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TESTIMONY BEFORE THE

SUBCOMMITTEE ON INTERIOR, ENVIRONMENT, AND RELATED AGENCIES

OF THE HOUSE COMMITTEE ON APPROPRIATIONS

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WILDLIFE RESOURCES SECTION

ON BEHALF OF THE ASSOCIATION OF FISH AND WILDLIFE AGENCIES

OCTOBER 17, 2019

Thank you for the opportunity to testify before you today during this oversight hearing on Chronic Wasting Disease (CWD) on behalf of the Association of Fish and Wildlife Agencies (Association). My name is Paul Johansen, and I am a Certified Wildlife Biologist with more than 36 years of service to the citizens in West Virginia. I have held various positions within the West Virginia Division of Natural Resources, including Wildlife Manager, Assistant District Biologist, Wildlife Planner and Assistant Chief in Charge of Game Management. Currently, I serve as Chief of the Wildlife Resources Section where I am responsible for administering the statewide wildlife and fisheries management program. I am honored to work with some of the finest wildlife professionals in North America and to serve dedicated hunters, anglers and other wildlife-associated recreationalists. I hold a Bachelor of Science Degree in Wildlife Biology from the University of Massachusetts and a Master of Science Degree in Fisheries and Wildlife Science from Virginia Tech. I serve on many committees for regional, national and international professional wildlife organizations, including The Wildlife Society, the Southeastern Association of Fish and Wildlife Agencies, and the Northeast Association of Fish and Wildlife Agencies. I serve as chair of the Southeastern Cooperative Wildlife Disease Study Steering Committee and the Association's Fish and Wildlife Health Committee. I am also an active member of the Association's Chronic Wasting Disease Working Group.

The Association, founded in 1902, is the professional association for the state fish and wildlife agencies, whose membership includes public agencies charged with the

protection and management of North America's fish and wildlife resources. The Association represents its state fish and wildlife agency members (state agencies) before Congress and the Administration to advance favorable fish and wildlife conservation policy. All 50 states are members. The Association promotes sound resource management and strengthening federal, state, and private cooperation in protecting and managing fish, wildlife, and their habitats in the public interest.

Some of the following information relating to CWD is directly from the Association's Best Management Practices Technical Report, which can be found at https://www.fishwildlife.org/application/files/9615/3729/1513/AFWA_Technical_Report_on_CWD_BMPs_FINAL.pdf.

