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and Public Works Washington, D.C.

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EXAMINING THE IMPACTS OF DISEASES ON WILDLIFE CONSERVATION AND
MANAGEMENT

Wednesday, October 16, 2019

United States Senate

Committee on Environment and Public Works

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The committee met, pursuant to notice, at 10:08 a.m. in room 406, Dirksen Senate Office Building, the Honorable John Barrasso [chairman of the committee] presiding.

Present: Senators Barrasso, Carper, Braun, Rounds, Sullivan, Boozman, Ernst, Cardin, Gillibrand.

STATEMENT OF THE HONORABLE JOHN BARRASSO, A UNITED STATES
SENATOR FROM THE STATE OF WYOMING

Senator Barrasso. Good morning. I call this hearing to order.

Today, this committee will examine the impacts of disease on our wildlife health, human health, and on the economy. We will explore what government can do to combat the growing problem that we are facing.

Successful wildlife conservation and management depends on keeping wildlife populations healthy. Unlike in captive animals, disease in wildlife is often difficult to prevent, to detect, and to control. In many cases, disease hosted in infected wildlife can be transmitted to other wildlife, domesticated animals, and even to humans.

Diseases that spread from wildlife to humans pose an imminent threat in public health. Eastern equine encephalitis, also known as the Triple E, is a virus that can cause human brain infections, neurological problems, and even death. Triple E is naturally hosted in birds and can be transmitted to people through the bite of an infected mosquito.

In 2019, 31 cases of Triple E infections have been reported to the Centers for Disease Control and Prevention. That is an alarming 300 percent increase over the previous 10-year average. Triple E has already claimed 11 lives across the United States

this year alone.

West Nile virus is hosted in birds, transmitted to people through the bite of an infected mosquito. An average of 2,500 people are infected with West Nile virus annually, including roughly 40 people in my home State of Wyoming.

Lyme disease is hosted in birds and mammals like deer and mice. It is transmitted to people through the bite of an infected tick. An average of 33,000 people annually are reported to be infected with Lyme disease.

According to the Centers for Disease Control and Prevention, scientists estimate that more than six out of every ten known infectious diseases in people are spread from animals. Three out of every four new or emerging infectious diseases in people are spread from animals. Every year, tens of thousands of Americans will get sick from harmful germs spread between animals and people.

Disease can also spread from wildlife to other wildlife, and to domesticated animals, eradicating populations, eroding economic value and creating new threatened and endangered species. Earlier this year, the Atlantic Magazine ran an article entitled The Worst Disease Ever Recorded. It was about a particularly deadly fungus known as Bd. Bd has led to the extinction of 90 different amphibian species, and the catastrophic population decline of over 124 other amphibian

species.

White-nose syndrome has killed an estimated 7 million bats in the United States. Bats play an important role in ecosystems, including through insect control. Largely because of white-nose syndrome, the U.S. Fish and Wildlife Service has listed the northern long-eared bat as a threatened species under the Endangered Species Act.

In Wyoming, the three diseases that pose the biggest threat to wildlife are chronic wasting disease, or CWD, pneumonia among bighorn sheep, and brucellosis. Chronic Wasting Disease affects deer, elk, and moose in our State, causing the degradation of the animal's brain, loss of bodily control, and death. It not only impacts Wyoming's management of these species, but also the operation of everything from landfills to feed grounds. Hunters have been advised not to eat meat from animals that they harvest if they test positive for Chronic Wasting Disease.

Chronic Wasting Disease has been found in 277 counties in 24 States. Brucellosis afflicts primarily Rocky Mountain elk and bison in the northwestern part of Wyoming. From a management perspective, transmission of brucellosis between elk or bison and domestic cattle is a serious concern. The bacterial disease is known to cause severe complications with the pregnancies of infected cows, resulting in economic losses for ranchers. Also of concern is pneumonia, which has

devastated Wyoming's herds of bighorn sheep.

Many entities are responsible for managing wildlife disease. States are the primary manager of wildlife within their respective borders, and usually they play the most important role in fighting wildlife disease.

Agencies throughout the Federal Government also manage wildlife disease. The U.S. Fish and Wildlife Service is the primary national wildlife management agency. But it is not alone. Other agencies within the Department of the Interior, along with the National Oceanic and Atmospheric Administration, the Department of Agriculture, and the Centers for Disease Control and Prevention, all have important roles.

