



Chronic Wasting Disease Management Plan

2024



Table of Contents

I.	Mission Statement	3
II.	Definitions of Terms	3
III.	Executive Summary	4
IV.	Introduction	4
V.	History	5
VI.	Sampling and Testing	6
VII.	Response and Guidance	7
VIII.	Best Management Practices	9
IX.	Surveillance	9
X.	Management and Research	11
XI.	Stakeholder Information and Survey	11
XII.	Public Outreach	13
XIII.	Supporting Activities	13
XIV.	Literature Cited	14
XV.	Appendix A	16
XVI.	Appendix B	19
XVII.	Appendix C	20
XVIII.	Appendix D	22

Our Mission

The mission of the Nebraska Game and Parks Commission is stewardship of the state's fish, wildlife, park, and outdoor recreation resources in the best long-term interests of the people and those resources.

Definitions of Uncommon Terms

Aspiration pneumonia- a type of lung infection that is due to a relatively large amount of material from the stomach or mouth entering the lungs

Cervid- a term used to encompass all animals within the deer family (*Cervidae*)

Culling- the intentional removal of animals from a population for a purpose that improves the status of the base population

Endemic- when an infection is constantly maintained at a baseline level in a geographic area without external inputs

Euthanize- to put a living animal to death humanely

Intracerebral inoculation- introducing a vector into the brain

Prevalence- the proportion of a population that is infected by a disease such as CWD, calculated as number infected divided by the total number sampled and normally expressed as a percentage.

Prion (PrP^{cwd})- a malformed, disease-associated protein that can trigger normal proteins in the brain to fold abnormally. This malformed protein serves as a template to generate additional prions.

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.

Executive Summary

Chronic Wasting Disease (CWD) is a contagious neurological disease affecting mule deer, white-tailed deer and elk in Nebraska. It is characterized by a spongy degeneration of the brain in infected animals resulting in loss of bodily functions, abnormal behavior, emaciation and eventually death. Deer and elk hunting generates substantial recreation and economic impact in Nebraska (>\$848,000,000 annually) and supporting 8,856 jobs (Wagner 2017). Significant declines in deer and elk populations caused by CWD could therefore have devastating impacts not only to these populations, but also to the state's economy. The Nebraska Game and Parks Commission (Commission) first identified CWD in the wild in 2000. The first Nebraska CWD Management Plan was implemented in 2002. Since that time, the Commission's goal has been to learn more about this disease and implement surveillance and testing strategies throughout the state. There are many challenges facing the Commission associated with this disease, including its detection, spread, means of transmission and effects on deer and elk populations. In response, the Commission has developed a plan to help manage and mitigate disease in these herds and the issues they face. The goals of the Nebraska CWD Management Plan are to develop detection methods that aid in identifying the state's current CWD occurrence and prevalence, track changes and trends in prevalence, and create strategies that reduce further spread. Our purpose is to create a transparent document to be referenced by wildlife managers, conservation partners, the public and other stakeholders. Several objectives have been identified to direct management decisions. Some tasks related to these objectives are ongoing, while new tasks have been created. This plan is not all-inclusive and is meant to be adaptive to respond to changing cervid populations and new information. It should be re-assessed at minimum every five years. The Nebraska CWD Management Plan will help facilitate discussions on future deer and elk management strategies in Nebraska.

Introduction

Chronic Wasting Disease (CWD) is a fatal transmissible spongiform encephalopathy (TSE) disease involving prions that attack the brain of an infected deer, elk, or moose. Other TSEs include scrapie, Creutzfeldt Jakob disease (human variant), and bovine spongiform encephalopathy or Mad Cow Disease (Saunders et al. 2012). CWD is caused by a misfolded protein, or prion, that replicates and infects other normal proteins (Saunders et al. 2012). It is not completely known how the disease is transmitted from animal to animal, but bodily fluids such as feces, blood, urine, and saliva likely act as pathways for spreading the disease (Mathiason et al. 2006; Centers for Disease Control and Prevention). Consequently, animals at high densities or in confined spaces have a greater likelihood of encountering bodily fluids from infected animals and therefore have a higher likelihood of contracting CWD if the prion is present (Belay et al. 2004). There is variance in the virus' pathogenicity between different species; cattle appear to be resistant to natural infection while sheep have been found to be susceptible to infection through intracerebral inoculation. However, there is no evidence that the disease can be transmitted to sheep via oral exposures or other vectors (Williams 2005). The disease has not been shown to be transmissible to humans at this time, but there is some evidence that closely related primate species may be susceptible to the disease in laboratory settings (Race et al. 2009).

Once an animal has contracted CWD, it takes 12-16 months (or longer) before symptoms are observed. Animals can succumb quickly once symptomatic, primarily due to dehydration, starvation, predation due to poor health, or aspiration pneumonia (CWD Alliance 2012). Common clinical signs at the end stage of the disease include ataxia, drooping ears, holding the head in a lowered position, excessive thirst, urination and drooling, listlessness, decreased awareness, and other behavioral changes (Blanchong et al 2012). None of these symptoms can be exclusively used to diagnose CWD because many are also symptoms of other diseases (Center for Disease Control and Prevention 2018).

A rectal biopsy is the only USDA-approved method to live-animal test for CWD; however, the test accuracy is not as precise as postmortem testing. Postmortem examination of the brain, tonsils, or lymph nodes can conclusively diagnose CWD.