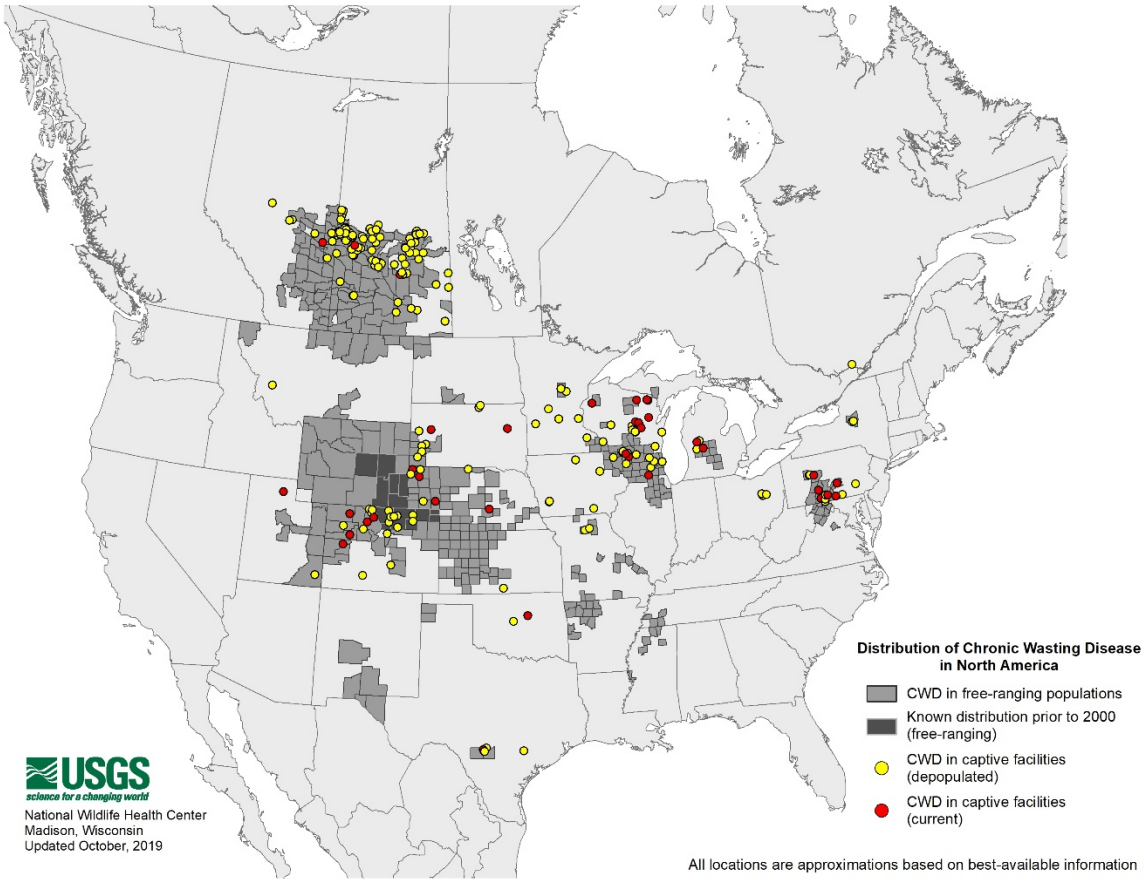
History of Chronic Wasting Disease

Chronic wasting disease (CWD; Williams and Young 1980) is widely considered to be the most challenging disease threatening North American wildlife today. A 100% fatal, transmissible, and degenerative disease of deer, elk, moose, reindeer, and other species of the family *Cervidae*, CWD affects all native North American cervid species. The current scientific consensus as expressed by the World Health Organization and the US Centers for Disease Control and Prevention (CDC) is that CWD is caused by a misfolded, transmissible protein called a "prion." Misfolded prions are remarkably resistant to standard field and laboratory decontamination measures and can remain active and infectious in the environment for many years. CWD-infected animals excrete the infectious prions through their saliva, urine, and feces, and infectious prions even remain active within deer carcasses. As a result, CWD prions lead to persistent, infective, environmental contamination which is extremely difficult to mitigate; consequently, this means state and provincial wildlife management agencies have relatively few options to ameliorate the effects of this disease.

Chronic wasting disease became known to wildlife managers well after it appeared in North American free-ranging deer and elk populations in the early 1980s (Spraker et al. 1997, Miller and Kahn 1999, Miller et al. 2000). CWD is a transmissible spongiform encephalopathy (TSE) or "prion" disease affecting species in the family Cervidae. In North America, CWD has been documented in wild populations of deer (*Odocoileus spp*.), elk (*Cervus elaphus*.), and moose (*Alces alces*). The disease was first diagnosed in captive deer and elk at wildlife research facilities in Colorado and Wyoming (Williams and Young 1980, 1982). Scientists diagnosed CWD as a TSE through histopathological evaluation of brains from affected mule deer (*O. hemionus*) and elk showing clinical signs of neurological disease and physiological wasting (Williams and Young 1980, 1992). It has not been possible to determine, retrospectively, if CWD first occurred in captive or free-ranging animals (Williams and Young 1992, Williams et al. 2002), although modeling suggests that

CWD likely was present in wild populations prior to its identification in captive facilities since the early 1960s, if not earlier (Miller et al. 2000).

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.



