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TESTIMONY OF BRIAN R. NESVIK
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BEFORE THE
SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS ON
A DISCUSSION DRAFT BILL TO CREATE A UNITED STATES FISH AND WILDLIFE SERVICE CHRONIC WASTING DISEASE TASK FORCE

DECEMBER 4, 2019

Thank you for the opportunity to testify before you today as you consider the Discussion Draft Bill to Create a United States Fish and Wildlife Service Chronic Wasting Disease Task Force (Discussion Draft). I am Brian Nesvik and I have the privilege to serve as the Director of the Wyoming Game and Fish Department (Department). I have over 24 years of service to the citizens and wildlife of Wyoming in my role as a wildlife manager. My testimony is premised in my experiences while serving in various positions within the Department including Game Warden, Regional Wildlife Supervisor and Chief Game Warden/Chief of the Wildlife Division. I have served as the Director for the past 10 months and in this role I am the chief administrative head of the Department with general leadership, supervision and control of all activities, functions and employees of the Department. I report to the Governor of Wyoming and work closely with the Governor appointed Wyoming Game and Fish Commission. I am honored to work with and lead an extremely talented and dedicated team as we work together to manage Wyoming's vast and diverse wildlife and the places they live for those who enjoy them today and will enjoy the tomorrow. I earned a Bachelor of Science Degree in Fish and Wildlife Biology and Management from the University of Wyoming and a Master's of Science Degree in Strategic Studies from the U.S. Army War College. I serve on many state, regional and national organizations and committees including the Western Association of Fish and Wildlife Agencies, the Association of Fish and Wildlife Agencies (AFWA) and the Board of Directors for the Intermountain West Joint Venture.

As you will read in the comprehensive testimony below, only recently has Chronic Wasting Disease (CWD) been considered a threat to deer, elk and moose populations. Prior to research from the past 5-10 years, most wildlife managers and members of the public recognized the disease, but took the view that impacts were minimal. We now know that with high prevalence levels the disease can limit and even reduce the health and viability of certain wildlife populations.

While I speak to you from a Wyoming wildlife manager perspective, this disease is a national problem. CWD continues to spread across our country and its impacts continue to increase commensurate with changes in distribution. This disease has been documented in 26 U.S. States

and 3 Canadian Provinces. Aside from wildlife health problems, this disease has economic affects and indirectly impacts the work state agencies are able to conduct on other high conservation priorities. AFWA estimates states will spend $84 million on testing and surveillance over the next 5 years. Infrastructure at the federal level that facilitates cross-state and interagency coordination, planning and synchronization is needed and the ideas in the Discussion Draft you are considering today provides it. This is a national problem that requires the collective thought, wisdom and experience of members of the government, academia, non-governmental organizations and elected leaders. Your consideration of this Discussion Draft is important and I applaud your commitment to consider its provisions.

In Wyoming we have re-doubled our efforts in the recent past to explore new options and change the way we think about attacking this problem. We recently convened a statewide citizen group made up of 31 members and charged them with studying the disease and making recommendations for future management. Additionally, we established a committee comprised of senior leaders from many Wyoming state agencies to specifically look for solutions to deal with carcass disposal. The Wyoming legislature's Travel, Recreation and Wildlife Committee took this issue up for interim study and, like you, has received testimony regarding the disease, resources required to deal with it and future plans to enhance our efforts.

As explained below, there have been national efforts initiated and federal assets allocated to this problem in the past. In the absence of information indicating direct affects on wildlife at the population level and the lack of scientific links to human health, funding support waned in 2012. Federal funds were redirected to other high priority needs, and consequently, work on the disease at the national and state level declined. Unfortunately, funding for CWD research diminished before potential tactics and strategies for controlling and managing the disease could be tested and evaluated. Taking a new look into the allocation of federal resources in the face of new information is wise and this Discussion Draft outlines important concepts necessary to establish the framework for a new look. The Discussion Draft provides funding and ideas to move CWD research forward in a cooperative, interagency and comprehensive way.

Portions of this written testimony were developed by Mr. Paul Johansen, West Virginia Division of Natural Resources, Wildlife Resources Section. Mr. Johansen testified before the Subcommittee on Interior, Environment and Related Agencies of the House Committee on Appropriations on behalf of AFWA on October 17, 2019 regarding resources and funding for this nationwide problem.

What is Chronic Wasting Disease?

Chronic wasting disease is a chronic, fatal disease affecting the central nervous system of members of the deer family (*Cervidae*). In the United States, CWD affects mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), elk (*Cervus canadensis*), and moose (*Alces americanus*). This disease belongs to the group of rare diseases called transmissible spongiform encephalopathies (TSEs). These diseases are caused by abnormal proteins called "prions," which are proteins devoid of nucleic acid. Prions have similar amino acid sequences compared to normal cellular proteins, but in a different conformation. Prions cause a conformational change in the normal cellular protein structure, and disease is induced when the normal cellular protein is converted into the abnormal prion protein. The accumulation of prions leads to central nervous system cell death (Forloni et al. 1993). The disease progresses as more nervous system cells are lost, ultimately ending in the death of the animal. There is currently no cure for CWD or other prion diseases, partly because the immune system of an infected animal does not recognize prions as a source of infection. Therefore, there is no immune response, making the development of a vaccine or other treatments very difficult.

Early in the course of CWD, animals show no clinical signs. As the disease advances, affected animals show weight loss, reluctance to move, excessive salivation, droopy ears, increased drinking and urinating, and lethargy.

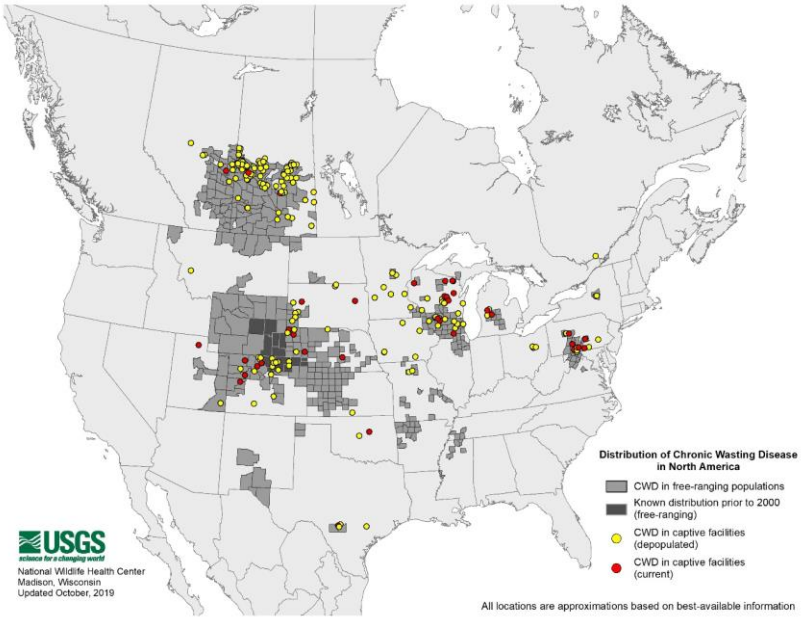
An elk at the very late stages of CWD - The majority of all CWD positive animals appear completely normal until they get in the late/advanced stages of the disease. Wyoming Game and Fish Department photo.