History of CWD Surveillance and Management Efforts

- 1967** Discovered as a fatal wasting syndrome of captive mule deer in a Colorado Division of Wildlife research facility at Fort Collins
- 1978** Recognized as a transmissible spongiform encephalopathy
- 1979** Identified in elk at a Colorado Division of Wildlife research facility
- 1981** Diagnosed in the wild in a free-ranging elk in northcentral Colorado
- 1997** First CWD survey project in Nebraska in a joint effort with South Dakota and New Jersey
- 1998** CWD first detected in Nebraska in captive elk herds
- 1999** Nebraska starts hunter harvest CWD surveillance
- 2000** Confirmed CWD positive in free-ranging two-year-old mule deer in Kimball County
- 2001** Targeted culling efforts followed in Kimball County in attempt to reduce the spread
- 2002** First Nebraska CWD Management Plan adopted
- 2002-2014**
- Deer annually sampled across Nebraska
 - Detections continue in the west with few or no detection across much of eastern Nebraska
 - Elk periodically sampled with no detections
- 2015** New surveillance strategies adopted
- 2018**
- Additional elk harvest surveillance implemented
 - 7 positives in 426 sampled elk
 - Prevalence increases in west and central deer management units
- 2023**
- Nearly 57,000 harvested deer and over 400 elk tested for CWD since 1999 (*Appendix A*)
 - 1,269 positive tests of deer and 19 elk since 1999 (*Appendix A*)
 - CWD in Nebraska occurs in 58 counties
- Present (2024)**—CWD has been detected in 32 states and 3 Canadian provinces in free ranging cervids and in captive facilities in 18 states and 3 provinces

CWD in Nebraska Deer

Within Nebraska, CWD has been detected in 58 counties from the Panhandle east to Cass and Otoe Counties (*Appendix B*). Recent increases have been observed in the Upper Platte, Platte, and Republican Deer Management Units while the highest prevalence is in the Panhandle and Frenchman Units. Currently, based on the sampled portion of the population, the Plains Unit has the highest prevalence in the state at 30.9%. Recent sampling conducted in Calamus East and West Units yielded 12 positive samples from 231 tested mule/white-tailed deer. Historically, western units have been sampled more frequently due to high prevalence rates (Figure 1). See *Appendix A and B* for full prevalence details.

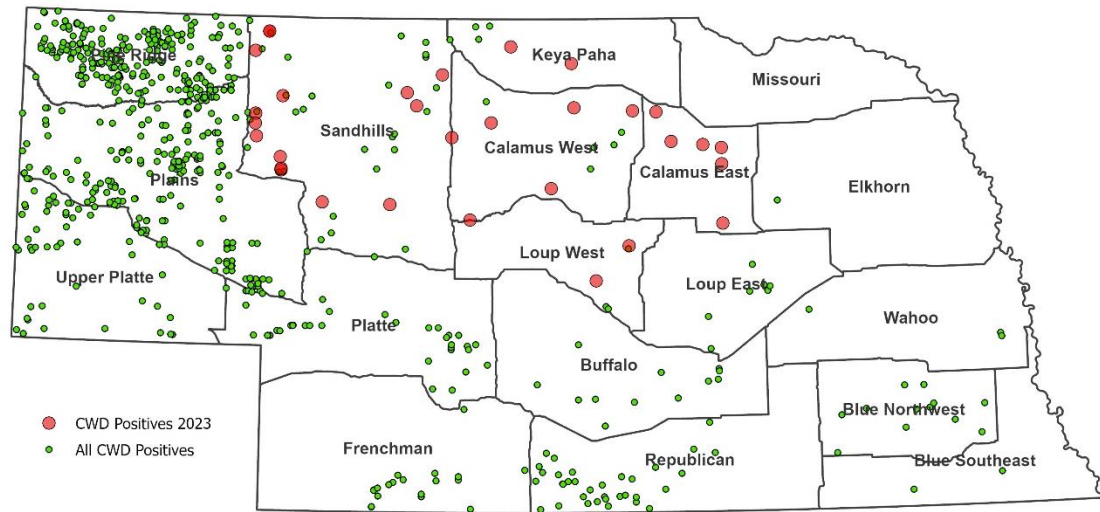


Figure 1. Positive CWD detections in deer in Nebraska Deer Management Units from 1999-2023 (2023 detections in red). Additional detection data in Appendices A, B and C.

CWD Sampling and Testing

Current Sampling and Testing Methods

The two United States Department of Agriculture (USDA) approved tissue types for testing for CWD in deer and elk are the medial retropharyngeal lymph nodes and the brainstem (obex; USDA January 2020). Samples are collected on a volunteer basis from hunter-harvested deer and elk, and from diseased deer and elk that are either reported to or found by agency staff. Samples can be submitted to many labs across the country; however, most Nebraska samples are submitted to the Nebraska Veterinary Diagnostic Laboratory at the University of Nebraska—Lincoln (UNL) and the Southeastern Cooperative Disease Wildlife Study (SCWDS) in Athens, Georgia.

The primary test used at both UNL and SCWDS is the enzyme-linked immunosorbent assay that detects prions with antibodies and calculates the intensity of prions present in the tissue (USDA January 2020). The other approved test utilizes immunohistochemistry, which is a method that uses staining to detect the presence of prions in the tissue with antibodies that bind to the proteins.

CWD Surveillance of Elk

Elk surveillance began in the early 2000s with larger scale, voluntary sampling of hunter-harvested elk implemented in 2018. The total number of elk permits issued in Nebraska is relatively small, so sampling efforts will not provide a statistically valid sample size to develop robust occurrence and prevalence data for elk. However, continued sampling will provide useful information. Since testing expansion in 2018, CWD has been detected in elk in Units 3, 4, 7, 8 and 11 (Figure 2).

