

Wild Cervid Chronic Wasting Disease Management and Response Activities 2021 Cooperative Agreements

2021 Project Executive Summaries

December 2021

Project Summaries for the Wild Cervid Chronic Wasting Disease Management and Response Activities 2021 Cooperative Agreements

USDA APHIS WS is awarding \$2.535 million through Cooperative Agreements to twenty State Departments of wildlife in sixteen states, and one Tribal organization representing twenty Federally recognized Native American Tribal governments. These projects will allow recipients to further develop and implement Chronic Wasting Disease (CWD) management, response, and research activities in wild cervids, including surveillance and testing. The Executive Summaries provided by the cooperators are below.

Fully Funded
CWD Communications Toolkit and Implementation in the Southeast, Arkansas Game and Fish Commission (Griffith, S.)
<p>The southeast agency's communications staff would like to develop a CWD Communications toolkit and implement it in order to educate wild cervid stakeholders about CWD. In this project we will:</p> <ul style="list-style-type: none">• Identify top things we want people to know about CWD; things from debunking myths to general education• Develop communications campaign toolkit around those things for any southeastern state to use with assets for all social media platforms including Facebook, Instagram, YouTube, Twitter, TikTok, and any others identified as needed.<ul style="list-style-type: none">○ Ads will have customizable calls to action for each state○ States will be able to select the ads they want to use○ Imagery will be approved by all states' communications staff○ Identify specific target audiences for each message and tactics to target those people○ Ads will drive traffic to whatever sites each state chooses (agency website or CWD Alliance or whatever the state wants)• Develop assets that any agency can use on their websites or any other owned communications channels like magazines, press releases, newsletters, etc.• Place paid digital ads on social media and through Google Display network and Google Discovery in Arkansas, Alabama, Georgia, Mississippi, Virginia, Louisiana, Tennessee, and South Carolina<ul style="list-style-type: none">○ Different tactic will be used from placing ads on different social media channels to geofencing to influencer marketing and others○ Each state will get to select which of the tactics they would like to implement• States will choose which of the messages to use in their states' campaign• States with paid ad placement will provide in-kind and matching funds (to the extent that each state can)• Effectiveness will be measured through engagement rates and other trackable metrics including reactivating hunters license sales• Will use one marketing firm to help us create the toolkit• Each state will decide to use their own marketing firm or use the marketing firm that developed the toolkit or place the ads without assistance from a marketing firm.• Each state identified will get ~\$25,000 and the rest of the southeast (and the country) will have access to the campaign toolkit so they can use them as they wish.

Several similar efforts like this have been very successful. This is a tried and tested model that works for communications. Here are some examples:

<https://www.fishwildlife.org/making-it-last> - agency relevancy toolkit used by 25+ states

[https://www.takemefishing.org/getmedia/ebe9209a-dc87-454b-9c32-](https://www.takemefishing.org/getmedia/ebe9209a-dc87-454b-9c32-7c5187f0db38/ReactivateLapsedAnglers_DirectAndEmailMarketingToolkit)

[7c5187f0db38/ReactivateLapsedAnglers_DirectAndEmailMarketingToolkit](https://www.takemefishing.org/getmedia/ebe9209a-dc87-454b-9c32-7c5187f0db38/ReactivateLapsedAnglers_DirectAndEmailMarketingToolkit) - email marketing toolkit

Applying AWFA Best Management Practices for Chronic Wasting Disease (CWD) Risk Assessment & Surveillance in Florida, The Florida Fish and Wildlife Conservation Commission (FWC), (Sayler, K.)

The Association of Fish and Wildlife Agencies (AFWA) has developed a concise set of best management practices (BMPs) for the prevention, surveillance, and management of chronic wasting disease (CWD) in North America. Although we have not detected CWD in Florida yet, AFWA has provided specific guidance for CWD-negative states, which have not been fully implemented in Florida due to agency resource constraints. Specifically, AFWA recommends the use of surveillance strategies that leverage spatial risk factors. Still, implementation can be labor-intensive, particularly in low coverage areas where biologists are not present and long-distance travel is required. We propose to implement the BMPs by performing a risk assessment for hazard identification followed by using a weighted and targeted surveillance strategy for this devastating disease. Indeed, an ounce of prevention is worth a pound of cure for CWD. If we target our efforts using the BMPs, we have the potential to detect and manage the disease before it damages the ecosystem irrevocably, including white-tailed deer populations. Delayed detection and management will result in millions of dollars in control costs and lost revenue for Florida.

Trained Canine Detection of Fecal Sample Odor and Whole-Body Odor Associated with Chronic Wasting Disease Infection in White-Tailed Deer and Other Cervid Species, Tennessee Wildlife Resources Agency (Karns, S.)