The effects of CWD on populations of the affected species are significant in some areas. Research and predictions via simulated modeling have indicated that CWD is likely additive to white-tailed deer population mortality and could impact populations, particularly at higher prevalence (Edmunds et al. 2016), to the extent that hunter opportunity would also be impacted (Foley et al. 2016). Mule deer research also showed population declines with a CWD prevalence >20% versus stable populations without CWD present (DeVivo et al. 2017). Recently published research on CWD and elk also concluded that mortality from CWD can exceed that

of natural deaths (Galloway et al. 2017), reduce survival of adult females, and decrease population growth of elk herds (Monello et al. 2014). The disease is invariably fatal in infected animals. Williams (2005) found in mule deer that the pathogen has early widespread distribution of specific protease-resistant disease-associated prion protein (PrPcwd) in lymphoid tissues, and only later is PrPcwd evident in central nervous system (CNS) and peripheral tissues. The pathogen ultimately causes normal prions in neurological tissue of the CNS to convert to the abnormal PrPcwd. These abnormal prions accumulate in the brain (and other tissues), and eventually cause neurological disease, emaciation, and death. A long incubation period (16–18 months to 5 years or longer for some genotypes of deer and elk) between acquiring the infection and showing clinical signs makes managing CWD extremely challenging. The maximal incubation period is unknown; however, CWD prions are shed from an infected animal into the environment during this extended incubation period, meaning that non-clinical animals may be infectious before signs appear (Tamgüney et al. 2009). Some genotypes, currently believed to be rare in wild populations, may exhibit varying incubation periods; however, no genotype is fully resistant. These individuals may have prolonged incubation periods and therefore shed prions into the environment longer than the more common genotypes. The rarity of these genotypes in wild populations raises questions about their genetic fitness. Currently, CWD infection is fatal to all North American deer, elk, and moose challenged experimentally, in captive settings, or in free-ranging populations (Williams et al. 2014). A prion is a 'proteinaceous particle' consisting only of protein, with no nucleic acid genome (DeArmond and Bouzamondo 2002, Prusiner 2004). The abnormal prions are similar to normal prions found in the membranes of normal cells, but the PrPcwd has an altered shape, or conformation. Distorted PrPcwd can bind to normal prions and cause alteration in their conformation, producing a reaction that begins the disease process and generates new infectious material.

Other pathogens like bacteria and viruses have nucleic acids that allows them to reproduce but also makes them susceptible to ultraviolet light and disinfectants. Misfolded prions are resistant to many common disinfectants, high heat, sunlight, and freezing, as well as many of the other methods used to kill conventional pathogens (Travis and Miller 2003). They have been shown to persist in the environment for years, potentially decades, and remain infectious to susceptible animals. Research conducted since the discovery of CWD in the 1980s suggests that CWD probably is transmitted by direct contact between infected and susceptible animals and indirectly via consumption or exposure to materials contaminated with prions shed in the urine, saliva, feces (Mathiason et al. 2009), or from decomposed carcasses of infected animals (Miller et al. 2004). Researchers also have shown CWD prions are able to bind to montmorillonite, a type of clay in soil, suggesting that some soils and soil minerals may facilitate CWD infectivity (Johnson et al. 2006). Although the maximum length of time that prions can remain infective in the soil is unknown, if CWD is similar to other TSEs such as scrapie, environmental

prions may be infectious years to decades. Related research also has shown certain plants can assimilate and uptake small, nearly undetectable levels of the CWD prion from contaminated substrate, suggesting a potential route for susceptible animals to ingest the pathogen from contaminated habitats (Rasmussen 2014). The prolonged incubation period, persistent shedding by clinically normal animals, along with environmental contamination and persistence of CWD prions, make the disease difficult to detect early and manage before it spreads.

Depopulation of an entire wild or captive herd may not eradicate the disease because of untreatable and widespread persistence of infectious CWD prions in a highly contaminated 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. Researchers at the National Institutes of Health were unable to demonstrate transmission to non-human primate test subjects (Race et al. 2009; 2018). However, unpublished work from a Canadian and German research team indicates apparent CWD transmission to macaques via several inoculation methods including consumption of meat from infected, clinically normal deer (Czub et al. 2017). Apparent transmission of bovine spongiform encephalopathy to humans indicates that the species barrier may not completely protect humans from animal-borne prion diseases (Belay et al. 2004). To date, no human CWD infections have been reported, although humans undoubtedly consume CWD-infected animals. Public health authorities recommend that animals that test positive for CWD should not be consumed, nor should any animal that appears unhealthy.