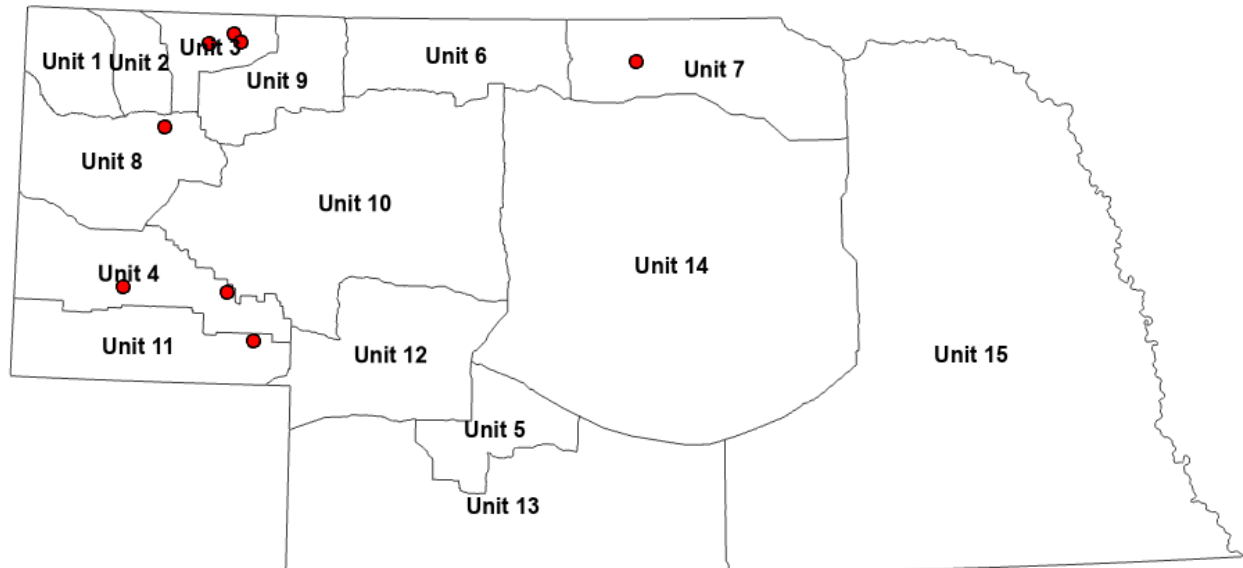


Figure 2. Nebraska elk management units and positive CWD cases (2018-2023).

In the 2018 elk season, 2 elk of 138 tested were CWD positive. For the 2019 elk season, four hunter harvested elk of 124 tested positive for CWD. In 2020, no positive samples were detected of 202 samples collected. In 2021, another three elk of 164 tested were CWD positive. In 2022, one elk out of 83 hunter harvest samples was CWD positive. In 2023, CWD surveillance in elk was reduced due to the low detection rates. Two hunter harvest samples were submitted with no detections. Although prevalence rates in hunter-harvested elk appear to be relatively low, NGPC will continue to opportunistically sample hunter-harvested elk each season.

Surveillance of Sick Deer and Elk

Cervids (primarily deer) displaying abnormal or sick behavior or that are found dead are often reported to the Commission. Each report is investigated by Commission staff. Some cervids die before a Commission staff member can investigate the report and some cervids may be euthanized by Commission staff. CWD samples are collected from any dead cervids in suitable condition for sampling. The Commission continues to collect location data and document individual events and positive results.

Response and Guidance

The purpose of this Plan is to provide guidance to wildlife managers and information to the public. In composing this plan, the Commission has coordinated with wildlife professionals and

stakeholders because any regulation changes and their implementation would have implications beyond local and game management unit boundaries. Stakeholders range from hunters and captive cervid facilities to the general public. It has been essential that we focus on both short- and long-term objectives as CWD has no known cure or treatment and we will likely be managing cervid populations infected with the disease for the foreseeable future. It is also to be noted that this document and the overall management of CWD in the state may change as the Commission and others continue to conduct research and utilize the best science available as well as updated input on social tolerances. We anticipate long-term CWD occurrence in Nebraska and will need cooperation and coordination from all stakeholders.

CWD Guiding Principals

- CWD is an infectious prion disease that attacks the brain of infected cervids and is transmitted through contact with feces, urine and saliva
- CWD is 100% fatal in infected cervids
- There is currently no cure for CWD
- CWD progresses slowly in infected cervids
- CWD is not known to be transmissible to humans
- Environmental contamination can increase risk of transmission and is difficult to eradicate
- CWD should be evaluated and managed in accordance with sound biological principals
- Cervid populations provide recreational, economical and ecosystem benefits to Nebraska
- The Commission has a responsibility to educate and inform the public on CWD management as well as consider their inputs and social tolerances

Objectives

- Provide Commission staff, hunters, agency partners, conservation organizations and the public with updated information and best management practices regarding CWD
- Continue and modify monitoring efforts associated with captive and free-ranging cervid herds in Nebraska as needed
- Monitor disease prevalence and develop strategies to adapt management as new information becomes available.
- Routinely (5 years) assess stakeholder interest and concerns about CWD by conducting stakeholder surveys, public meetings and provide updated information through media outlets
- Engage in CWD-related research and information sharing with other agencies and associated working groups
- Create an informed stakeholder base through Commission communication and other platforms, providing transparency and educational information about CWD
- Provide statewide, regional, and unit-specific recommendations as more becomes known about CWD

Best Management Practices for Prevention, Surveillance and Management of CWD

The Commission is a member of the Association of Fish and Wildlife Agencies (AFWA), which “represents North America's fish and wildlife agencies to advance sound, science-based management and conservation of fish and wildlife and their habitats in the public interest.” In September 2018, AFWA approved a set of Best Management Practices (BMPs) for the prevention, surveillance and management of CWD. The purpose of the BMPs was to create recommendations that state wildlife agencies across North America could utilize when attempting to manage CWD. These BMPs were crafted by wildlife professionals associated with their member agencies and utilized the best available peer-reviewed science. While the following BMPs are not mandated by the Commission, agency staff may recommend any of these to stakeholders to minimize the spread of this disease. A summary of AFWA’s Best Management Practices, which include carcass transportation/disposal, baiting/feeding and urine-based scent lures, can be found at: [AFWA Best Management Practices](#) and in *Appendix C*.