Chronic wasting disease (CWD) has become a major concern amongst those involved in managing wild and captive cervid populations. CWD management is complicated by the lack of a practical, non-invasive, live-animal screening tests. Studies have shown animal biotectors are capable of detecting changes in odor based on infection status in spite of environmental variation. Experiments conducted at the Monell Chemical Senses Center and USDA National Wildlife Research Center in partnership with Colorado State University have demonstrated that mice, ferrets, and most recently, dogs are capable of detecting avian influenza (AI) infection using fecal volatiles. Not only did ferrets demonstrate they were capable of detecting AI in the feces from asymptomatic ducks, but also in the feces of another species (i.e., chickens). Importantly, ferrets demonstrated that the odor changes used to detect AI were specific to AI infection when given the opportunity to select fecal samples from ducks infected with AI, Newcastle's disease virus, or infectious laryngotracheitis within the same panel of samples. Dogs have demonstrated the ability to detect avian influenza in fecal samples, fecal swabs, cloacal swabs, gastrointestinal tracts, and carcasses. Our current body of research clearly predicts that canine biotectors can be trained to identify populations and/or individuals infected with CWD via detection of feces odors. Such a tool may also prove useful in identifying potentially infected live animals, carcasses, urine, feces, and contaminated environments.

Reducing Risks of CWD Transmission Through Facilitating Proper Carcass Disposal, Wisconsin Department of Natural Resources (Kamps, A.)

Chronic wasting disease (CWD) was first detected in Wisconsin in 2002 from three white-tailed deer harvested during the 2001 deer hunting season. Moving forward, the 2018 deer hunting season was the first year that more than 1,000 CWD positive deer were detected statewide, and the positive detections continued to increase in the 2019 and 2020 deer seasons. The movement of dead or alive CWD positive cervid species (natural or human-assisted) is a key pathway in the spread of CWD. The infectious nature of the CWD prion contributes to an increased risk of introduction and spread of CWD if deer carcasses are brought to new areas and not disposed of properly. In 2018, the Wisconsin Department of Natural Resources (DNR) initiated an Adopt-a-Dumpster (AAD) program. The main goal of the AAD program is to provide hunters an option for appropriate deer carcass waste disposal, especially in areas where carcass disposal options are very limited or not already available. During the 2018 deer hunting season there were 16 AAD partners, and in 2019 participation expanded to 61 (with 38 of these being cost-share), as well as 32 DNR hosted. The first year the cost-share option was available was 2019, where the DNR reimbursed 50% of the total cost of a dumpster, up to \$500, for up to two dumpsters in select counties. In 2020, the cost-share option expanded to include all 72 counties in the state. Hunter feedback indicates they appreciate having more deer carcass waste disposal options statewide, and AAD partners are satisfied with their involvement in this program but the financial burden associated with a dumpster is limiting where and how long dumpsters can be available for hunter use. In preparation for the 2021 deer hunting season, DNR increased the reimbursement amount for each AAD cost-share dumpster and increased the number of AAD cost-share dumpsters allowed per county to three. For the 2021 deer season, the AAD partner and DNR will share the cost of the dumpster, 50:50 for the first \$1,000, and then the DNR will cover the entire remaining cost above \$1,000. This will mean that an AAD cost-share participant will provide a maximum of \$500/dumpster while adhering to all other program guidance requirements. This maximum amount is reasonable and could encourage more individuals/organizations to participate in this program. It is still a priority to have a DNR hosted dumpster in counties that do not have an AAD or other proper deer carcass waste disposal option. As a result, the request is for \$90,000 to provide funding for deer carcass waste disposal dumpsters.

Providing proper carcass disposal options statewide is an action item in Wisconsin's current CWD Response Plan. Carcass disposal is also in the Prevention and Management sections of the AFWA Best Management Practices for Prevention, Surveillance, and Management of Chronic Wasting Disease, and is a direct action in priority 2 (Improve the management of CWD-affected wild cervid populations) as well as priority 1 (Improve the management of wild cervid CWD-affected areas) of this Funding Opportunity Announcement.

CWD Prion Accumulation Dynamics at Bait Sites for Free-ranging Deer, Tennessee Wildlife Resources Agency (Karns, S.)

It has long been suspected that human actions influence the spread of chronic wasting disease (CWD), as is known for other wildlife diseases. The use of baiting is a common practice among sport hunters, state wildlife agencies, and wildlife enthusiasts. However, regulation of baiting is inconsistent, and to date no formal research has been conducted which assesses the risk associated with baiting in CWD zones, despite the fact that infected deer shed prions into the environment. We are therefore pursuing the following study, which will address this critical knowledge gap. First, using real-time quaking induced conversion (RT-QuIC), we will assess former bait sites in a CWD zone for the