No immunity, recovery, or absolute resistance to CWD has been documented. This disease is always fatal, and most animals die from the disease within about 2.5 years of infection (Miller et al. 2012, Miller et al. 2008). However, natural genetic variation in host species can extend

survival time following infection. Infected animals do not typically exhibit clinical signs until late in the incubation period, resulting in the majority of hunter-harvested animals that test positive for CWD appearing to be in normal body condition. Infection can be detected in carcasses as well as in live animals, and diagnostic tests become increasingly reliable as CWD progresses (Miller and Fischer 2016). Chronic wasting disease is infectious, and prions are shed from several routes during most of the disease course, exposing other cervids either directly or through environmental contamination. Prions can persist for years in the environment, and their binding to soil elements (e.g., clay) enhances persistence and infectivity (Johnson et al. 2007). The environmental persistence of prions complicates disease management and control, especially once prevalence is high (Miller and Fischer 2016).

Initial modeling efforts predicted CWD would drive affected cervid populations to extinction (Gross and Miller 2001). More recent projections suggest CWD may have significant population-level impacts in Rocky Mountain National Park elk (Monello 2013, Monello 2014), Wyoming white-tailed deer (Edmunds et al. 2016), and Wyoming mule deer (DeVivo 2017). Other research suggests certain populations may be able to survive, bolstered by genetic selection and some level of hunting season restrictions (Robinson 2012, Williams 2014). Regardless, endemic CWD will likely depress some cervid populations at an unknown but potentially significant level. As such, management efforts designed to reduce the spread and prevalence of CWD are warranted.

Captive elk exported from Saskatchewan to South Korea marked the first detection of the disease outside of North America (Williams et al. 2002). Recently, two forms of apparent CWD have also been discovered in reindeer (*Rangifer tarandus*) and moose in Norway (Benestad et al. 2016) and in Finland, but these cases have not been linked to North America. CWD continues to spread across North America, likely through movement of infectious animals or materials, either naturally in migrating/dispersing wild populations, or through anthropogenic movement of infectious live animals, carcasses, or other materials. Over the past 50 years, CWD has been detected in captive and/or wild cervids in 26 states and the three Canadian provinces of Alberta, Saskatchewan, and Quebec. Most recently, a bull moose near Troy, Montana has tested positive for chronic wasting disease, which is the first known case in that species in Montana and is of great concern, again demonstrating the need for inter-state and international work on CWD management and research.



Depopulation of an entire wild or captive herd would not eradicate the disease because of untreatable and widespread persistence of infectious CWD prions in the environment. Subsequent reintroduction of susceptible animals can and likely will result in new infections. No vaccine, treatment, or medical cure for CWD currently exists. Although live animal tests have been used in research applications, in captive cervid operations as a whole-herd test, and for some interstate publicly owned, free-ranging interstate cervid translocations, no practical or validated live animal test for individual animals is available. The tests that are available are for detection of disease in cervids and should not be regarded as food safety tests. The minimum infectious dose of CWD prions is unknown, so determination of the level or degree of infectivity is unknown. Species in the family *Cervidae* appear to be the only animals naturally infected with CWD, although infection in other species outside this family has been demonstrated with varying success in experimental inoculation studies. To date, no human CWD infections have been reported, although humans undoubtedly consume CWD-infected animals. Public health authorities (Center for Disease Control and World Health Organization) recommend that animals that test positive for CWD should not be consumed, nor should any animal that appears unhealthy.

A new species of concern regarding CWD is feral swine. Since the range and habitats of feral swine and cervids in the United States overlap in many regions this raises concerns of whether feral swine are susceptible to the disease and if so, what role they could play in the spread and management of CWD. In 2017, a study conducted by Moore et al. found that domestic hogs were susceptible to CWD through oral exposure. This gave rise to the question of whether feral swine living in CWD endemic regions could become infected with CWD following consumption of infected cervid carcasses and sharing a contaminated environment. In 2018, the National Feral Swine Damage Management Program and the National Wildlife Disease Program partnered with universities and state and federal agencies to evaluate feral swine for evidence of interspecies CWD infection. By working with the Arkansas Wildlife Services Program, 102

samples were collected from feral swine in a CWD-endemic region. An additional 27 samples were obtained from a region of Oklahoma believed to be free of CWD to serve as negative controls. Since there is a limited understanding of naturally acquired prion disease in pigs, it is essential for this study to utilize a range of assays to produce meaningful data. Two amplification assays were identified to screen feral swine tissues for small amounts of CWD prions. To date, two feral swine samples have come back as suspect positives by both amplification assays. There is very limited information about prions and CWD in pigs and more analysis needs to be conducted to understand the findings.

Chronic Wasting Disease Outside of Wyoming

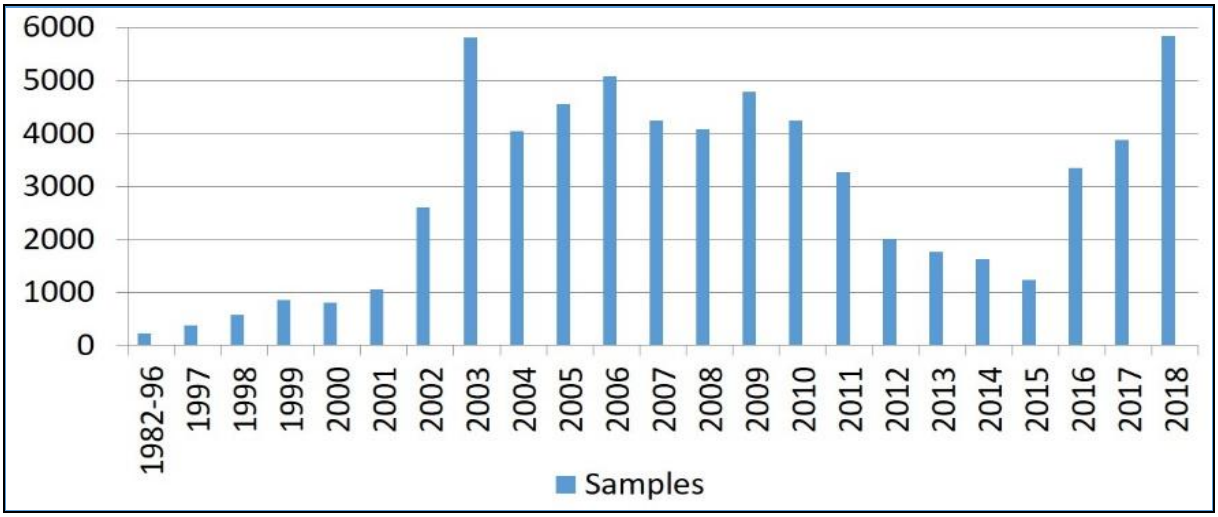
Chronic Wasting Disease continues to spread throughout Wyoming, North America, and in some European and Asian countries. To date, CWD has been documented in captive and/or free-ranging cervids in 26 U.S. states, three Canadian provinces, Norway, Sweden, Finland, and South Korea. See the United States Geological Survey (USGS) National Wildlife Health Center website for a map of current CWD distribution in North America (https://www.usgs.gov/media/images/distribution-chronic-wasting-disease-north-america-0).