Surveillance

Since 1999, the Commission has regularly sampled Nebraska cervids for CWD. Prior to 2015, sampling was conducted on a relatively state-wide basis to identify areas of prevalence (*Appendix A, Table 3*). In 2015, a unit detection rate approach was implemented to rotate sampling among the five Commission districts (Northeast, Southeast, Southcentral, Northwest, and Southwest) during the nine-day firearm deer season (Figure 3). The sampling goal for each management unit is a 90% probability of detecting CWD at a prevalence of 1% or greater. For most management units, the target sample size for deer is 230 males aged 2.5 years and over, but this can be adjusted to incorporate females if needed to meet the sample size requirements. Recent sampling has focused heavily on males due to high prevalence rates in males and ease of access at deer check stations, but with recently approved changes for deer check processes, staff may begin sampling more females. Aside from convenience, this would provide a more robust estimate of disease prevalence in males and females. These voluntary samples will continue to be collected at check stations during the November firearm deer season as well as when contacted by the public outside of the firearm season. With a hybrid tele-check system being implemented for the 2024 firearm season and other potential changes into the future, sampling efforts will continue to evolve.

Historically, the highest prevalence units have also been the units most frequently and intensively sampled. These units are in the Northwest and Southwest Districts (Figure 3). Following the 2023 season, a decision was made to begin transitioning to a hybrid tele-check system that would incorporate both mobile and in-person check-ins. Sampling protocols during the 2024 firearm season will remain unchanged. The Commission will continue to assess sample availability and collection efforts and adapt to any future changes in hunter check-in processes by adjusting sampling in units and counties with low CWD prevalence as well as a focus on species- and sex-specific sampling.

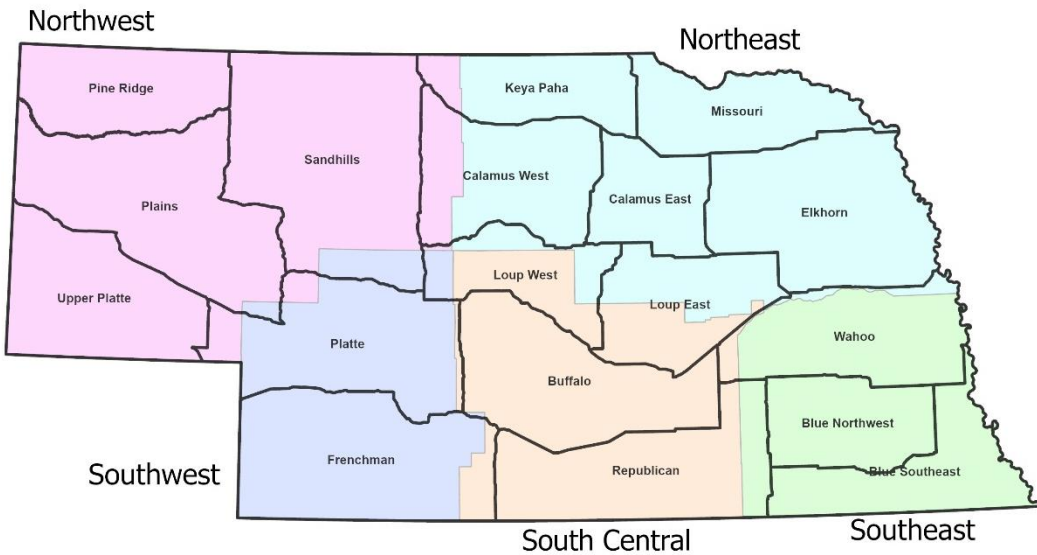


Figure 3. Nebraska deer management units (black boundaries) and administrative districts (colored polygons).

Urban Cervids

Though not currently a major issue in Nebraska, deer and elk have become increasingly frequent in urban areas throughout the country. As urban cervid populations and densities increase, the prevalence of diseases such as CWD and the risk of wildlife conflicts can increase. Because most cities and towns have laws and ordinances against hunting or firearm discharge, managing urban cervid populations can be challenging due to low hunter harvest (a primary management tool) and natural mortality. Increased cervid densities create a risk of increased CWD prevalence in cities or towns that exceed densities of surrounding populations. With these risks in mind, local governments must be involved in localized management and education efforts if urban disease and nuisance issues increase.

Captive Cervids

Captive cervid facilities (primarily elk and mule deer) are scattered throughout Nebraska and are known to be a source and risk for diseases such as CWD. The first detection of CWD in a Nebraska captive cervid herd occurred in 1998. Since then, there have been 42 confirmed positive elk with CWD in captive facilities, with the last confirmed positive occurring in 2021 (W. Meier pers. communication 2021). Regulatory authority and monitoring of captive facilities is conducted by the Nebraska Department of Agriculture (NDA). All elk and deer that are 12 months of age or older that are harvested in a domesticated facility for possible human consumption—whether exhibiting symptoms of CWD or not—must be tested by an approved laboratory for CWD as per NDA regulations. The Commission can assist the NDA with fence checks and escapees and does have permission to euthanize an escaped animal if not recaptured within 5 days after the discovery of such an occurrence. The monitoring of captive cervid herds is vital in protecting both the private agricultural interests and wild, free-ranging cervid populations. Because of the potential disease issues between wild and domestic cervids, it has been the Commission’s policy to euthanize any wild cervid that have contact with a domestic cervid facility.

Management and Research

While some states identify specific management actions to be taken if prevalence meets a specific threshold, the Commission has maintained a surveillance and research approach to CWD. While much is unknown about this disease, by focusing on monitoring, we have and will continue to gather the data necessary to make CWD management decisions as warranted and in conjunction with overall cervid herd objectives and social tolerances.

Past Commission CWD-Related Research (citations with links in Appendix D):

- Space use of sympatric deer in a riparian ecosystem in an area where Chronic Wasting Disease is endemic
- The use of home range analysis to evaluate Chronic Wasting Disease in White-tail and Mule deer in the Nebraska Sandhills
- Geographic variation in the PRNP gene and its promoter, and their relationship to Chronic Wasting Disease in North American deer
- Genetic and evolutionary considerations of the Chronic Wasting Disease - human species barrier
- Considering the use of the terms strain and adaptation in prion research
- Harvest management and Chronic Wasting Disease prevalence trends in western mule deer herds

Current Research

- Assessment of adult female and neonatal mule deer survival, movements, and habitat use in Nebraska
- Investigation of the fate and transport of Chronic Wasting Disease prions after landfilling or burial
- Cause-specific mortality and sub-clinical behavioral responses in Chronic Wasting Disease infected mule deer

Stakeholder Information & Survey

As CWD continues to be a concern, many members of the hunting community and general public possess varying levels of knowledge about the disease. In 2021, the Commission conducted a Hunter CWD Survey to assess hunter knowledge and concerns regarding CWD in Nebraska. The information gathered from this survey will allow the Commission to make more informed management decisions—especially as it pertains to hunters. Current plans are to conduct this survey every five years to gather information and assess potential changes in the levels of concern and knowledge.