presence of CWD prions. This will provide information regarding the potential for former bait sites, known to be visited for years after discontinuation, to harbor prion infectivity. Next, we will establish new bait sites, using both mineral licks and feed, and monitor these sites with trail cameras. Soil samples will be taken periodically at each site, and prion deposition will be measured by RT-QuIC. We will then develop a model describing the correlation between deer behavior, residence time at bait sites, soil properties, and prion deposition in the environment. Lastly, we will selectively seal former bait sites and measure prion dissipation from each (if any) as a function of time, precipitation, and soil properties. This work will provide the first quantitative assessment of prion deposition at baiting locations specifically, and the environment generally. No prior studies have measured prion deposition in real-time. Ultimately, we will create a model which describes prion deposition in the environment as functions of time, deer behavior, and soil properties. This will be among the most comprehensive analyses of environmental prion dynamics ever undertaken. In addition, our project will significantly advance our understanding of prion behavior in actual environments. These findings will be of great value to regulatory agencies who are responsible for crafting and enforcing rules regarding baiting practices. Further, our findings will be very important to landowners and cervid farm operators, both of whom will find use in estimates of prion deposition as a function of time and deer behavior. Lastly, this work will assist in future efforts to address prion transmission by environmental exposure by providing quantitative evidence of bait sites as hot spots of prion deposition, which may then receive priority decontamination. In addition, the models gleaned from this work will allow some estimation of prion deposition as CWD spreads to new areas. In total, this project provides significant insights into the interplay between human activities, CWD transmission and spread, and environmental factors, integrated to an extent never before attempted.

Motivating Behavior Change toward CWD Best Practices through Improved Outreach and Education,
Wisconsin Department of Natural Resources (Henning, C.)

Chronic wasting disease (CWD) is an infectious prion disease and affects cervid populations including white tailed deer (*Odocoileus virginianus*). Disease surveillance in the United States is conducted primarily through the submission of retropharyngeal lymph nodes (RLN) from hunter harvested animals although new tissues types such as rectal mucosa associated lymphoid tissues are now being incorporated in captive disease management programs.

Currently, detection of prions relies on the detection of proteinase K resistant PrP^{Sc}, either by ELISA or immunohistochemistry (IHC) in neural or lymphoid tissue, the two official methods approved for use in the National Animal Health Lab Network responsible for carrying out the surveillance for CWD in the United States.

Real time quaking-induced conversion (RT-QuIC) assay has shown promise for sensitive detection of abnormal CWD prions but is not yet in use pending multi-lab validation verification and acceptance as a tool to be used for CWD diagnostics. This request focuses on 1) improving CWD detection using RT-QuIC for antemortem testing with feces, 2) assess use of pen collected fecal samples as a part of on farm risk assessment for CWD infection and 3) monitoring of animal and birds collected from the infected farms.

Leveraging incentivized harvest, local hunter-landowner partnerships, and testing with amplification assays to slow the spread of Chronic Wasting Disease, Iowa Department of Natural Resources (Harms, T.)

Increasing localized harvest is the primary tool for slowing the geographic spread of Chronic Wasting Disease (CWD) in wild cervid populations but is often functionally challenging for wildlife management agencies to implement. This goal is commonly achieved using localized culling (i.e., sharpshooting), which is largely unpalatable to the hunting public. An alternative to sharpshooting is increasing hunter harvest by allocating more days and licenses, but the efficacy of this alternative is hindered by both access to private land within CWD management areas and lack of hunter participation. There is a need, therefore, for a framework to engage both landowners and hunters in local partnerships to fight a battle of attrition against CWD. We intend to fund three CWD Extension Specialists to implement an incentive hunt to increase localized hunter harvest of antlerless deer within three CWD-endemic areas. We will engage both local landowners and hunters in partnerships that increase controlled access to private lands within endemic areas and provide a harvest-based incentive of an additional any-deer (i.e., buck) license to increase hunter participation. Additionally, we will survey both participating landowners and hunters to understand their knowledge of CWD, motivations for participating in the incentive hunt program, and attitudes towards various CWD management activities to aid in the development of educational materials that encourage future participation in CWD management. Lastly, we will leverage the additional harvest within the endemic areas to collect and test both medial retropharyngeal lymph nodes, the diagnostic tissue of choice in wild deer, and rectoanal mucosa-associated lymphoid tissue (RAMALT), a diagnostic tissue often reserved for antemortem testing of captive cervids, to evaluate the time course of infection on positive individuals. This testing effort will provide valuable information that will allow managers to better identify the spatial extent of CWD-endemic areas and the leading edge of infection and will serve as a proof of concept for other wildlife management agencies interested in implementing a similar approach. Partnerships among hunters, landowners, and wildlife management agencies are critical to the success of CWD response activities, especially in states like Iowa with most land under private ownership. With this project, we will develop a framework for engaging these entities in an effort to slow the spread of CWD that is cost-effective, sustainable, and widely accepted by constituents.

Preparing Western Washington Treaty Tribes for Chronic Wasting Disease, Northwest Indian Fisheries Commission (NWIFC), with the support of twenty member tribes (Bowman, W.)