Chronic Wasting Disease in Wyoming

Chronic wasting disease was first recognized in 1967 in captive mule deer in a facility near Fort Collins, Colorado (Williams and Young 1980), and was later recognized in Wyoming in the 1970s at the Department's Tom Thorne/Beth Williams Wildlife Research Center north of Laramie. Initially, CWD was thought to be related to nutrition but was later identified as a TSE by Dr. E.S. Williams in 1978 (Williams and Young 1980). The timing of the introduction of CWD into Wyoming, as well as its origin, remains unknown. In Wyoming, this disease was first identified in free-ranging mule deer in 1985, elk in 1986, white-tailed deer in 1990, and moose in 2008.

Prior to 2000, CWD was poorly understood and of little interest at the national level. Starting in the late 1990s and early 2000s, concern over CWD rapidly increased as more jurisdictions began to detect the disease and questions about human health arose. In 1996, bovine spongiform encephalopathy (BSE) was linked to variant Creutzfeldt-Jakob disease (vCJD) in people in the United Kingdom (Bruce 1997). The similarities of CWD and BSE led to human health fears over the consumption of CWD-positive cervids. From 2002 to 2012, human health concerns resulted in federal funding for CWD surveillance across the nation. This funding enabled Wyoming to greatly increase surveillance, although efforts waned after funding declined in 2010. Decreasing public and agency interest in CWD, from both a wildlife and human health perspective, led to further decline in disease surveillance efforts (Figure 1). That trend was reversed when emerging research identified the potential negative effects of CWD on western deer and elk populations (Geremia et al. 2015, Edmunds et al. 2016, DeVivo et al. 2017, Monello et al. 2014). Concern also increased within the Department when sharp increases in prevalence were detected in deer herds outside of what was then considered to be Wyoming's core endemic area (southeastern Wyoming), such as in the Bighorn Basin and along the eastern slope of the Bighorn Mountains.

Figure 1. Total CWD samples tested by year in Wyoming (1982-2018).



Since the discovery of CWD in 1985 in a free-ranging mule deer in southeastern Wyoming, this disease has slowly spread throughout much of the state. As of November 2019, CWD had been identified in 31 of 37 (84%) of the state's mule deer herds (Figure 2), in 9 of 36 (25%) of the state's elk herds (Figure 3), and generally wherever white-tailed deer occur in Wyoming (white-tailed deer herd units are loosely defined in Wyoming outside of the Black Hills). In contrast, CWD remains very rare in moose and has only been detected in one targeted moose in 2008, with over 1,120 moose tested to date. Prevalence estimates vary between herds, although deer herds generally exhibit significantly higher prevalence than sympatric elk herds (Table 1). In the majority of mule deer herd units where statistically significant sample sizes have been obtained, prevalence has steadily increased since its initial discovery within that herd unit. However, in some southeastern Wyoming mule deer herds where the disease has long been established, CWD prevalence has either somewhat declined from peak levels and/or has remained relatively static, albeit at levels high enough to likely impact population performance. Overall, prevalence tends to be higher in southeastern Wyoming, where the disease has long been established, but is quickly becoming more common and widespread in much of the state.

Figure 2. CWD Distribution in Wyoming Mule Deer (2019).

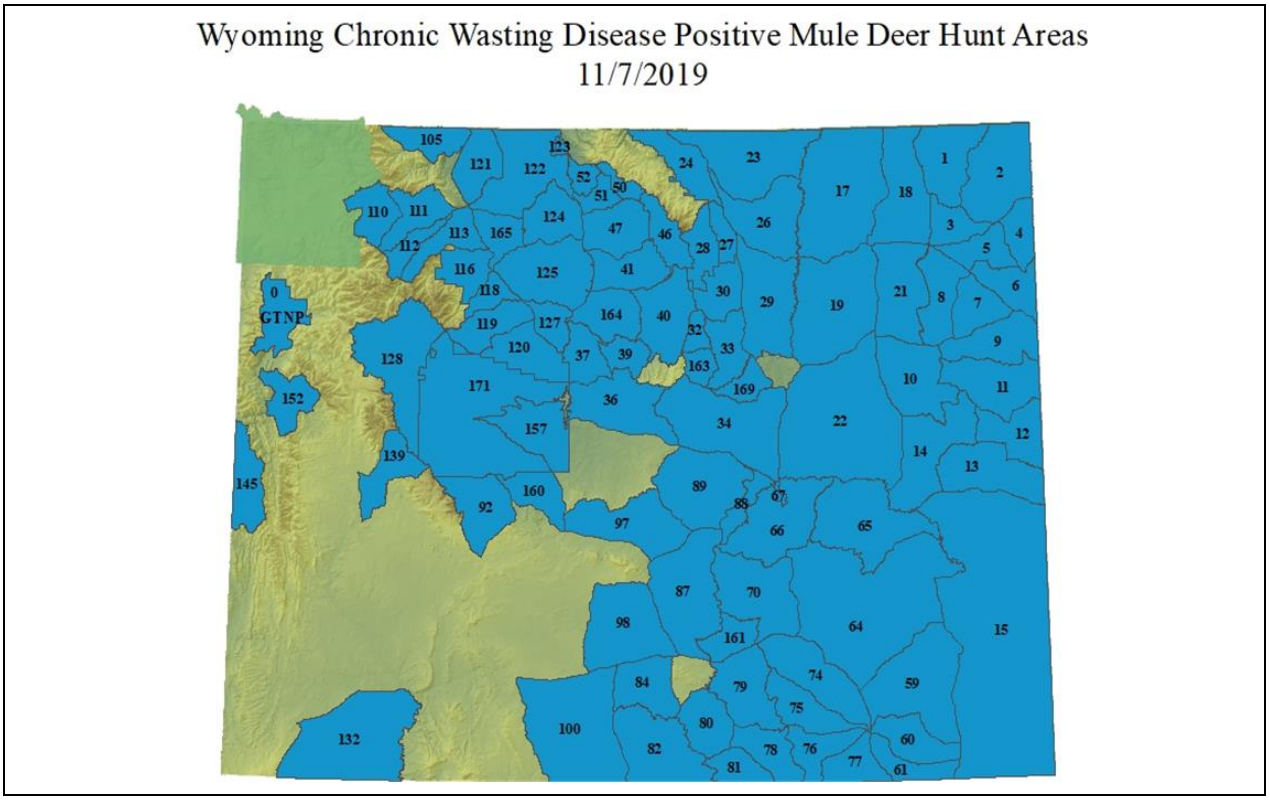


Figure 3 CWD Distribution in Wyoming Elk (2019)

