis.
 - a) CWD Management Zones should be established on the basis of the location of affected animals and natural history of local populations.
 - b) Management activities likely will occur in concert with surveillance actions to define the affected area.
5. Surveillance and management of captive cervids should be in place as part of planning efforts and include fencing design, mandatory testing, inspections, animal ID, quarantine and decontamination protocols, among others (see Captive Cervid section below).

C. Managing CWD Prevalence should include utilizing harvest, sharpshooters or other removal mechanisms combined with statistically appropriate sampling and testing to monitor changes in prevalence. Strategies may include:

1. Targeting the portion of the population most likely to have CWD.
2. Targeting animals in known CWD hotspots.
3. Adjusting timing to most effectively remove infected animals.
4. Reducing cervid density in CWD-positive areas with high animal density.
5. Eliminating practices that promote artificial cervid concentrations to minimize environmental contamination.
6. Utilizing a coordinated, adaptive management approach that allows evaluation of experimental CWD suppression strategies whereby the data gathered from these efforts would be used to develop improved strategies.
7. Restricting or prohibiting intact carcass and high risk material transport out of CWD management zones.

D. Rehabilitation of Deer and other Cervids may result in translocation and/or release of infected animals.

1. Prohibit cervid rehabilitation activities, including animal transport, either statewide or in designated CWD management zones or in other geographic areas where CWD has been detected in wild or captive cervid populations.
2. Alternative practices: In areas where CWD is suspected but not yet reported,

restrict rehabilitation activities to facilities that observe all recommended biosecurity protocols for the safe handling, disposal, and decontamination of prions and prion-infected tissues, materials, and equipment.

- E. Carcass Disposal** is critical to prevent exposure of wildlife to the CWD agent.
1. Incinerate carcasses in an Environmental Protection Agency-approved conventional incinerator, air curtain incinerator, or cement kiln.
 2. Treat carcasses with high-pressure alkaline hydrolysis followed by burial of the treated material in an active, licensed landfill.
 3. Alternate practices: Composting; centralized sites for disposal of CWD-positive or high risk carcasses. Landfills often are used: although burial does not eliminate infectious prion, carcass parts should be inaccessible to cervids and other animals.
- F. Decontamination and Disinfection Methods for Equipment** require special techniques because of the resistance of the CWD agent to standard disinfectants and sterilization methods.
1. Effective products and methods include 2% sodium hypochlorite (bleach) solution, autoclaving under specific conditions, or the use of Environ LpH se Phenolic disinfectant.

SUPPORTING ACTIVITIES

- A. Internal and Public Communications** are critical to build support within agencies and among the general public for CWD prevention, surveillance, and management policies, regulations, and activities. Development of an integrated communications strategy and CWD communications plan is recommended. Messages should be developed with thorough understanding of the importance of the human dimensions of wildlife disease management.
1. Communications should be open between agency administrators and field employees.
 2. Agencies should maintain accurate, up-to-date websites that contain general information about CWD, jurisdiction-specific CWD information, surveillance and response activities, relevant regulations, public health concerns, recommendations for hunters and information indicating how they can help, reporting procedures for sick or dead ungulates, and test result reporting.
 3. Social science surveys may be conducted to inform management decisions and increase positive stakeholder engagement.
- B. Research** is needed to identify:
1. The most effective techniques for prevention, surveillance, and management; prion detection and diagnostics; and disease epidemiology.
 2. Human dimensions issues such as the impact of CWD on hunting practices and on hunting-related expenditures.
 3. The cost of CWD to state and provincial economies.
 4. The costs of CWD to wildlife agencies to facilitate budget planning and to landowners, hunters, and other stakeholders.

5. Other sources of funding for CWD prevention, surveillance, and management.

C. Cervid Regulations in North America. State, provincial, and territorial wildlife agencies should:

1. Work closely with neighboring jurisdictions to coordinate management and regulatory responses to CWD.
2. Review and evaluate regulations and authorities on a regular basis in order to ensure sufficient management flexibility and regulatory authority for managing CWD in wild and/or captive cervid populations.
3. Develop and implement policies and regulations to address the best management practices identified in this AFWA document.

D. Captive cervids. Best management practices include:

1. State or provincial wildlife agency authority over wild and captive cervids in order to conserve free-ranging wildlife. Alternative: shared authority with the animal health agency.
2. Testing of all captive cervid deaths regardless of facility participation in the federal CWD Herd Certification Program
3. Adequate fencing and barriers to preclude contact between free-ranging and captive cervids.
4. Individual animal identification visible from a distance, regular physical inventory of captive cervids and reconciliation with records.
5. Detailed response plans to detection of CWD in a captive facility.
6. Relevant U. S. case law discussing regulatory authority over, categorization of, and ownership interests in captive cervids is summarized in the Technical Report. Important cases occurred in Missouri, Minnesota, Ohio, Texas, and Indiana.