Preparing Western Washington Treaty Tribes for Chronic Wasting Disease is a project designed to help Northwest Indian Fisheries Commission (NWIFC), a natural resources management support organization serving 20 federally-recognized Native American tribal governments, address the current needs of treaty Tribes regarding CWD. NWIFC member tribes are natural resource co-managers working as equal partners with WA State. Treaty tribes in Western WA have not yet been engaged in a widespread and purposeful manner with regards to CWD, and this project will employ a three-pronged approach to support tribal co-managers prepare for CWD. Two qualified Program Veterinarians and the Wildlife Program Manager from NWIFC will lead this project. Since WA is still in the early stages, education is the most important aspect of this project. A 2-day educational workshop will be hosted by NWIFC staff for the wildlife staff from member tribes. This workshop will include information on CWD, necropsies and opportunities for staff to practice collecting samples, instructions on sample submission, and roundtable discussion on best management practices and the needs of specific tribes. Four regional workshops will be held for tribal hunters based in the North

Puget Sound, South Puget Sound, the Kitsap Peninsula, and the Olympic Peninsula. If there is a need, additional workshops may be held at specific tribes for hunters unable to attend regional workshops. Tribal hunters must be educated on the impending risk of CWD and actions they can take to prevent spread and protect themselves, because wild cervids are vital to tribal food sovereignty and subsistence needs. Informational flyers and laminated wallet cards will be distributed to tribal hunters at these workshops. Additionally, a website will be created with information about CWD and informational resources available for download. This website will be maintained quarterly for the duration of the year-long project and beyond. Materials for sample collection and submission will be distributed to tribal wildlife staff. Necropsy instruments and personal protective equipment (PPE) will be provided for proper sample collection. Sample collection kits will be put together and distributed to individual tribes. Freezers for sample storage will be regionally installed so that samples can be batched and shipped to the Washington Animal Diagnostic Disease Laboratory (WADDL), a USDA-accredited lab. Regional storage and batch sample submission will save the money and time of this project, tribal staff, and WADDL. This will ensure successful sampling of any wild cervids that staff may come across during the year-long surveillance program, whether they are clinically-suspect animals, hunter harvests, or roadkill. Early initial detection of CWD will be important and inform management and response practices for tribal staff. A sample tribal CWD management plan will be created and distributed to wildlife staff. This plan will be reviewed during roundtable discussions. The success of this project will be assessed incrementally as each objective is achieved. The overall project success will be evaluated at an annual meeting of the Intertribal Wildlife Committee of the 20 treaty tribes that are a part of the NWIFC.

A multicenter validation of RT-QuIC assay for sensitive detection of Chronic Wasting Disease,
Michigan Department of Natural Resources (Cosgrove, M.)

To date, prion amplification (RT-QuIC and sPMCA) technologies have only been validated and utilized by a handful of research laboratories. In alignment with the USDA's move to apply RT-QuIC as a diagnostic test for Chronic Wasting Disease, we first propose a coordinated research program among 6 laboratories across the US to accelerate the scientific validation of this prion amplification technology as it applies to a variety of sample matrices (including lymph nodes and obex) derived from white-tailed deer. We will take this unprecedented collaborative opportunity among New York, Michigan, Minnesota, Wisconsin, Missouri, and Pennsylvania to validate the use of either commercial or in-house synthesized (by UMN) RT-QuIC substrate (recombinant prion protein, PrP). Second, this CWD testing group will interact with USDA, NIH, and other research laboratories to ensure that state diagnostic labs are capable of implementing RT-QuIC. Third, protocols for state agriculture and wildlife agencies to collect and submit samples for RT-QuIC testing will be developed and samples will be shared across the labs for evaluation and protocol optimization. Critically, we propose to evaluate retropharyngeal lymph nodes to determine which has the greatest potential for RT-QuIC applications. We will validate the RT-QuIC amplification products in a subset of experiments by Western blotting.

Strengthening CWD Surveillance in Eastern Arizona, Arizona Game and Fish Department
(Justice-Allen, A.)

It is vital to detect the introduction of CWD into new areas. The Arizona Game and Fish Department has conducted surveillance throughout the state for more than 20 years. The Department has periodically reviewed the surveillance program to ensure that it meets standards for biological and epidemiological validity. We have determined that our surveillance program is not meeting our objectives in eastern Arizona, an area that we consider at high risk for the introduction of CWD. To

correct this deficiency, we are proposing the following: increasing the number of taxidermists enrolled and enlisting greater participation by hunters in our surveillance program. To achieve these objectives, we will identify taxidermists in eastern Arizona and western New Mexico and provide them with training and supplies. We will pick up samples from the taxidermists every 2 weeks. Additionally, we will place freezers at key locations in the area where hunters will be able to drop off the heads of their harvested deer and elk. Using the information acquired from our current Outreach Grant (FAIN AP20VSSPRA00C122), we will provide messaging directly to the hunters requesting their assistance and inviting them to training on CWD sample collection and carcass management. We will provide the hunters with data tags, and bags for sample collection. Additionally, we will work with local wildlife interest groups to encourage participation by their members. Our objective for the first year of this program will be to increase the total number of samples collected from deer and elk populations in eastern Arizona and western New Mexico by 120 over last year's number of samples (for a total of 260).

Improving hunter participation and awareness for Chronic Wasting Disease in Nevada, Nevada Department of Wildlife (LaHue, N.)

Nevada is currently CWD free but is at significant risk for the introduction of the disease. The two main ways that CWD could be introduced to Nevada are the through the movement of migrating deer and elk and the importation of infected material by hunters harvesting animals in CWD affected areas. In order to prevent introduction via the import of infected materials in 2019 the Nevada legislature passed Senate Bill 85, which limits the importation of the most likely sources of contamination from the carcasses of cervids. The Nevada department of Wildlife has made an effort to disseminate this information through a variety of sources. However, knowledge among the hunting public continues to be lacking. In addition, the Department continues to receive complaints from taxidermists about the increased burden the requirements place on them. This includes more work when hunters damage capes and work moving out of state for hunters who want European mounts. Anecdotal reports show that some taxidermists either turn away clients with out of state animals or have them use a pressure washer to remove brain tissue, allowing CWD infected material to potentially wind up in the landscape.