Survey Results:

- 68,552 email surveys distributed; 6,987 responses received (10% response rate)
- 5,471 resident responses, 1,516 non-resident responses

- Overall, respondents are:
 - Concerned about the impact of CWD on cervid populations
 - Favorable towards additional research of CWD and further regulations to reduce CWD spread
- Respondents chose to hunt for several reasons, including: to bring meat home, to obtain a sense of accomplishment from a successful hunt, to have the opportunity to shoot while socializing with family and friends, and to maintain a healthy deer herd.
- Most hunters process their own meat, ~70% at least wear gloves when field dressing deer; ~60% use their field dressing tools for just field dressing
- Some hunters (22.5%) return inedible parts of their deer to the landscape in an area other than where they harvested the deer
- Half or more of respondents did not feel they had enough information about CWD
 - ~57% thought NGPC providing the right amount of information
 - ~80% trust NGPC's response to CWD
- Much of the public underestimates the prevalence of CWD (most guessed that the CWD prevalence in their DMU would be 0% or 1-2%; and either 6-10% or 3-5% across state)
- Respondents from DMUs with the highest prevalence rates had the greatest concern
- Many respondents (46%) did not test their deer for CWD because they believed they knew how to properly handle and cook the meat. Nearly half didn't test just because they didn't know how to submit a sample
- While ~78% of respondents would keep hunting in the same area if CWD was detected, about a quarter of respondents (26%) would stop hunting all together if there was evidence of human health risk related to CWD
- About 66% of respondents were only following news about CWD in Nebraska a little or not at all
- Most hunters trust the information released by the NGPC concerning several aspects of CWD, and the majority of respondents (~55%) would prefer to get their information about CWD from the NGPC website
- Half or more of respondents did not feel they had enough information about CWD, including information on where CWD is found, what species are affected, and health risks for livestock and humans
- About 90% of the invitees did not respond so a lot remains unknown on how much Nebraska hunters are concerned about CWD
- Most respondents found several AFWA CWD regulation strategies to be acceptable suggestions, including the increase of multiple license types (~60% acceptable across options), and even restrictions of baiting and feeding (~59% acceptable across options) and carcass movement (~53% acceptable across options)
- While many process their deer in the same location that it was hunted, hunters travelled an average of 78 miles between their hunting location and processing location
- Most hunters (~70-85%) transport not only their meat outside the state, but other parts of the deer as well

- Respondents (28.6%) that had a deer test positive for CWD still ate the meat. 14.3% disposed of the meat in a different location from where it was harvested
- 45.4% of respondents tested for CWD citing they would like to contribute data and/or help the efforts towards chronic wasting disease monitoring and detection

Public Outreach

While information about CWD is readily available and can be found on the websites for most, if not all, state wildlife agencies, it is important that we continue to provide current information to the public. In addition to continued public outreach through big game public meetings, check station interactions, stakeholder surveys and social media platforms, tutorials and specific information can be found at [Nebraska CWD Information](#), and within this document. The CWD Alliance [CWD-Info](#) and the USGS [Chronic Wasting Disease](#) websites also provide important information. As we learn more about CWD, it may be necessary to consider further public opinion or input through additional surveys, advisory groups or other considerations.

Supporting Activities

The Commission is developing a big game disease database to track all disease events for big game species. The database will allow Commission staff to submit and record disease reports, access testing results, and map locations of disease detections. Once finalized, this online database will be available to the public to view current CWD information for the state of Nebraska.

Literature Cited

- Association of Fish and Wildlife Agencies (AFWA). 2018. AFWA Best Management Practices for Surveillance, Management and Control of Chronic Wasting Disease. AFWA, Washington, D. C. 111 pp.
- Blanchong, J. A., D. A. Grear, B. V. Weckworth, D. P. Keane, K. T. Scribner, and M. D. Samuel. 2012. Effects of chronic wasting disease on reproduction and fawn harvest vulnerability in Wisconsin white-tailed deer. *Journal of Wildlife Diseases* 48:361–370.
- Centers for Disease Control and Prevention. 2018. Chronic Wasting Disease. <<https://www.cdc.gov/prions/cwd/index.html>>. Accessed: 13 February 2019.
- CWD Alliance. “CWD in North America.” *CWD*, cwd-info.org/map-chronic-wasting-disease-in-north-america/. Accessed 21 Sept. 2023.
- Race B, Meade-White KD, Miller MW, Barbian KD, Rubenstein R, LaFauci G, Cervenakova L, Favara C, Gardner D, Long D, Parnell M, Striebel J, Priola SA, Ward A, Williams ES, Race R, Chesebro B. Susceptibilities of nonhuman primates to chronic wasting disease. *Emerg Infect Dis*. 2009 Sep;15(9):1366-76. doi: 10.3201/eid1509.090253. PMID: 19788803; PMCID: PMC2819871.
- Malmberg, J., G. Titcomb, L. Bailey, L. Parrie, B. Windell. 2023. Investigating the Impact of Chronic Wasting Disease on Mule Deer in Nebraska. In Progress
- Mathiason, C. K., J. G. Powers, S. J. Dahmes, D. A. Osborn, K.V. Miller, R. J. Warren, G. L. Mason, S. A. Hays, J. Hayes-Klug, D. M. Seelig, M.A. Wild, L. L. Wolfe, T. R. Spraker, M. W. Miller, C. J. Sigurdson, G. C. Telling, E. A. Hoover. 2006. Infectious Prions in the Saliva and Blood of Deer with Chronic Wasting Disease. *Science* 314:133-136. <<http://science.sciencemag.org/content/314/5796/133.full>>.
- Meier, B. Livestock Veterinarian Epidemiologist. Nebraska Department of Agriculture. CWD Plan. Email Correspondence. 29 March 2019.
- Saunders, S.E., S.L. Bartelt-Hunt, and J.C. Bartz. 2012. Occurrence, Transmission, and Zoonotic Potential of Chronic Wasting Disease. *Emerging Infectious Diseases*. 18(3). <https://wwwnc.cdc.gov/eid/article/18/3/11-0685_article>.
- United States Department of Agriculture. 2024. Cervids: Chronic Wasting Disease Specifics. <<https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/cervid/cervids-cwd/cervid-cws-specifics>>. Accessed: 23 April 2024
- Wagner, G. 2017. Why Hunting is Important. *Nebraskaland Magazine*. <<http://magazine.outdoornebraska.gov/2017/08/109097/>>.