Past CWD Management Efforts and Funding

In the early 2000s, there were significant federal efforts to assist the 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 and National Wildlife Research Center, the US Forest Service Research and Development, other academic institutions and Colleges of Veterinary

Medicine, and others launched into CWD research conducting numerous studies 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. The state agencies and our CWD colleagues and researchers have been doing the best job they can with the limited resources available.

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 antemortem 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 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 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. Unfortunately, earlier this year the Administration proposed to eliminate federal contributions for the USDA-APHIS cervid health program efforts "due to higher priority animal health needs and the lack of tools available to reduce the spread and eradicate CWD" (https://www.obpa.usda.gov/20aphis2020notes.pdf). This development puts more pressure on the state agencies and our federal agency partners subject to the jurisdiction of this Subcommittee, but we are pulling together and not giving up on our nation's wild cervids or the need to research and control CWD.

The West Virginia Experience with CWD

In the state of West Virginia, we are currently spending $100,000 each year on surveillance and monitoring of CWD, and we currently test 1,200 deer samples annually in order to obtain a statistically robust estimate of the occurrence of the disease in our state. Over the next five years, we anticipate spending over $600,000 on surveillance and monitoring of this disease.

In addition to the expenditures on surveillance and monitoring, we spend an additional $100,000 annually on direct management of CWD, including implementation of our CWD management plan, design and implementation of regulations to help halt the spread of the disease, coordination with state and federal agencies on management activities, collaboration with researchers studying the spread and effects of the disease, and coordination and communication with the hunting public. We currently have identified at least $100,000 in unmet funding needs for additional wildlife veterinary staff capacity that would help us expedite the return of CWD test results from hunter-harvested deer in our state.

All of these expenditures on CWD are funds that would otherwise be spent by our agency on direct wildlife conservation activities, including habitat restoration and species management. In West Virginia, the funding to conduct surveillance, monitoring, prevention, and management for CWD comes from the very same sources that support broader wildlife conservation activities in our state.

Consequently, other species and wildlife conservation activities will be adversely affected by the continued spread and increasing expenditures associated with CWD.

State Resources and Expenditures: The Exponential Increase

West Virginia is not unique in spending significant resources to detect and manage CWD. The Association 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 the Association 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 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 locality 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, including 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.

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, whether it be 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. Frankly, 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 current 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. However, Congress can remedy this problem by passing HR 877, the *"Modernizing the Pittman-Robertson Fund for Tomorrow's Needs Act,"* a bipartisan bill that would give the state agencies 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 without raising federal taxes. We respectfully request each member of this Subcommittee cosponsor, support, and help pass HR 877 as soon as possible.

Research Needs to Manage the Disease

The West Virginia Division of Natural Resources, 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 the Association's Fish and 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, but realistically the development of such measures appears unlikely in the near term.
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. We respectfully request each member of this Subcommittee cosponsor, support, and help pass this legislation as soon as possible. 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. We respectfully encourage members of this Subcommittee to also consider sponsoring this legislation.

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 moving forward. 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.

We believe that these research investments, delivered through an existing consortium 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, we note that certain highly desirable research products such as animal-side testing, vaccines or treatments for live animals once infected present extremely difficult challenges for the scientific research community at present. We do not have these tools available for many of the existing human and livestock prion diseases, let alone CWD. Large investments in these types of research questions are extremely risky and may not necessarily yield the desired results. For example, recent trials of an experimental CWD vaccine by Wyoming Game and Fish Department and partners failed spectacularly: 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. 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 and until such time as HR 837 is enacted and additional guidance and recommendations are advanced by the National Academies of Sciences.

Finally, proper cervid carcass disposal is becoming a challenge as a growing number of landfills prohibit such action. The Environmental Protection Agency's Office of

Research and Development has been working to develop new and innovative incineration techniques that meet Clean Air Act standards and provide solutions to address some of the carcass disposal and disease transmissions issues. We greatly appreciate their interest and willingness to assist the wildlife conservation community with solving some of these multi-faceted CWD problems and look forward to working closer with them going forward.

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 kill 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 (NAHLN). 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.