This project solves these problems in two-fold. One is an awareness campaign using traditional and digital media to target hunters, and the second is a series of educational materials that will help NDOW to organize and disseminate pertinent CWD content into an easy to digest format for hunters and stakeholders.

In addition, surveillance for CWD in Nevada is lacking due to poor participation by hunters. This prevents us from clearly demonstrating that Nevada is free of CWD. Currently NDOW received the majority of CWD samples via cooperative agreements with taxidermists and meat processors with poor attendance at CWD check stations and few having animals sampled at offices. Better participation by stakeholders will not only improve surveillance but will also lead to increased engagement and improved relationships between stakeholders and the department. Thus, they may be more amenable to regulation changes and CWD management activities in the future. Advertising campaigns will seek to improve.

Hunter Attitudes Toward Chronic Wasting Disease and Management Efforts in a Two-County Disease-Positive Area in West Virginia, West Virginia Department of Wildlife Resources (DWR)
(Barton, E.)

Public involvement and compliance are key elements of disease management in free-ranging cervid populations. A previous survey of Hampshire County, WV, deer hunters to determine opinions on and attitudes toward CWD and its effects on their hunting participation was conducted in 2011. At the time, CWD had been detected in a limited number of white-tailed deer (99) that were confined almost exclusively to Hampshire County. As of 2021, CWD has been detected in five contiguous counties and has been detected in nearly 500 free-ranging deer in West Virginia and is now endemic in Hampshire County. The 2011 survey and the 2021 survey proposed are designed to determine if baiting and feeding restrictions and carcass transport restrictions affected hunters' participation, determine extent of public knowledge about CWD, determine if the presence of CWD affected hunters' attitudes toward hunting in Hampshire County, and if they had shifted areas they hunted or decreased their hunting because of CWD. Successful hunters (i.e., those who had checked at least one deer in one hunting season) in Hampshire County prior to the detection of CWD (2003-04), shortly after CWD detection in Hampshire County (2005-09), after detection of CWD in an additional county (2010-2014), and in recent years after the transition to electronic game checking (2015-20) will be matched with agency hunter records and sorted into relevant categories. Hunters will be surveyed multi-modally to assess their participation in deer hunting and determine if current disease management actions or increases in CWD distribution and hunter harvests of positive animals have influenced their hunting participation. The West Virginia Division of Natural Resources will partner with an experienced survey research firm that specializes in natural resources and outdoor recreation issues to conduct, analyze, and summarize the results of this survey to approximately duplicate methodology used in 2011 and thereby enable clear comparisons between survey results over time. These results should be of interest to wildlife agencies in states where CWD is endemic and will provide insight into how hunter recruitment and retention may change in response to CWD over time. Agencies can use this information to identify communication needs and in designing or altering their own management plans.

Additional hunter survey work will focus on answering questions relating to the effect of harvesting one or more CWD-positive deer on indicated hunter participation, behaviors, and concerns about CWD than hunters who have not personally harvested a positive animal.

Arkansas Game and Fish Commission CWD Testing Awareness and Outreach Promotion, Arkansas Game and Fish Commission (Griffith, S.)

In February 2016, an elk harvested in the fall of 2015 near Pruitt, Arkansas in Newton County tested positive for CWD. This was the first documented case of the disease in the State of Arkansas. Also in February 2016, a white-tailed deer was found sick near Ponca, Arkansas in Newton County and tested positive CWD. An initial sampling effort in the vicinity of these cases found a total CWD prevalence of 23 percent in white-tailed deer from northern Newton County. Additional CWD positives have been found in Benton, Boone, Carroll, Independence, Johnson, Madison, Marion, Pope, Scott, Searcy, Sebastian and Washington counties. Meaning nearly a third of Arkansas counties are directly in our CWD management zone.

The AGFC recognizes that the detection of CWD in Arkansas has significant biological, ecological, economic and sociological implications. Now that CWD has been identified in Arkansas, it represents a severe long-term threat to the health of cervids in the state.

A key component to wildlife health and disease management is educating the public and staff about these issues. Educational components are intended to maximize participation in sampling efforts by the public, encourage reporting of disease events to facilitate rapid response by the agency, minimize loss of hunting participation associated with disease concerns, and increase awareness of the role of the Arkansas Game and Fish Commission and our public in wildlife management.

Partially Funded

Surveillance for chronic wasting disease in wild deer surrounding recently detected CWD-positive captive cervid facilities in Minnesota, Minnesota Department of Natural Resources (Jennelle, C.)