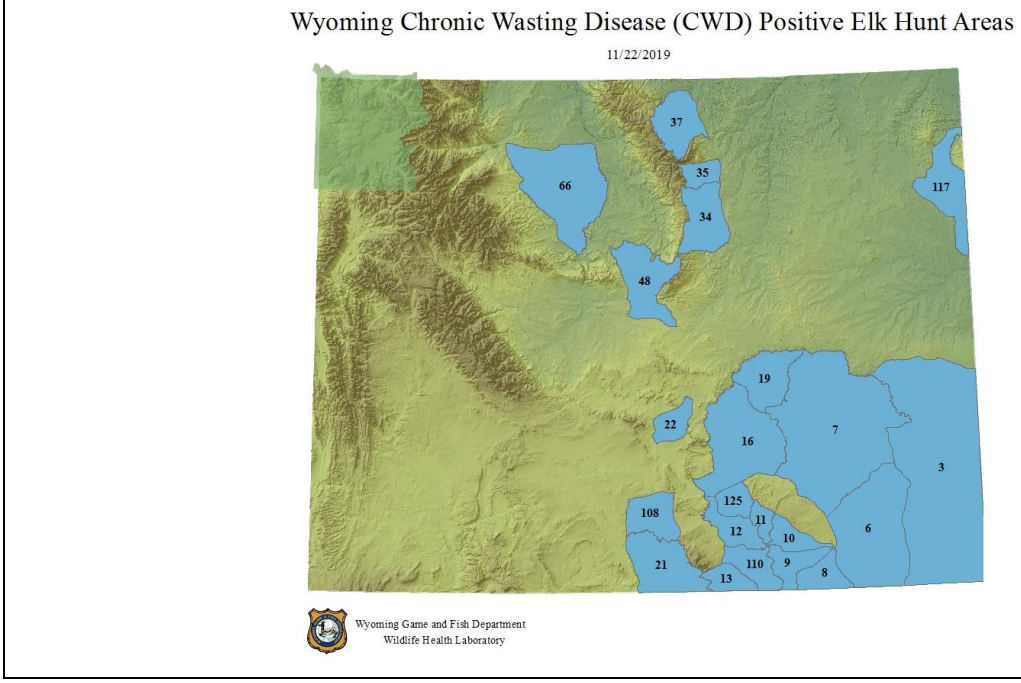


Table 1. CWD prevalence in sympatric Wyoming mule deer and elk herd units based on adult mule deer bucks and adult male and female elk (2016-2018).

Species and Herd Unit	Sample Size	Prevalence	95% C.I.
Mule Deer - Platte Valley	222	8%	4.2% - 12%
Mule Deer - Laramie Mountains	415	23%	15.6% - 27.7%
Mule Deer - Bates Hole/Hat Six	199	28%	16.9% - 34.9%
Mule Deer - South Converse	105	40%	21.1% - 48.2%
Elk - Snowy Range *(compare to Platte Valley mule deer)*	271	2%	0.6% - 4.3%
Elk - Laramie Peak / Muddy Mountain *(compare to Laramie Mountains, Bates Hole / Hat Six & South Converse mule deer)*	441	7%	4.5% - 9.8%
Elk - Iron Mountain *(compare to Laramie Mountains mule deer)*	168	14%	7.9% - 18.4%

Chronic wasting disease prevalence in mule deer is based on adult males (≥2 years old), a standard metric that allows for comparisons of disease demographics across North American jurisdictions. The selection of males is based on surveillance data that demonstrates prevalence in adult males is significantly higher than adult females within the same herd. Moreover, infection is less common in yearlings, and relatively rare in fawns. In addition, because female mule deer harvest is limited in Wyoming, sampling hunter-harvested adult males provides larger sample sizes for assessment of long-term trends in prevalence. Although the focus is on adult males, assessment of yearling male and adult female prevalence is also monitored in those herds where harvest is sufficient to achieve meaningful sample sizes.

For CWD surveillance in white-tailed deer, prevalence can be measured in adult males for cross-jurisdictional comparisons, but can also be adequately measured in females in many areas in Wyoming due to liberal harvest strategies. However, white-tailed deer populations are not well defined at the herd unit level in Wyoming as they are a lower priority for population demographic data collection in most of the state. In elk, CWD prevalence is also measured in adults of both sexes due to the significant level of male and female harvest attained within many of Wyoming's elk herds.

From January 1- November 8, 2019, the Department has collected and tested 3,414 deer, elk and moose CWD samples (at $32/sample) from hunter kills, road kills and targeted animals resulting in 353 CWD positive animals, with 285 being hunter harvests. The majority of samples are hunter-harvested male mule deer, followed by elk and moose. This effort resulted CWD being newly detected in Deer Hunt Areas 50, 105 and 152. While we have no data on the final outcome of the 285 CWD positive hunter harvested animals, we have strong indication that the

vast majority of these animals are not consumed, due to human health concerns, but are disposed of in a landfill at a cost (e.g. Cheyenne landfill charges $35 for a deer carcass).

Between January 1 - October 31, 2019, Department employees have spent 11,604 man-hours, driven 65,869 miles resulting in the Department spending at least $650,610 on CWD work, paid for by sportsperson's license dollars. These CWD expenses have a direct negative impact to the available funding for other wildlife conservation efforts. These expenses will only increase as CWD expands and management action and public testing demands increase.

Wyoming's CWD Public Collaborative Process and Revised Management Plan

Wyoming's wildlife are public resources highly valued by our citizens and it is in this spirit that the Department launched a robust collaborative CWD Working Group made up of diverse members of the public. Public meetings were hosted and public comment collected before and after the group did their work to ensure the Department's pending revised CWD Management Plan (Plan) considers a wide range of ideas. Management recommendations were considered in developing a revised CWD management plan. Recommendations were based on the newest science as well as ideas from the public. The time and commitment the Department and the CWD Working Group dedicated to the development of the Plan was substantial.

The next steps in managing CWD in Wyoming will include implementing new and modified management actions and adapting the Plan in the future based on evaluation of outcomes associated with the new approach . This Plan outlines immediate actions to curb this disease, but many of the strategies listed are long-term efforts that may take over a decade to see through to completion. Many components of the plan will be executed by Wyoming's wildlife managers, but other actions will require the scientific/research community, other states and international governments and publics.

As part of the pre-Plan development, an extensive CWD survey of Wyoming's 2018 Wyoming deer hunters was conducted. Three thousand (1,500 resident and 1,500 nonresident) deer hunters were surveyed on their, knowledge, concerns, opinions and management of CWD. The response rate was 40.65%, with the following key results:

- Hunters want the Department to do something about CWD.
- Hunters want the Department to prioritize a balance between herd health and hunting opportunity with a greater emphasis on herd health.
- As prevalence increases, hunters are more likely to hunt in different areas.
- Management strategies focused on harvest are preferred – particularly if it does not reduce populations.
- Most carcasses are disposed of at the site of kill or through a processor.

Colorado did a very similar survey and the results of the both surveys are being analyzed with a tentative publish date of sometime in 2020.

Past CWD Management Efforts and Funding

In the early 2000s, there were significant federal efforts to assist states with the management of CWD. The Department of the Interior launched a CWD Task Force in conjunction with the US Department of Agriculture (USDA) and developed a work plan to help the states manage CWD. Select Cooperative Fish and Wildlife Research Units (CRUs) within the US Geological Service (USGS), the USGS National Wildlife Health Center, the Animal and Plant Inspection Service (APHIS) Wildlife Services, the National Wildlife Research Center, the US Forest Service Research and Development, other academic institutions and Colleges of Veterinary Medicine cooperatively initiated CWD research. Their purpose and goals aimed to garner more insight into the disease epidemiology and to look for management solutions. After a few years, federal interest in CWD waned, the federal CWD work plan was outcompeted for resources and attention, and subsequent funding declined. Unfortunately, funding for CWD research diminished before potential tactics and strategies for controlling and managing the disease could be tested and evaluated. State agencies and our CWD colleagues and researchers have continued to do some research, but it has declined commensurate with declining federal resources.