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 for their family. 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 run into issues 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. We respectfully request your help with finding the appropriate resources and capacity to facilitate 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 are 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 to 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 and 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 such as the West Virginia Division of Natural Resources have primary management authority for most wildlife species within their borders, including deer, elk, moose, and other wild species of the family Cervidae. The Association is the professional organization that unites all state fish and wildlife agencies on a national level. The Association 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, a committee that I currently chair. When 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 the Association's Committee at their meeting in September 2018 and was subsequently endorsed by the Directors of the 50 state fish and wildlife agencies at the Association'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, the Association'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 the Chair of the Association's Fish and Wildlife Health Committee, I am particularly heartened to see the increased attention being paid to CWD by our colleagues at the Department of the Interior (Department), under the able 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 within the Department, in order to develop a better understanding of current efforts at the Department to combat this disease and to improve coordination across bureaus within the Department. 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 Department can do to assist state agencies and their partners in responding to this disease. The Association greatly appreciates the state-federal partnerships among all of the members of the Department's CWD team.

We recognize and applaud the significant research on CWD that has been conducted and continues by scientists at the Department, 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 encourage the Subcommittee to fully fund these important programs and to consider targeted increases to support specific and immediate research needs, as discussed above.

We also note the important role that federal land managers at the Department have played in understanding and helping to manage the spread of this disease. Whether it be Dr. Samantha Gibbs at U. S. 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, or Dr. Margaret Wild and Dr. Jenny Powers of the National Park Service, who have conducted seminal research on the dynamics of CWD in elk and mule deer populations in and around Rocky Mountain National Park, there is much that federal land managers can do to help advance our understanding of this disease and support prevention, surveillance, and management efforts led by the state agencies. Further, we greatly appreciate the strong partnership between U. S. Forest Service (USFS) Research and Development, the Association, and the state agencies. Robust scientific expertise and interest in assisting states with CWD research exists within USFS Research and Development, which from our perspective seems underutilized, and the USFW Starkey Project may also provide some interesting insights into CWD transmission and management. Additional resources directed to USFS Research and Development could also be leveraged with other state and private resources, and we would welcome the assistance from USFS scientists in solving these problems.

While not under the purview of this Subcommittee, USDA APHIS Wildlife Services could provide yet another source of wildlife disease research capacity and assistance through their National Wildlife Research Center and their ongoing cooperative partnerships with the state agencies. We would appreciate your help with reaching out to other members of the full committee and working to integrate other federal agencies such as APHIS Wildlife Services who can help with CWD management and research challenges.

One of the most exciting new collaborative efforts that is intended to address critically important research needs for CWD is the recently-formed CWD Research Consortium, a group of researchers and wildlife managers as referenced above. The CWD Research Consortium is currently coordinated by researchers at the University of Wisconsin and Michigan State University. The CWD Research Consortium plans to communicate regularly and meet in-person annually for a facilitated working meeting among partners and the five working groups. We look forward to working with this new cooperative endeavor to make great strides toward managing CWD in wild cervid populations. Our best opportunities to find solutions to CWD lies within our collective abilities to leverage state, federal, and private funding as well as share our expertise, capacity, resources, and ingenuity.

We Must Keep Moving Forward

As a Certified Wildlife Biologist with more than 36 years of service to the citizens in West Virginia, I have never witnessed such overwhelming management challenges as those created by CWD. Despite this threat, please rest assured, state and provincial wildlife agencies will not give up the fight to conserve North America's wildlife populations for the benefit and enjoyment of today's citizens and future generations. The stakes are too high. Many rural communities in my home state and others depend upon healthy wildlife populations and wildlife-associated recreation for their economic health and well-being. These rural areas are being disproportionately affected by this disease. 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 license sales or, in Canada, general government revenues. 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. But 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 and permits for mule deer, white-tailed deer, 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, contributing over $3.3 billion per year and over $5.5 billion per year in state and local and federal tax revenue, respectively (Southwick Associates 2018). These economic contributions are vital to 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.

Thank you for holding this important oversight hearing and for the opportunity to testify on Chronic Wasting Disease before you today. We look forward to working with you, and I would be happy to answer any questions you may have.

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