This project entails CWD surveillance in wild white-tailed deer (*Odocoileus virginianus*) in direct response to recent detection of CWD in a captive cervid facility in northwest Minnesota (Beltrami County, Spring 2021). The Minnesota Department of Natural Resources (MNDNR) currently oversees three CWD Management Zones, one Control Zone, and four CWD Surveillance Zones in Minnesota, which stretches agency funding levels very thin. There is high risk of CWD exposure to wild deer in the Northwest CWD Surveillance area of Beltrami County because 13 of 55 euthanized deer in the captive cervid facility tested positive for CWD, the facility had a single fence around its perimeter, and CWD-positive carcass materials were detected outside the fence line. The MNDNR has not conducted CWD surveillance in this region recently because until recent events, there was a perceived low risk of CWD exposure to wild deer. The surveillance activities we propose address an urgent need to protect the wild deer population in this area. In the Northwest MN Surveillance area, we will implement mandatory sampling of all hunter-harvested deer during the opening weekend of firearms season in November 2021. To augment sample numbers, we will offer voluntary CWD sampling during the remainder of the harvest season from September through December 2021. We will also establish a taxidermist network offering cash payments for voluntarily submitted CWD samples for testing, and we have a goal of reaching a CWD detection threshold of 99% confidence to detect CWD if prevalence is at least 1%. If CWD is detected, we will establish a CWD Management Zone with associated protocols outlined in the MNDNR CWD Surveillance and Management Plan (3). We will evaluate financial, personnel, and logistical costs of our surveillance efforts, and the time it takes to reach our sampling goal. The people of Minnesota, including three sovereign Ojibwe nations, will directly benefit from this project's outcomes because this project protects the population health of wild white-tailed deer, a valuable cultural resource.

Increased CWD Surveillance to Inform Management to Contain Spread, Pennsylvania Game Commission (Rosenberry, C.)

Pennsylvania is currently experiencing both an increase in CWD infections in the established area as well as an expansion of the area with infections. The expansion of the infected area requires a coinciding expansion of sampling and testing for CWD. Doing so will more accurately determine the prevalence in these new areas as well as identify how far the expansions extend out of existing disease management areas. The additional CWD sampling and testing would add considerable expense the state and would require shifting resources from other areas. This change would be

problematic, as full sampling is still needed elsewhere to both evaluate the effectiveness of new regulations at reducing the prevalence as well as to continue to detect the expansions of CWD. Funding received here would be used to increase sampling surrounding new detections via the collection and testing of roadkill deer as well as an increase in hunter head collection bins and testing. The increased sampling will provide data for models to inform proactive approaches to CWD management. In addition, the additional testing will identify environmental features, such as major roadways and rivers, that could assist in stopping additional spread of the disease. Pennsylvania Game Commission (PGC) has partnered with researchers at Pennsylvania State University as well as the University of Pennsylvania to ensure that CWD detection data is being integrated into best practice management outcomes. Thus, funding to expand testing will directly inform CWD management permitting a rapid and informed response to the continued geographic spread of CWD. This is critical as once CWD becomes established it can persist in the environment for years and management is more costly and difficult.

Perceived Risk, Behaviors, and Attitudes Related to Chronic Wasting Disease in Virginia, Virginia Department of Wildlife Resources (DWR), (Gwynn, R.)

Chronic wasting disease (CWD) is a fatal infectious disease of cervids and is considered one of the most significant threats to the long-term health and stability of Virginia's white-tailed deer population. To date, CWD has been detected in 109 wild white-tailed deer killed in ten counties in Virginia. CWD management and control is listed as one of the top five priorities of the Virginia Department of Wildlife Resources (DWR). In addition to enacting various administrative and regulatory measures to control the spread of the disease over the last decade, including enacting a carcass importation ban, prohibiting the use of natural deer lures and scents, and liberalizing hunting opportunities in Disease Management Areas (DMA), DWR continually endeavors to develop more effective management and outreach strategies to further engage hunters.

In some areas of the U.S. where CWD has been confirmed, a percentage of hunters have stopped hunting because of concerns over CWD (Needham et al. 2017). Some human dimension studies have shown that changes in hunter behavior are at least somewhat attributable to perceptions of risks associated with CWD (Lyon and Vaske 2010). Unfortunately, public perception of risks and control over hazards are not always reflective of expert judgements (Needham et al. 2017) and familiarity and knowledge associated with a hazard can be related to risk perception (Siegrist and Cvetkovich 2000). In Virginia, the majority of CWD management strategies employed by the DWR rely on hunter engagement, buy-in, and participation. Consequently, DWR's efforts to continue to use hunters to manage this disease is dependent upon hunter willingness to engage and participate and successful management would likely be significantly hindered if a similar philosophy was adopted by a non-negligible percentage of local hunters. Steps would need to be taken to provide appropriate and effective outreach to affected populations to help ensure local participation in CWD management actions. The DWR has never conducted a CWD human dimensions study and has therefore not had the opportunity to utilize response data to assist in the development of novel outreach strategies and management activities.

The results of this work will be used by the DWR to make more informed, data-driven management decisions, help the DWR to determine the preferred level of its engagement in managing CWD, improve the DWR's CWD outreach efforts, and more accurately address the public's concern about the zoonotic potential of CWD.