Williams, E.S. 2005. Chronic Wasting Disease. *Veterinary Pathology*. 42: 530-549. <<https://doi.org/10.1354/vp.42-5-530>>.

Appendix A. Mule deer and white-tailed deer CWD prevalence rates, samples collected and positive results in Nebraska deer management units from 1999-2022. No CWD hunter harvested surveillance was conducted in 2013, 2014, or 2020.

Table 1: CWD prevalence rates by deer management unit from 1999-2023 (Only includes samples collected during November firearm season)

	Blue NW	Blue SE	Buffalo	Calamus E	Calamus W	Elkhorn	French	Keya Paha	Loup E	Loup W	Missouri	PR	Plains	Platte	Repub	Sandhills	U. Platte	Wahoo
1999	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.07%	-
2001	-	-	-	-	-	-	-	-	-	-	-	2.38%	-	0%	-	-	0.82%	0%
2002	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-	0.49%	0.46%	0%	0%	0%	0.52%	0%
2003	0%	0%	-	-	0%	0%	0%	0%	0%	0%	0%	0.63%	1.60%	0%	0%	0%	1.11%	0%
2004	0%	0%	0.60%	-	0%	0%	0%	0%	0%	0%	0%	0.86%	1.11%	0.23%	0%	0.50%	0.91%	0%
2005	0%	0%	-	0%	0%	0%	0%	0%	0%	0%	0%	1.25%	1.79%	0%	0%	0%	0.84%	0%
2006	0%	0%	-	0%	0.35%	0%	0%	0.31%	0%	0%	0%	2.48%	0.82%	0%	0%	0.35%	0.73%	0%
2007	-	-	0.31%	0	0%	-	0.28%	0%	-	0%	-	1.45%	1.19%	0%	-	0%	1.84%	-
2008	0%	0%	-	0%	-	0%	0.49%	-	-	-	0%	0%	0.46%	0.66%	0%	0.64%	0.49%	0%
2009	-	-	-	0	0%	-	0%	0	-	0%	-	2.59%	3.62%	1.36%	-	1.70%	4.07%	-
2010	-	-	0.25%	0%	0.39%	0%	0.52%	0	-	-	0.45%	7.05%	3.27%	0.33%	0%	0.78%	3.21%	-
2011	-	-	0.42%	-	0.82%	-	-	0.73%	-	0.41%	-	6.71%	-	-	0%	-	-	-
2012	-	-	0.47%	-	0%	-	-	0	-	0.29%	-	-	1.36%	-	0.23%	-	-	-
2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2015	-	-	-	-	-	0%	-	-	0.82%	-	0%	-	-	-	-	-	-	-
2016	0.83%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.80%
2017	-	-	-	-	-	-	10.71%	-	-	-	-	18.22%	10.08%	9.86%	10.67%	-	15.04%	-
2018	-	-	-	-	0%	-	-	0.41%	-	0.78%	0%	29.96%	19.49%	-	-	6.28%	-	-
2019	-	-	-	0%	-	0.41%	-	-	1.72%	-	-	26.14%	21.71%	-	-	-	-	-
2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2021	3.42%	0.85%	7.20%	-	-	-	-	-	-	-	-	-	-	14.96%	16.92%	-	-	0.42%
2022	-	-	-	-	-	-	26.44%	-	-	-	-	27.68%	30.92%	-	-	-	16.80%	-
2023	-	-	-	6.00%	4.58%	-	-	1.54%	-	2.90%	-	-	-	-	-	12.15%	-	-