From 2002–2012, federal funding was available to states for surveillance, monitoring, and management of CWD in wild and captive cervids, and to the captive cervid industry for indemnity payments to owners/managers if their herds became infected and required depopulation. To control movement of the disease in the captive cervid industry within the United States, APHIS's National Herd Certification Program (HCP) was fully implemented in 2012 (Code of Federal Regulations: 9 CFR Part 55 https://www.law.cornell.edu/cfr/text/9/part-55) to regulate interstate shipment of live cervids. Participation in the HCP is voluntarily; however, only animals from HCP-certified herds may be shipped interstate. Prior to implementation of this federal program, individual states regulated the movement of captive cervids. The national HCP certifies herds in approved state CWD programs as being at low risk for having CWD after five years of disease-free monitoring. However, there is no "CWD-free" certification of captive cervid herds. Individual states may implement regulations more stringent than the national HCP and their regulations preempt the Federal requirements with one exception: states must allow transit of captive cervids through the state, even if they do not allow captive cervid operations within the state.

The federal HCP has not prevented the continued spread of CWD or eliminated CWD in captive herds enrolled in the program. Since implementation of the HCP in 2012, CWD has been detected in additional captive cervid herds, including HCP-certified herds. Intra- and interstate movement of animals from HCP-certified herds later found to be infected is well documented and has resulted in infection of linked herds within the same state as well as at one Wisconsin herd that received an infected deer from a certified Pennsylvania herd. According to information provided by officials in affected states, all certified herds had been monitored for more than the five years required by the HCP before CWD was detected. Similar situations have been documented in Saskatchewan. Until there is a highly-sensitive ante mortem test for CWD, live animal movements remain a significant risk for the spread of the disease. Evidence for long-term persistence of prion proteins in the environment, combined with the long incubation periods

observed in many prion diseases, suggests that the current five-year monitoring period may be inadequate. Regulators need to be aware the HCP (US) and Voluntary HCP (Canada) may create a false sense of security among the public and industry that CWD cannot be spread through movement of live animals from certified herds. The fact that CWD continues to be detected in HCP-certified captive herds after more than five years of monitoring suggests the certification program may not be as effective as desired.

Since 2012, no federal funding for state surveillance, monitoring, and management of CWD in wild deer has been available. The growing economic burden has fallen solely on the states, and those impacts are now affecting other wildlife conservation efforts, federal agencies, and interests well beyond the scope of the agriculture appropriations that were available in the early 2000s. This is one of the reasons we are testifying before you today. Chronic wasting disease and its management challenges continue to spread and are now affecting federal agencies and their budgets and capacities within the jurisdiction of this Subcommittee such as the USGS, the US Fish and Wildlife Service, the US Forest Service, the Environmental Protection Agency, and the National Park Service.

State Resources and Expenditures: The Exponential Increase

Wyoming is not unique in spending significant resources to detect and manage CWD. AFWA surveyed state agencies in 2017 and again in 2019 to identify actual and anticipated expenditures by state on the surveillance, monitoring, prevention, and management of this disease. In 2017, the average expenditure by states on surveillance and monitoring activities alone was $437,440, while in 2019 the average expenditure by states on surveillance and monitoring activities had jumped to $511,844. Total expenditures on surveillance and monitoring activities jumped from $12.6 million to $13.3 million between 2017 and 2019. This increase is due in large part to increased demand from the hunting public for CWD testing of hunter-harvested animals, which is also encouraged by state agencies. In 2017, the CDC recommended that hunters have their deer tested for CWD if the animal was harvested in an area where the disease is known to occur. These recommendations are having a profound impact on the overall demand for CWD testing: state agencies reported to AFWA in 2019 that they anticipate an average increase of 32% in the number of animals tested between the current fiscal year and the next fiscal year. On average, individual states are testing 5,698 deer or other cervids this year, and some states are testing far more: Michigan expects to test over 40,000 animals this year, Missouri expects to test 32,500 animals, Wisconsin expects to test 17,000 animals, and Texas expects to test 10,000. The state agencies expect to test collectively an estimated total of over 159,000 wild cervids during the 2019-2020 hunting season. This increase in testing comes with a steep price tag -- over the next five years, the states currently battling CWD anticipate spending over $84 million on surveillance and monitoring alone, an average of over $3 million per state in which the disease has been confirmed in wild animals. To exacerbate the problem, the number of active hunters and the associated revenue they generate through hunting licenses, permits, and Wildlife Restoration Program funding is declining, providing fewer financial resources to the state agencies at a time when the costs associated with CWD continues to climb.

I would like to thank you and the House of Representatives for passing FY2020 appropriations legislation that proposes to increase federal funding for CWD research, surveillance, and monitoring to states. As you can see, these funds are desperately needed by the state agencies, and we appreciate your strong support to help manage this disease. We support adoption of the House provisions related to CWD funding in the FY2020 conference committee negotiations.

State agencies also are expending significant resources on the prevention and management of CWD. According to the 2019 Association survey, these expenditures are roughly equivalent to expenditures on surveillance and monitoring, totaling over $13 million in the current fiscal year alone. Nearly every state has developed or is developing a CWD response plan, a document which contains detailed recommendations for surveillance, monitoring, and management of the disease should it be found to occur in wild deer, elk, or moose herds within the state. In practice, these plans often need to be revised once CWD is actually detected within a state in order to address the particular conditions of the wildlife herd and the specific management context for the exact location and geography where the disease is detected. States also coordinate extensively with other agencies and organizations to assist them with all aspects of CWD surveillance, prevention, and management. Some of these agencies include the USGS's National Wildlife Health Center, the Southeastern Cooperative Wildlife Disease Study at the University of Georgia, the Northeast Wildlife Disease Cooperative at the University of Pennsylvania, the USGS's Cooperative Fish and Wildlife Research Unit Program, the individual institutions in the land grant university system, the APHIS Wildlife Services, and other diagnostic laboratories and research institutions.

State agencies are also actively implementing regulations to improve our ability to manage the spread of this disease. At this time, 41 states have implemented some form of restrictions on the movement of harvested cervid carcasses, and state agencies are also actively exploring other management approaches such as restrictions on feeding and baiting for wild cervids as well as supplemental harvest opportunities to reduce disease prevalence. Changes in state regulations and the implementation of management actions to combat the disease and help wild cervids are received with mixed reactions from hunters and ongoing frustration and misunderstanding about why management is needed as well as the severity and importance of controlling the disease. Often new regulations mean hunters will need to adjust their hunting habits and traditions, which can be difficult and create resistance to change. Engaging the public early and having them be part of the management decision discussion, process, and action implementation is critical.

State agencies spend significant time and resources communicating with hunters and the general public about the seriousness of this disease and the threat that it poses to wild cervid populations. Many of the management tools which have been specifically recommended by the scientific research community to reduce the spread of CWD also have the potential to impact the hunting public. Examples include actions to restrict feeding and baiting, restrictions on natural scent lures, reduction of overall herd size to reduce disease prevalence, antler point restrictions, or targeted removal of animals from a disease focal area. It is a challenge for state agencies to communicate effectively to hunters and the hunting public about these management options, many of which run counter to longstanding practices and traditions in the hunting community, even when the practices are clearly supported by the best available science.

Further exacerbating state agencies' communication challenges with hunters and the public is the fact that "public relations" are explicitly prohibited under the Pittman-Robertson Wildlife Restoration Act (Section 8a; 16 U.S.C. 669g), a primary source of funding for most state agencies to combat CWD. State agencies are having limited success using Hunter Education programs as the only means of explaining to hunters and the public about CWD, its impacts, and why management and adherence to regulations are important. If Congress passes HR 877, the *"Modernizing the Pittman-Robertson Fund for Tomorrow's Needs Act,"*, states will have the same communication, education, and outreach flexibilities for hunters as they already have for anglers and boaters under the Dingell-Johnson Sport Fish Restoration Act. HR 877 does not include provisions for raising federal taxes.