ELISA testing in Indiana, Indiana Department of Natural Resources – Division of Fish & Wildlife (DNR) (Marcus, M.)

Indiana Animal Disease Diagnostic Laboratory (IN ADDL) performs CWD diagnostic testing of wild deer for the Indiana Department of Natural Resources or individual hunters and CWD diagnostic testing of captive deer for cervid farmers. Testing is performed related to surveillance programs designed to identify positive cases and allow mitigation efforts to control disease spread in a cervid population.

The ADDL averages 1200 CWD tests annually, with 82% of those from farmed deer. The DNR anticipates increasing diagnostic testing needs of wild deer as CWD surveillance continues. Once positive samples are identified in Indiana, anticipated surveillance/response testing will increase to multiple thousands per year. Other Midwestern states have seen similar increases in diagnostic testing needs as CWD spreads and prevalence increases. This proposal allows DNR and IN ADDL to address increasing CWD diagnostic testing needs.

The testing platform currently used by the IN ADDL is the Ventana Discovery XT, with the capacity of 58 tests per shift or 87 tests per 24-hour period. With neighboring states documenting positive CWD cases and expansion of their surveillance testing, Indiana is anticipating an increase in CWD surveillance testing needs. This proposal for incorporation of an additional ELISA testing platform would expand IN ADDL testing capacity for CWD. Using the ELISA platform, IN ADDL believes it will be able to process 184-368 samples per day and improve turn-around time on test results to 1-4 days. As CWD continues to spread in surrounding states and as it is eventually detected in Indiana, the IN ADDL daily testing needs will exceed the capacity of the current IHC platform. Addition of the ELISA platform will expand the IN ADDL's capacity to respond to anticipated increased demand for CWD diagnostic testing; thereby aiding customers (DNR, other state wildlife/natural resource agencies, captive cervid owners) in CWD surveillance, response, and management activities.

Improving CWD Educational Outreach by Creating Social Media Platform Materials, Mississippi Department of Wildlife, Fisheries, and Parks (Roberts, M.)

Growing hunter uncertainty related to potential impacts of the expanding range of Chronic Wasting Disease (CWD) will decrease enjoyment of and participation in recreational hunting and management of deer. Agencies have produced educational materials for traditional media (newspapers, radio, magazines), but effective messaging via social media (Instagram, Facebook, etc.) has been limited. This is a problem because social media is the source of information for a large percentage of Americans. Our cooperative group of agency biologists and wildlife educators will produce 8 effective, factual educational outreach videos that each state cooperator can deliver via their respective social media platforms. Videos will inform hunters and wildlife enthusiasts about the disease and foster greater trust in science and state fish and wildlife agencies, which may improve hunter retention and agency management effectiveness. After the project is completed, the videos will be made available to all state/provincial and federal agencies and NGOs for release on their respective social media platforms, greatly increasing the educational outreach effectiveness of the 4-state effort.

Optimization of CWD Surveillance, Data Management, and Carcass Disposal Strategies in Virginia, Virginia Department of Wildlife Resources (DWR), (Gwynn, R.)

Chronic wasting disease (CWD) is a fatal infectious disease of cervids and is considered one of the most significant threats to the long-term health and stability of Virginia's white-tailed deer population. To date, CWD has been detected in 109 wild white-tailed deer killed in ten counties in Virginia. CWD management and control is listed as one of the top five priorities of the Virginia Department of Wildlife Resources (DWR). In addition to enacting various administrative and regulatory measures to control the spread of the disease over the last decade, including enacting a carcass importation ban, prohibiting the use of natural deer lures and scents, and liberalizing hunting opportunities in Disease Management Areas (DMA), DWR continues to improve its CWD surveillance, carcass disposal, and educational outreach strategies.

For the last three years, DWR has worked with cooperating taxidermists to maximize sampling of older male deer, which is the sex and age class most likely to be infected with CWD. This surveillance strategy has resulted in CWD detections in Culpeper, Fauquier, and Montgomery counties. Detection of the disease in an area with low prevalence allows the DWR the best opportunity to utilize the 2021 – 2025 DWR CWD Management Plan to develop and implement effective management actions. The use of USDA funds to continue this targeted, taxidermist-assisted statewide CWD surveillance program will allow DWR to maximize the efficiency and precision of its statewide CWD surveillance strategy.

The hiring of a new staff member dedicated to entry of data associated with CWD samples will allow DWR to map surveillance data in rapid fashion and assess sample distribution prior to the conclusion of the deer hunting season. Additionally, it will facilitate more timely access to real-time CWD data, thereby enabling the DWR to more rapidly implement activities to manage and/or control the spread of CWD in affected deer populations. Rapid data entry will also help to foster cooperation and participation from hunters in regard to voluntary CWD surveillance efforts. Hunters perform a critical role in Virginia's CWD surveillance efforts and, without their cooperation, DWR is unlikely to meet its sample goals.

This proposal demonstrates a commitment by DWR to detect CWD at a low prevalence by optimizing the efficiency and sensitivity of Virginia's CWD surveillance strategy and improve CWD surveillance data entry and management.