E. CWD and Public Health. Best management practices include:

1. Wear protective gloves and wash hands.
2. Disinfect field equipment when handling cervids or any other wildlife or carcasses.
3. Avoid sawing through the bone and cutting through the brain and spinal cord.
4. Do not consume meat from animals that appear sick or are found dead of unknown causes.
5. Do not consume meat or other tissues from CWD-positive animals.
6. Follow guidance from wildlife and public health agencies.

Appendix 6. Frequently asked questions related to chronic wasting disease. Information is also available at <https://gfp.sd.gov/chronic-wasting-disease/>.

Where Does CWD Occur?

Where is CWD found?

CWD was first described in a Colorado Division of Wildlife captive deer research facility in 1967 and a few years later in a similar Wyoming research facility. CWD was first found in free-ranging wildlife in a white-tailed deer in Fall River County during the 2001 big game hunting season. In South Dakota, CWD has only been detected in free-roaming wildlife in Lawrence, Pennington, Custer, and Fall River Counties, Custer State Park, and Wind Cave National Park. A map of current CWD cases is present [here](#).

How often does CWD occur?

Surveillance by hunter-harvest survey and testing of sickly deer and elk implies CWD is relatively rare in free-roaming cervids when the number of animals present is considered. Thus far, in South Dakota, twenty years of surveillance and testing of wild deer and elk have shown 203 CWD positive deer and 194 CWD positive elk out of 27,063 deer and elk tested. Of the 397 positive animals, Wind Cave National Park has discovered 126 elk and 10 deer that tested positive. Custer State Park has discovered 24 elk and 2 deer that have tested positive. In the 2017-2018 sampling period, 37 animals (12 deer, 25 elk) were found that were infected with CWD.

CWD Testing

How can I submit my own CWD sample for testing?

Hunters with licenses to harvest animals in South Dakota priority surveillance areas will be mailed information on how to submit CWD samples. Hunters who harvest deer or elk outside of priority surveillance areas can still have their animal tested for CWD by following the process outlined below. As a voluntary submission, hunters will be responsible for the cost of shipping and any professional sample collection costs. South Dakota Game, Fish and Parks (GFP) will pay for the testing cost of the sample at South Dakota State University Animal Disease and Research Diagnostics Lab (SDSU ADRDL). Results will be sent to both the hunter and GFP. These results will supplement GFP's surveillance effort across the state.

Submission Steps

- Fill out the [South Dakota Chronic Wasting Disease Hunter Submission Form](#). Record the location of harvest as accurately as possible.
- Collect only the retropharyngeal lymph nodes, located in the throat area, as demonstrated in videos below. Extraction can easily be performed with a field knife, but some veterinarians will exact samples for a small fee as well.
- Informational videos showing how to extract samples can be found [here](#) and also [here](#).
- Once removed, place lymph nodes in a sealed bag (Ziplock or similar). Place sealed bag into another sealed bag, then wrap in a paper towel. Place the wrapped sample with a cold ice pack and the submission form (in separate sealed bag) into a small box and send via your choice of postal carrier. Choose a carrier that will deliver your sample within 24-48 hours. Ship samples during the week (Mon-Thurs) and avoid shipping on weekends and holidays. Use a carrier that offers tracking of your package.
- Package delivery address is listed below, and at the bottom of the Chronic Wasting Disease Hunter Submission Form. Results are usually available 7-10 days.

Send samples to:
South Dakota State University
Animal Disease Research and Diagnostic Lab
Box 2175, 1155 North Campus Drive
Brookings, SD 57007

What is the difference between prevalence rate and presence?

Prevalence rate can be defined as a percentage of cervids in a population or hunting unit that are infected with chronic wasting disease.

Presence just means that CWD has been documented in a given population or hunting unit.

CWD Transmission

How is CWD transmitted?

How the pathogenic prion is transmitted from diseased animals to healthy ones is believed to be through direct animal to animal contact and/or contamination of feed or water sources with saliva, urine, and/or feces.

Numerous organizations and individual scientists across the United States and Canada are continuing to conduct detailed investigations in an effort to obtain a definitive answer to the route of transmission. Evidence shows that infected carcasses may serve as a source of infection. CWD seems more likely to occur in areas where deer or elk are crowded or where they congregate at man-made feed and water stations. Artificial feeding of deer and elk will likely compound the problem.

Is CWD transmissible to humans?

Public health officials and the Center for Disease Control in Atlanta, Georgia have found no link between CWD and any neurological disease in humans. The Center for Disease Control and Prevention website is located [here](#) for more information.