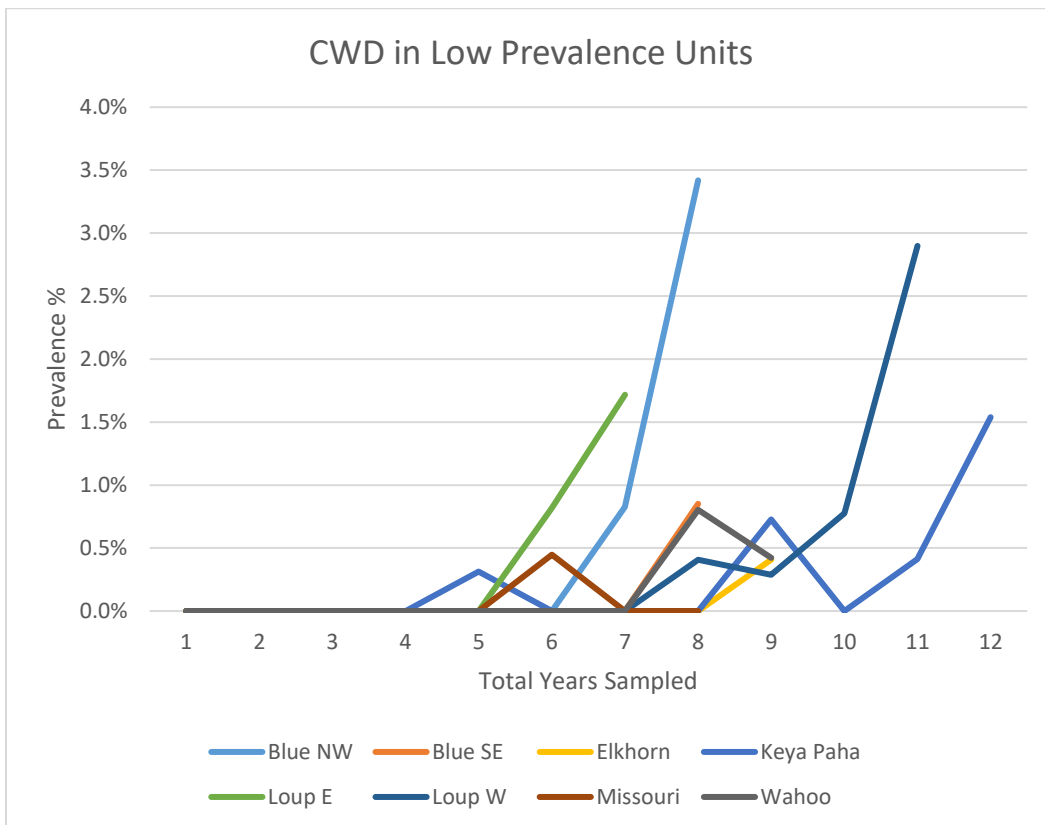
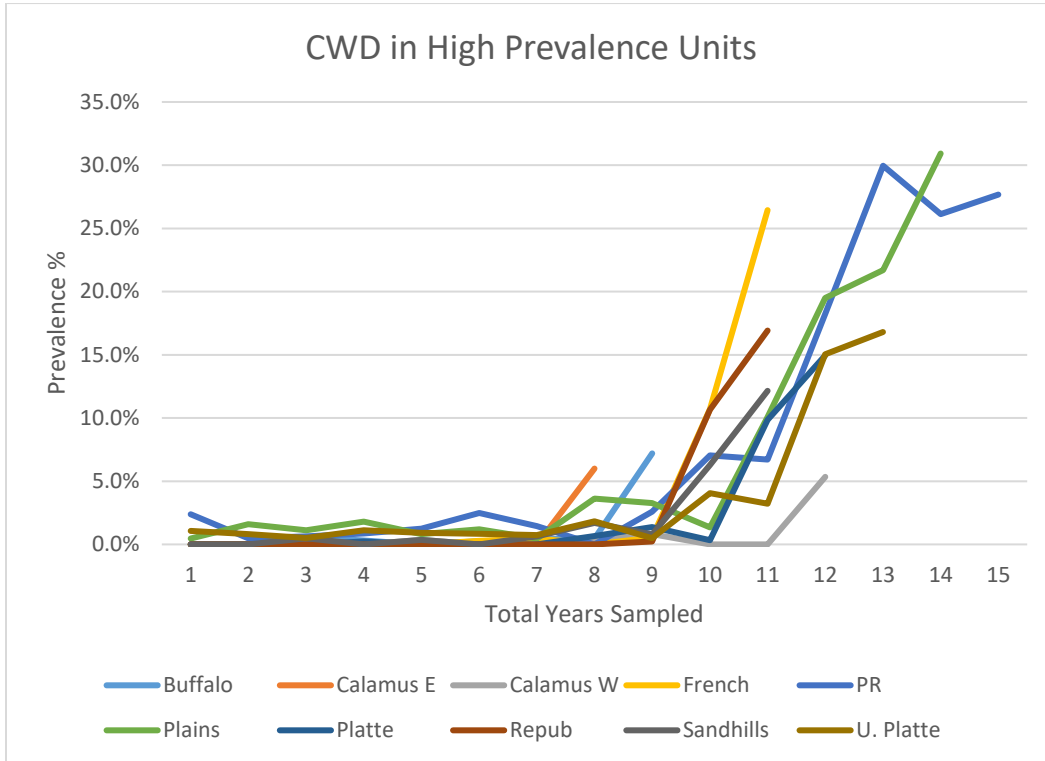
Table 2: CWD positive results by deer management unit from 1999-2023 (Only includes samples collected during November firearm season). No data collected in 2013, 2014 and 2020.

	Blue NW	Blue SE	Buffalo	Calamus East	Calamus West	Elkhorn	Frenchman	Keya Paha	Loup East	Loup West	Missouri	Pine Ridge	Plains	Platte	Republican	Sandhills	Upper Platte	Wahoo
1999	--	--	--	--	--	--	--	--	--	--	--	--	0	0	--	0	0	--
2000	--	--	--	--	--	--	--	--	--	--	--	--	0	0	--	--	2	--
2001	0	0	0	--	0	0	0	0	0	--	--	10	0	0	0	0	3	0
2002	0	0	0	0	0	0	0	0	0	0	--	6	3	0	0	0	3	0
2003	0	0	0	0	0	0	0	0	0	0	0	7	10	0	0	0	5	0
2004	0	0	1	0	0	0	0	0	0	0	0	12	11	1	0	3	4	0
2005	0	0	0	0	0	0	0	0	0	0	0	5	10	0	0	0	3	0
2006	0	0	0	0	1	0	0	1	0	0	0	7	3	0	0	1	2	0
2007	--	--	1	--	0	0	1	0	0	0	0	4	4	0	0	0	5	0
2008	0	0	0	0	0	0	2	0	0	0	0	0	2	2	0	2	3	0
2009	--	--	0	0	0	--	0	0	--	0	--	7	13	4	--	5	10	--
2010	--	--	1	0	1	0	2	0	0	0	2	21	12	1	0	2	7	0
2011	--	--	1	--	2	--	0	2	--	1	--	21	1	--	0	0	0	--
2012	--	--	2	--	0	0	1	0	0	1	0	0	5	--	1	0	0	0
2015	--	--	--	--	--	0	--	--	2	--	0	--	--	--	--	--	--	--
2016	2	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2
2017	--	--	--	--	--	--	57	--	--	--	--	46	22	28	27	--	33	--
2018	--	--	0	0	0	--	0	1	0	1	0	68	46	0	--	14	0	0
2019	--	--	--	0	--	1	--	--	4	--	0	69	101	--	--	--	--	--
2020			0	-	0	0	1	-	-	-	-	7	5	4	1	0	4	0
2021	8	2	20	-	-	-	-	-	-	-	-	-	-	38	51	--	--	1
2022	-	-	-	-	-	-	119	-	-	-	-	62	78	-	-	1	21	0
2023	-	-	-	6	6	-	-	3	-	2	-	-	-	-	-	13	-	-

Table 3: Total CWD samples collected by deer management unit from 1999-2023 (Includes ALL samples for the year). No data collected in 2013, 2014 and 2020.