Implementing a comprehensive molecular methods package for chronic wasting disease surveillance through Kansas, Kansas Department of Wildlife, Parks, and Tourism (KDWPT) (Jaster, L.)

We propose to combine multiple modern molecular methods for CWD surveillance within Kansas. This will include 1) genomic investigations of regional genetic diversity and dispersal among populations of mule and white-tail deer from throughout Kansas; 2) genotyping of the primary prion susceptibility gene (PRNP) to assess the distribution of CWD resistance; 3) comparison with existing immunohistochemistry test results for CWD among the same individuals; and 4) genomic investigation of hybridization among mule and white-tail deer in a recently detected zone through western Kansas to understand if hybridization is linked to CWD genetic susceptibility. All methods have only recently been developed and have never been combined. Demonstrating their joint

application based out of a single molecular lab will have strong implications for developing coordinated and standardized protocols across institutions, and on a continental scale.

Kansas is currently experiencing increasing incidence of chronic wasting disease (CWD) among both mule and white-tailed deer. This increase is coincident with an ongoing decline and range contraction of mule deer, coupled with range expansion of white-tail deer. We consider that CWD among expanding white-tailed deer is, or soon will be, a significant contributor to mule deer decline in Kansas, and yet interactions of disease, dispersal, and demographic change are still largely unresolved. Additionally, our preliminary genomic investigations of deer through western Kansas have identified a zone of hybridization between mule and white-tailed deer with roughly 8% having hybrid ancestry, and strong support for fertility among hybrids. Our genomic data also indicate a demographic decline in effective population size and genetic diversity within mule deer and demographic expansion and higher genetic diversity within white-tailed deer. These trends are in accord with in-progress ecological population monitoring. Low genetic diversity can translate to lower resistance to disease at susceptibility genes.

Assessing the complexity of these interactions will require a multi-factorial molecular approach, which we will implement across Kansas, a region of expanding State investment towards understanding and mitigating the spread of CWD. We will use recently developed methods to characterize the relative susceptibility of local deer populations to CWD through genotyping of the PRNP gene coupled with accurate tests for CWD that already exist. These combined methods offer the most comprehensive template to-date for understanding the genomic mechanisms of CWD spread. Finally, Kansas has recently implemented systematic statewide CWD sampling and testing across both mule and white-tailed deer populations through hunter-returns and opportunistic sampling of wild populations and is having all samples tested for CWD through traditional immunohistochemistry methods. A subset of these extensive samples will be leveraged for the proposed work.

Our work will be critical for linking standardized and comparative molecular results from wild cervid herds across North America, for improving sampling and analytical protocols across state wildlife agencies and will meet the overarching priorities of APHIS for improving diagnosis and management of wildlife disease. Ultimately, understanding genetic factors controlling spread of CWD will provide mitigation options to maintain both public recreation and livestock interests.

A risk assessment of chronic wasting disease in Massachusetts and the proactive development of a communication strategy for MassWildlife and wild cervid stakeholders in Massachusetts,
Massachusetts Division of Fisheries and Wildlife (MassWildlife), (Feehan, M.)

Emerging infectious diseases like Chronic Wasting Disease (CWD), force decision-makers to make decisions in the face of large uncertainty and risk. Under these pressing circumstances, two important tactics and tools for decision-makers are: (1) obtaining buy-in from stakeholders and (2) formal risk assessments, which predict the potential distribution of a novel pathogen in new habitats. In an effort to prevent CWD from spreading into Massachusetts (MA), the MA state wildlife agency, The Massachusetts Division of Fisheries and Wildlife (MassWildlife), is implementing several proactive management strategies (e.g., regulations to restrict whole carcass importation of deer, improving and focusing on standards for cervid farming); however, it is unclear whether there is stakeholder buy-in or how effective this management is. Therefore, to address these barriers, we propose:

(1) To assess existing wild cervid stakeholder perceptions, behaviors, and misconceptions using a survey. We will develop and disseminate a survey that reaches 9,500 wild cervid stakeholders in MA.

(2) To examine patterns and trends related to wild cervid stakeholder perceptions, behaviors, and misconceptions, we will analyze the data obtained from the wild cervid stakeholder survey (obj. 1). This will enable us to extract patterns and trends.

(3) To identify areas of high risk for CWD introduction, establishment, and spread in MA, we will conduct a risk assessment based on host and prion ecology.

(4) To obtain wild cervid stakeholder buy-in and trust, we will:

- update the MA CWD response plan with the results of the wild cervid stakeholder survey (obj. 1 & 2) and the risk assessment (obj. 3),
- develop a communication strategy that will be used to help MassWildlife engage more regularly with wild cervid stakeholders, and
- disseminate the results of the wild cervid stakeholder survey (obj. 1 & 2) and the risk assessment (obj. 3) to wild cervid stakeholders as applicable.

Collectively, our objectives aim to promote transparency and open the lines of communication between the state of MA and wild cervid stakeholders. More specifically, this proposal aims to engage wild cervid stakeholders prior to CWD invasion, generate a communication strategy based on what wild cervid stakeholders are seeking (and using the modalities of communication they prefer; learned from the survey), and obtain stakeholder buy-in for proactive and reactive CWD management.