Research Needs to Manage the Disease

The Department, as with all state fish and wildlife agencies, is acutely aware of the need for additional investments in scientific research to investigate CWD. Priority research topics that have been identified by AFWA's Wildlife Health Committee in their 2018 "Best Management Practices for Prevention, Surveillance, and Management of Chronic Wasting Disease" include:

1. Prion detection and diagnostics. Research has led to significant advances in diagnostic testing (e.g., enzyme-linked immunosorbent assay (ELISA)), prion detection in some substrates (e.g., protein misfolding cyclic amplification (PMCA)), Real-Time Quaking-Induced Conversion (RT-QuIC), and antemortem diagnostics (tonsil and recto-anal mucosa–associated lymphoid tissues (RAMALT) biopsy). Additional advances in CWD detection will likely follow on the coat-tails of other prion diseases. Of particular need are more sensitive tests for live animals, including a rapid throughput test for surveillance and to facilitate test-and-cull management, and the ability to reliably detect prions in environmental samples, such as soil, water, and urine.

2. Disease biology and pathogenesis. Research has led to significant advances in understanding routes of prion shedding, transmission, species susceptibility, and genetic contributions to susceptibility. Next steps include applying these advances to continue modeling and understanding disease ecology, such as sources of new loci of infection and impacts of genetic resistance and selection, and filling knowledge gaps about strains of CWD and species barriers, particularly for humans, remain important needs. Developing prophylactic or treatment measures are needed, even if the time horizon for completion is long.

3. Management and Ecology of the Disease and the Host. Short-term studies have been performed to fill some knowledge gaps on the role of cervid ecology on CWD transmission, identify the role of soil and plants in prion availability, and model disease dynamics and predict management effectiveness. Significant needs remain in this area, particularly long-term, broad scale, multi-jurisdictional studies to evaluate the effectiveness of management treatments such as density reduction and targeted removals. Identification of techniques to reduce infectious load in the environment would be

beneficial for captive, and potentially for free-ranging cervids as well. A greater understanding is needed of the role of plant uptake (and other environmental sources) for CWD transmission, prion translocation, and exposure of humans, livestock, and other wildlife species to prions. Further research is also needed on the role of soils and lichens in the possible binding, transport, or degradation of infectious prions in the natural environment.

4. Human dimensions. Place-based inquiries on perceptions of CWD and impacts on hunting and risk evaluations have been conducted on a limited scale. Significant knowledge gaps remain that will influence managers' ability to successfully address CWD, particularly public attitudes on the need for management and acceptance of proposed management actions. Additional needs include understanding differences in attitudes and beliefs in different geographic locations, understanding concern about risk to human health, public acceptance of risk from CWD including human assisted movement of cervids, and evaluating communication preferences between geographic regions, stakeholder groups, and other demographics.

Identification of the relative contributions of the various disease transmission pathways towards the overall spread of CWD in wild and captive cervid populations has been identified as a research priority by the state agencies and is one of the focus areas in the bipartisan "*Chronic Wasting Disease Transmission in Cervidae Study Act*" (HR 837), reintroduced this Congress by Representative Ralph Abraham (R-LA) and the House leadership of the Congressional Sportsmen's Caucus. This bill proposes an independent, expert review by the National Academies of Sciences of the predominate CWD transmission pathways, actions needed to reduce transmissions, a list of identified research needs in priority order, and review and evaluation of best management practices and the HCP as well as ways they should be improved, among other high priority CWD-related issues. Further, the bipartisan *"Chronic Wasting Disease Management Act"* (HR 1550), was reintroduced in the 116th Congress by Mr. Kind (WI) and Mr. Sensenbrenner (WI) to provide funding to support state, provincial, and Tribal efforts to develop and implement management strategies to address CWD among deer, elk, and moose populations and to support applied research regarding the causes of CWD and methods to control the further spread of the disease. If enacted, this bill would provide $15 million for some of the much-needed research described above.

To address the above research priorities more effectively, a group of 46 researchers representing 25 different research institutions, agencies, or organizations joined together to form the CWD Research Consortium in September 2019, in order to coordinate and collaborate on CWD research across multiple disciplines and thematic areas. This meeting had the specific goal of informing current and future research efforts with needs specific to state and provincial CWD managers. This meeting also served as the first business meeting of the active NCDC234 multistate project led by University of Wisconsin-Madison and Michigan State University. Objectives for this meeting included:

1. Identify common research themes for coordinated action across the interdisciplinary team;

2. Identify avenues to improve communication between research and management within and among states throughout the region;

3. Identify sources and means to garner funding to support more diverse and effective research and management efforts; and

4. Develop a coordinated outreach approach for disseminating research results across states and agencies.

The 46 participants at the inaugural meeting of the CWD Research Consortium represented 14 universities, seven state agencies, one Canadian province, one nongovernmental organization, and three federal agencies, including the USGS's National Wildlife Health Center and CRU Program. Participants felt this was a *critical* effort that needs to continue due to the important role research is having on CWD and the need to communicate knowledge across disciplines and jurisdictions. The diversity of perspectives, balanced with a focused and facilitated process and small group size, was highly effective. Participants identified implementation and communication plans for specific research thematic areas. The group also agreed to move forward as a formal organization through the multistate project with the USDA State Agricultural Experiment Stations (SAES). The CWD Research Consortium plans to meet annually for a facilitated working meeting among partners.

Consortium participants successfully united multidisciplinary teams of researchers and partner agencies to develop new research proposals with disease management needs and impacts in mind. Five thematic research areas were prioritized and further developed over the course of the meeting. These were:

1. Develop an amplification assay using improved sourcing for substrate and implementation of RT-QuIC;

2. Develop a multistate adaptive management approach for CWD to evaluate management strategies;

3. Establish and support human dimensions research to better understand values, attitudes, and motivations regarding CWD management;

4. Establish a national CWD tissue database and repository for transmission and pathogenesis research; and

5. Conduct controlled CWD research using depopulated cervid facilities where CWD has been detected.

For each of these research areas, a working group has been established with identified research leads and a clear plan of action for next steps towards implementation. Crucially, these projects will invest in the infrastructure that will be needed in order to support long-term scientific

research and investigations into the biology, transmission, and management of CWD. Such long-term studies are critically important if we are to understand the pathways of disease transmission between wild cervids and to critically evaluate the effectiveness of particular management strategies on wild cervid populations.

Specific and immediate federal funding needs which have been identified by members of the CWD Research Consortium include:

1. Support for USGS National Wildlife Health Center - $1,370,000, to include:
   - $500,000 for study of disease epidemiology and transmission, using captive deer facilities infected by CWD prions;

   - $250,000 for support for the Southeastern Cooperative Wildlife Disease Study at the University of Georgia, which needs an additional $250,000 to ramp up CWD testing capabilities (RT-QuiC machine) and support staff;

   - $120,000 to establish a national database of CWD testing samples and other research-grade materials from tested deer; and

   - $500,000 to continue development of rapid testing approaches using sensitive testing methods (e.g. RT-QuiC).