	Blue NW	Blue SE	Buffalo	Calamus East	Calamus West	Elkhorn	Frenchman	Keya Paha	Loup East	Loup West	Missouri	Pine Ridge	Plains	Platte	Republican	Sandhills	Upper Platte	Wahoo
1999	--	--	--	--	--	--	--	--	--	--	--	--	10	15	--	1	54	--
2000	--	--	--	--	--	--	--	--	--	--	--	--	23	52	--	--	187	--
2001	3	5	3	--	2	1	12	2	1	--	--	421	53	236	6	2	364	38
2002	84	112	103	94	98	99	123	100	88	41	--	1233	647	266	105	153	579	108
2003	110	145	158	95	109	106	490	104	125	101	97	1116	625	427	107	290	450	83
2004	128	143	167	94	135	121	589	119	126	109	103	1392	991	493	117	604	441	151
2005	288	342	496	236	407	430	565	482	410	398	298	401	558	567	353	489	357	405
2006	293	240	338	288	283	360	358	320	340	315	329	282	367	271	235	282	274	312
2007	--	--	321	--	272	1	362	295	18	271	1	276	336	284	5	252	272	1
2008	325	295	417	210	16	347	410	13	42	2	307	301	431	302	301	312	610	324
2009	--	--	371	6	281	--	357	279	--	226	--	270	359	294	--	294	246	--
2010	--	--	398	191	256	364	382	321	4	4	447	298	367	303	293	255	218	5
2011	--	--	240	--	245	--	6	275	--	245	--	313	45	--	231	9	12	--
2012	--	--	430	--	390	2	13	512	34	349	20	16	369	--	439	2	12	2
2015	--	--	--	--	--	245	--	--	244	--	235	--	--	--	--	--	--	--
2016	242	254	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	249
2017	--	--	--	--	--	--	551	--	--	--	--	244	258	279	251	--	225	--
2018	--	--	4	2	132	--	3	243	3	129	2	227	236	7	--	223	5	1
2019	--	--	--	257	--	245	--	--	233	--	331	263	480	--	--	--	--	--
2020			9	-	2	1	2	-	-	-	-	62	16	22	1	2	6	2
2021	244	233	257	--	--	--	--	-	--	-	-	--	--	241	267	--	--	235
2022	-	-	-	-	-	-	452	-	-	-	-	224	252	-	-	8	130	1
2023	-	-	-	101	130	-	-	195	-	69	-	-	-	-	-	109	-	-

Appendix B: Levels of CWD prevalence in high and low prevalence Deer Management Units.



Appendix C: AFWA Recommendations for Prevention of CWD Introduction and Establishment (AFWA 2018)

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, and 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.

Approved September 12, 2018, by the Association of Fish and Wildlife Agencies

Appendix D: Past and Current CWD Research in Nebraska

Walter, W.D., Baasch, D.M., Hygnstrom, S.E., Trindle, B.D., Tyre, A.J., Millspaugh, J.J., Frost, C.J., Boner, J.R. and VerCauteren, K.C. (2011), Space use of sympatric deer in a riparian ecosystem in an area where chronic wasting disease is endemic. *Wildlife Biology*, 17: 191-209. <https://doi.org/10.2981/10-055>

The use of home range analysis to evaluate Chronic Wasting Disease in White-tail and Mule deer in the Nebraska Sandhills.

Zink RM, Najar N, Vázquez-Miranda H, Buchanan BL, Loy D, Brodersen BW. Geographic variation in the PRNP gene and its promoter, and their relationship to chronic wasting disease in North American deer. *Prion*. 2020 Dec;14(1):185-192. doi: 10.1080/19336896.2020.1796250. PMID: 32715865; PMCID: PMC7518737. <https://pubmed.ncbi.nlm.nih.gov/32715865/>

Genetic and evolutionary considerations of the Chronic Wasting Disease - human species barrier.

Zink RM. Genetic and evolutionary considerations of the Chronic Wasting Disease - Human species barrier. *Infect Genet Evol*. 2020 Oct;84:104484. doi: 10.1016/j.meegid.2020.104484. Epub 2020 Jul 27. PMID: 32731042. <https://pubmed.ncbi.nlm.nih.gov/32731042/>

Zink RM. Considering the use of the terms strain and adaptation in prion research. *Heliyon*. 2021 Apr 16;7(4):e06801. doi: 10.1016/j.heliyon.2021.e06801. PMID: 33898853; PMCID: PMC8060586. <https://pubmed.ncbi.nlm.nih.gov/33898853/>

Mary M. Conner, Mary E. Wood, Anne Hubbs, Justin Binfet, A. Andrew Holland, Luke R. Meduna, Annette Roug, Jonathan P. Runge, Todd D. Nordeen, Margo J. Pybus, Michael W. Miller; THE RELATIONSHIP BETWEEN HARVEST MANAGEMENT AND CHRONIC WASTING DISEASE PREVALENCE TRENDS IN WESTERN MULE DEER (*ODOCOILEUS HEMIONUS*) HERDS. *J Wildl Dis* 1 October 2021; 57 (4): 831–843. doi: <https://doi.org/10.7589/JWD-D-20-00226>