To minimize their risk of exposure to CWD, hunters should:

- Consult with their state wildlife agencies to identify areas where CWD occurs and take appropriate precautions when hunting in such areas.
- Avoid eating meat from deer and elk that look sick or that test positive for CWD.
- Consider having the deer or elk tested for CWD before consuming the meat if the animal was harvested from an area known to have CWD-positive animals. Information about testing is available from most state wildlife agencies.
- Wear gloves, bone-out the meat from the animal, and minimize handling of the brain and spinal cord tissues when field dressing an animal.

Is CWD transmissible to domestic livestock?

According to experts, there's no evidence that CWD can be naturally transmitted to domestic livestock. Chronic wasting disease is similar in some respects to two known livestock diseases:

- Scrapie, which affects domestic sheep and goats worldwide and has been recognized for over 200 years; and
- Bovine Spongiform Encephalopathy (BSE), which is a more recent disease of cattle in Great Britain and Europe. BSE has been found in Canada, and in the United States.

Though there are similarities, there is no evidence suggesting either scrapie or BSE is caused by contact or close association with wild deer or elk.

How Does CWD Impact Me?

As a hunter, what do I need to be the most concerned about?

In the absence of complete information on risk, and in light of similarities of animal and human TSEs, public health officials and wildlife management professionals recommend that hunters harvesting deer and elk in the endemic area, as well as meat processors and taxidermists handling cervid carcasses, should take some common sense measures to avoid exposure to the CWD agent and to other known zoonotic pathogens.

CWD poses serious problems for wildlife managers, and the implications for free-ranging deer and elk are significant.

Can I tell if an animal has CWD based on physical appearance or behavior?

An animal does not necessarily have to display clinical signs or look unhealthy for it to test positive for CWD. In fact, it is possible to harvest a healthy-looking animal that has CWD. If you harvest a deer or elk in one of the identified CWD areas on the map or anywhere in the state and have concerns, you have the ability to submit your own sample for testing using the form and instructions on this [page](#).

As a non-hunter, how does this impact me?

Impacts of CWD on population dynamics of deer and elk are presently unknown. Computer modeling suggests that CWD could substantially reduce cervid populations by lowering adult survival rates and destabilizing long-term population dynamics. This would potentially reduce the ability to view deer and elk by non-hunters.

Feeding wildlife for viewing purposes is a popular pastime for hunters and non-hunters alike. The concentration of wildlife at feeding and baiting stations increases the likelihood of disease transfer amongst wildlife visiting these locations. Feeding of certain wildlife may have to be stopped through specific laws in order to help protect wildlife species.

As a taxidermist, what do I need to be the most concerned about?

In the absence of complete information on risk, and in light of similarities of animal and human TSEs, public health officials and wildlife management professionals recommend that hunters harvesting deer and elk in the endemic area, as well as meat processors and taxidermists handling cervid carcasses, should take some common sense measures to avoid exposure to the CWD agent and to other known zoonotic pathogens.

These common sense or simple precautions, can be found [here](#).

As a landowner or producer, do I need to be concerned that this will transmit to my livestock herds (or domestic pets)?

Cattle and other domestic livestock appear to be resistant to natural infection. There are no reported cases of natural transmission of CWD from infected elk or deer to domestic livestock. However, the disease has been experimentally reproduced in cattle by the direct injection of the infectious agent into their brains. Several investigations are currently underway to further study this question.

What Can I Do?

What can I do to help slow the spread of CWD?

CWD can be spread from animal to animal and through the concentration of cervids at feeding and baiting stations. Eliminating the feeding and baiting areas can help to stop or slow the spread from animal to animal. Additionally, hunters who hunt in areas that are known to have CWD can assist in the reduction of CWD spread by deboning meat in the field and leaving the carcass at the harvest site. Research has shown that infected carcasses do pose a threat to the spread of CWD, and thus should be disposed of in a landfill that will bury the carcass.

How do I find out if there is a permitted waste facility near me?

Appropriate disposal of carcasses by hunters is not only ethical and the right thing to do; using a permitted landfill is a practice that helps reduce the risk of chronic wasting disease (CWD) transmission and establishment into geographic areas currently not known to have CWD. If a permitted landfill is not located near your residence, please contact your waste management provider to learn more on proper disposal options. Find an [Approved Big Game Carcass Disposal Site](#) on this map.

What should I do if I suspect a deer or elk has CWD?

Call our department at 605.394.2391 (Rapid City) or 605.773.3387 (Pierre) or the Animal Industry Board at 605.773.3321 (Pierre). Arrangements will be made to investigate the report.