2. Support for USGS Cooperative Fish and Wildlife Research Unit Program - $740,000, to include:
   - $120,000 for human dimensions research investigating impacts and attitudes towards CWD among hunters and the general public;

   - $500,000 for collaborative research with the public health sector on CWD and potential impacts to human and wildlife health; and

   - $120,000 for research on adaptive management approaches for CWD at multi-state and regional levels.

3. Support for USGS Ecosystems at USGS Headquarters - $220,000

   - $140,000 for support of the National Fish and Wildlife Health Initiative and the CWD Research Consortium;

   - $30,000 to support the 2020 National Fish and Wildlife Health Forum, to be hosted by USGS Ecosystems in Fort Collins, Colorado; and

   - $50,000 to support the 2020 International CWD Symposium, to be held at the annual conference of the Wildlife Disease Association.

The consortium believes that these research investments, delivered through an existing group of scientists and researchers working through the land grant university system, will yield significant returns on investments in terms of basic knowledge and improved understanding of CWD and

will directly benefit state fish and wildlife agencies in their struggles to manage this challenging disease.

At the same time, the consortium notes that certain highly desirable research products such as animal-side testing and vaccines or treatments for live animals once infected present extremely difficult challenges for the scientific research community at present. While investment in this type of research is risky and may not yield desired results, it still needs to remain a part of the discussion for the long term handling of this problem. One example of recent research that didn't yield desired results occurred at our wildlife research facility. We conducted a trial of an experimental CWD vaccine and it failed. Ultimately, the vaccinated animals developed the disease faster than those control animals which had not been vaccinated. We have been cautioned by members of the research community that some of these desirable products could easily consume all of the available funding for CWD research without any clear hope of achieving a desired research outcome in the near term. Such projects could be funded through challenge grants or incentivized through innovation awards. Accordingly, we recommend investments in the priority research topics identified above by the CWD Research Consortium through a collaborative process involving prion biologists, wildlife disease experts, and state and federal wildlife managers.

Proper and legal cervid carcass disposal is becoming a challenge (due to state/federal regulations and/or budgetary restraints) as a growing number of landfills prohibit such action or have closed. This leaves the hunter and others lacking viable and affordable options on proper carcass disposal. In addition to the current and traditional carcass disposal burial method, other disposal methods to include composting, incineration and alkaline hydrolysis needs to be researched, expanded and developed into a cost-effective carcass disposal method.

The ability for hunters to transport and dispose of their harvested deer, elk or moose within the boundaries of the harvest state or to/from another state is key, but must be done in compliance with carcass transportation and disposal regulations. Wyoming like many other states regulates the transportation and disposal of carcasses within the state as well as those that are exported or imported to minimize the spread of CWD. Interstate coordination on this issue is critical to the short and long term management of this disease.

Infrastructure Needs to Manage the Disease

Chronic wasting disease activities such as surveillance, management, and regulations are contingent on results from testing. Hunters are demanding increased ability to test their harvested animal with faster turn-around times. State wildlife agencies are spending millions on CWD testing alone each year, whether or not they have detected the disease. These increased demands put pressure on the 27 approved state veterinary diagnostic labs. The overwhelming majority of samples are collected during the hunting season, so state agency and laboratory staff are pulled away from other duties as these samples must be collected and processed by trained individuals. In states with high demand, literally tens of thousands of samples may be collected during a few weeks.

Laboratories conduct testing approved by the USDA through the National Animal Laboratory Health Network (NALHN). These laboratories run one or both of the two currently approved types of test for CWD [immunohistochemistry (IHC) and enzyme-linked immunosorbent assay (ELISA)]. Both tests involve multiple types of highly specialized equipment and several steps before a result can be read.

Staff from the Cornell College of Veterinary Medicine conducted a survey of these laboratories in 2019 which identified numerous deficiencies and unmet needs. In the past year, there have been two serious shortages that added weeks to months to testing turn-around times, including lack of available reagents and test kits. Ten laboratories were left struggling to complete their IHC testing after a company (Biocare) decided to no longer support their equipment. There is only one company (BioRad) approved for use to run the ELISA test, which is the fastest testing currently available. This company is not updating their software, supporting repair of aging equipment, making replacements available, or using the same test kits that are available for use in Europe. The US is lagging behind other countries, such as Norway, who only discovered CWD in 2016 but has already built a massive infrastructure around laboratory capacity and reducing the wait times for results. A multi-state, interagency approach that could be facilitated by the task force contemplated in this Discussion Draft appears reasonable and timely.

Ideally, a hunter would be able to collect a sample in the field and have an easy submission process that would provide results in a few days, before his or her animal is processed into food. However, current approved tests can only be run on a specific portion of the brainstem or the lymph nodes, both of which cannot be identified by the average hunter. Hunters that want their deer tested may encounter problems if they do not live in a state where the state agency will pay for the testing, such as in Arkansas or Michigan, or offers fee-for-service testing at the laboratory. Cost to the hunter for testing ranges from $25-80 per sample. Unfortunately, there is currently no research available that points to a “field ready” test kit anytime in the foreseeable future.

However, there are more sensitive amplification assays in use for human medical diagnoses and have been used in CWD research but have not been approved for CWD testing. RT-QuIC looks promising for use in diagnostic laboratories, but must first go through a validation process by the USDA. Currently, there is no funding to accelerate this process, which could take years with the current processes. Your passage of bill similar to what is proposed in the Discussion Draft will provide infra-structure to facilitate and prioritize this type of research and the USDA validation process for RT-QuIC to be used in CWD testing.

Ongoing concern with other TSE diseases, such as scrapie and bovine spongiform encephalopathy, led to increased support and funding which enabled diagnostic laboratories to purchase equipment and support staffing required to operate the equipment. Because comparable and commensurate funding has not been available for CWD since FY2011, much of the infrastructure around CWD testing is declining. As more states detect CWD and because of increased concern by the CDC, demand for testing is overwhelming current laboratory capacity. As noted above, state fish and wildlife agencies are on track to test over 159,000 deer and other cervids this year. In contrast, only 21,584 farmed cervids were reported to be tested by the

USDA CWD HCP last year. More states would increase their CWD testing if additional federal funding was provided to supplement costs.

Reducing the wait time for results is critical for both hunters and state agencies. However, aging equipment, lack of staffing, and availability of necessary reagents are limiting laboratory capacity. Immediate funding is necessary to support and grow current laboratory infrastructure and testing capacity, as well as bring online newer, more sensitive assays.

As Congress contemplates the possibility of a comprehensive infrastructure package, we respectfully encourage you to include as part of any package that may move forward considerations for maintenance, much needed upgrades, and expansions to research facilities as well as increasing laboratory testing capacity with the necessary biosecurity requirements to address these CWD challenges and limitations. An investment in such infrastructure will enhance our nation's ability to compete globally and solve not just these problems we have today, but those yet to come.

Current CWD Coordination and Cooperation

Under the US Constitution, state fish and wildlife agencies have primary management authority for most wildlife species within their borders, including deer, elk, moose, and other wild species of the family Cervidae. AFWA is the professional organization that unites all state fish and wildlife agencies on a national level. AFWA has a long history of involvement in the management of wildlife diseases, beginning with the founding of its Fish and Wildlife Health Committee (Committee) in the late 1980s. Since CWD was first detected in Wisconsin in 2002, this disease has become a major focus of the Committee, and the meetings of this Committee have served as an important forum for nearly twenty years for state agency biologists, veterinarians, wildlife managers, and policy leaders to discuss new developments regarding CWD and its management. The Committee meets four times annually, and monthly calls are held with state wildlife veterinarians and wildlife disease program managers to discuss specific resource needs and improve regional and national coordination around CWD and other diseases.

In 2017, the Committee initiated the development of the first-ever set of "Best Management Practices for the Prevention, Surveillance, and Management of Chronic Wasting Disease." Committee staff and leadership pulled together an all-star expert panel of over thirty individuals with expert knowledge of all aspects of wildlife disease management from state and federal agencies, academia, and other research institutions, and non-governmental agencies. The report produced by these experts was submitted to a robust external peer review process involving all 50 state fish and wildlife agencies as well as federal and academic partners with specific expertise in the management of CWD. The final version of these Best Management Practices was officially adopted by AFWA's Committee at their meeting in September 2018 and was subsequently endorsed by the Directors of the 50 state fish and wildlife agencies at AFWA's Business Meeting in 2018. The Boone and Crockett Club also endorsed these Best Management Practices in December 2018. In 2019, the Committee developed and endorsed four additional Best Management Practices covering additional aspects of CWD management by state agencies.

These four additional Best Management Practices were officially endorsed by the Directors of the 50 state fish and wildlife agencies at the AFWA Annual Meeting in September, 2019.

- The AFWA CWD Best Management Practices can be found here: https://www.fishwildlife.org/application/files/5215/3729/1805/AFWA_CWD_BMPS_12_September_2018_FINAL.pdf

- The accompanying 111 page technical report which provides background information, more detailed justification regarding specific practices, details on certain alternative practices that also may reduce the risk of disease transmission, and citations to the scientific and technical literature can be found here: https://www.fishwildlife.org/application/files/9615/3729/1513/AFWA_Technical_Report_on_CWD_BMPs_FINAL.pdf

- And the 2019 Best Management Practices supplement can be found here: https://www.fishwildlife.org/application/files/1315/7054/8052/AFWA_CWD_BMP_First_Supplement_FINAL.pdf

Since the endorsement of these Best Management Practices, AFWA's Committee has begun the important process of working with the state agencies to implement such practices as are appropriate for the specific management context and needs of each of the individual states. Many states have already been proactive in adopting some of these practices. For example, 41 states currently have some form of restrictions in place regarding the movement of deer carcasses, while other states are attempting to prevent unnatural concentrations of cervids by either prohibiting or restricting practices such as feeding, baiting, and the use of urine-based deer attractants. The Committee is currently reviewing existing state regulations and management practices to provide states with examples of additional tools that could be deployed by state governments to manage CWD more effectively.

As a state fish and wildlife agency director, I am particularly heartened to see the increased attention being paid to CWD by our colleagues at the Department of the Interior (DOI) under the leadership of Secretary David Bernhardt and his Science Advisor Dr. William Werkheiser. I wish to commend Secretary Bernhardt and Dr. Werkheiser for convening meetings of an internal coordinating group in order to develop a better understanding of current efforts to combat this disease and to improve coordination across bureaus. Although the state agencies have primary management responsibility for cervids (deer, elk, moose, and other species of the family *Cervidae*), there is still much that the DOI can do to assist state agencies and their partners in responding to this disease.

We recognize and applaud the significant research on CWD that has been conducted and continues by scientists at the DOI particularly in the USGS's Ecosystems Division. Specific programs at USGS Ecosystems that have made major contributions towards our understanding of the disease and its management include the National Wildlife Health Center, the Cooperative Fish and Wildlife Research Unit Program, and the regional USGS research stations. We also recognize the pivotal role played by USGS Ecosystems Headquarters staff, particularly Ms.

Anne Kinsinger and Dr. Camille Hopkins, in coordinating wildlife disease research efforts across the USGS and also with state agencies.

We also note the important role that federal land managers at the DOI have played in understanding and helping to manage the spread of this disease. Dr. Samantha Gibbs at the US Fish and Wildlife Services Division of Refuges, who coordinates closely with state agencies on the surveillance and monitoring of CWD for cervids harvested on units of the National Wildlife Refuge System, has provided important support for CWD monitoring. Dr. Margaret Wild and Dr. Jenny Powers of the National Park Service have conducted seminal research on the dynamics of CWD in elk and mule deer populations in and around Rocky Mountain National Park. These are two examples where federal land managers have helped to advance our understanding of this disease and support prevention, surveillance, and management efforts led by the state agencies.

Further Work and Focus on This Problem Must Continue

As a wildlife professional for the past 24 years, I have witnessed and dealt first-hand with the effects and threats CWD has on our wildlife populations, hunters, businesses and the public. The stakes are high and it is important that decision makers make this issue a priority. Many communities in Wyoming and others states depend upon healthy wildlife populations and wildlife-associated recreation for their economic health and well-being. Although state and provincial fish and wildlife agencies support and contribute to citizen recreation in many ways, the majority of funding for most fish and wildlife agencies is derived from hunting and fishing license sales. This funding supports the broader mission of the state fish and wildlife agencies beyond just the management of a single fish or wildlife species. From creating accessible wildlife areas to habitat improvement and supporting hunter education programs to everyday office expenditures, license sales often form the backbone of many state agency budgets. However, as state agency costs for managing CWD continue to grow, resources continue to diminish for the conservation of other birds and mammals.

The sale of licenses for mule deer, white-tailed deer, moose and elk hunting accounts for the highest proportion of these funding dollars in many states. The US expenditures directly related to deer hunting account for nearly half of all hunting related expenditures and are estimated to range from about $12 to over $18 billion dollars per year since 2001 (US Fish & Wildlife Service 2011; US Fish & Wildlife Service 2017). The total annual economic contribution of deer hunting to the US economy is over $67.7 billion/year with over $3.3 and $5.5 billion respectively per year going to state and local and federal tax revenue (Southwick Associates 2018). These economic contributions are vital to the health of our nation's GDP, rural economies, and are at substantial risk as CWD continues to increase and spread across the nation.

CWD is a costly endeavor and to effectively and efficiently fight the disease while maintaining other healthy wildlife populations and habitats and our rural economies, we must unite our state, federal, academic, and nongovernmental strengths, capacities, and resources. We must make it a priority to more cooperatively and collaboratively fight CWD and dedicate the resources necessary to expedite progress with this disease.

As stated previously, CWD was first discovered in Wyoming more than three decades ago. Since that time, the Department has strived to gain a better understanding of the disease through research and on the ground monitoring. We have spent years working in cooperation with other researchers evaluating vaccines, considering genetics, and searching for diagnostic test options, all while gathering over 30 years of prevalence data.

Wyoming and many other states and countries are still learning about this disease and its effects on deer, elk and moose populations, but there is clear evidence that CWD is adversely affecting the overall health and viability of some herds. As wildlife managers, it is our duty and responsibility to tackle this difficult issue, but we can't do it alone. It is key that an Act is developed and enacted containing the important ideas, framework and funding as are contemplated in this Discussion Draft. We will continue to conserve wildlife and serve people in the face of this challenging disease.

Thank you for holding this important hearing and for the opportunity to testify on Chronic Wasting Disease before you today. We look forward to working with you in the future as we tackle this important issue.

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