With so many federal and state players involved, coordination is clearly a key ingredient to improving the response to, and the management of, wildlife-borne disease. So I look forward to hearing from our distinguished panel today on how the Federal Government can improve the effectiveness of its response to wildlife disease.

I would now like to turn to the Ranking Member, Senator Carper, for his opening remarks.

[The prepared statement of Senator Barrasso follows:]

STATEMENT OF THE HONORABLE THOMAS R. CARPER, A UNITED STATES
SENATOR FROM THE STATE OF DELAWARE

Senator Carper. Thanks, Mr. Chairman. Thanks so much for bringing us together today. I had a chance to talk with each of our witnesses before we began the hearing, and I would say to our Deputy Director, thank you for all your service. He served, I think 40 years, did you say 40 years of service to the people of this Country? And a number of those years as a Marine. So I can say, the Navy salutes the Marine Corps, and thank you for your service. Different uniforms, same team. There we go. He is also an Aggie, right. You are not an Aggie from Texas, right?

Mr. Guertin. No, sir, Norwich University in Vermont.

Senator Carper. There you go. All right. Dr. Cook, great to see you. Thank you for joining us today. And Holly, I will get to give a little introduction of you here in a few minutes. We appreciate your presence and your testimony.

Over the past couple of decades, wildlife diseases have spread rapidly across the United States. We feel it in Delaware and throughout DelMarVa. These diseases oftentimes have far-reaching impacts on ecosystems, human health and the economy, and they present significant challenges for wildlife managers.

In Delaware, we have seen the devastating effects that disease can have on our wildlife, that includes amphibians, and

on birds, and bats. Since its discovery in New York in 2007, white-nose syndrome, which the Chairman has alluded to, has killed more than 6 million bats and spread to, I am told, 33 States.

In Delaware, white-nose syndrome has wiped out entire populations of State-endangered little brown bats, which provide an important ecosystem service to our farmers, and for a little State, we have a lot of them. The service provided by those bats is pest control. In fact, one study estimated that the economic value of bats to agriculture tops \$3.7 billion annually, and that is a conservative estimate. That is about half of the value of the agricultural economy in our State, in years I recall.

Our Country is also grappling with wildlife diseases that mosquitos and ticks transmit to humans and to wildlife. West Nile virus, Eastern equine encephalitis - did you call it Triple E? Triple E, and Lyme are all diseases that these pesky insects transmit to wildlife, to livestock and to humans, with sometimes devastating impacts on our economy and on human health.

Because these diseases cross State and jurisdictional boundaries, addressing wildlife disease is a challenge that requires cooperation and collaboration -- two of my favorite C words, cooperation and collaboration -- between many parties in

order to get us to consensus. We look forward to hearing from our expert witnesses about examples of partnerships between federal agencies, States, tribes and other parties to address wildlife diseases, such as the White-Nose Syndrome Response Team.

I also am interested to hear more today about how our Nation's wildlife scientists and managers, at both the State and federal level, are working together to address the spread of wildlife disease. I would encourage our witnesses to identify areas of opportunity for expanded research and innovative management actions.

In considering solutions to prevent the further spread of wildlife disease, however, we would be remiss to overlook the fundamental drivers of this problem, including climate change and habitat loss. We know that temperature, rainfall, and humidity affect the abundance and spread of disease, and we are seeing these impacts firsthand in the First State.

With warmer and wetter weather, new mosquito species, such as the Asian tiger mosquito, are taking residence in the First State. Mosquito season is also growing longer, I am told. In Wilmington, where my wife and I live, our mosquito season now averages about 142 days long, and it was only about in the 1980s, about 30 years ago, that season was 117 days long. So as a result, we have seen an increase in cases of mosquito-borne

diseases among wildlife, livestock and Delawareans.

What's more, change in human land use is causing declines in biodiversity, making species more vulnerable to emerging diseases by causing habitat loss, degradation, and fragmentation. So when we talk about wildlife disease, we must also consider how our Nation's extinction crisis is impacting its spread.

I would also note just briefly that this wide range of challenges magnifies the need for strong leadership at the agencies charged with managing wildlife. We thank you, Mr. Guertin, for providing that leadership today. During our committee's business meeting just a couple of weeks ago, I expressed concern about the Administration's nominee to lead the U.S. Fish and Wildlife Service, due in part to her reluctance to fully disclose information about her previous employment and experience at the Department of Interior to this committee. Unfortunately, those concerns remain largely unaddressed today.

I would just end with this: by working together and taking a science-based, holistic approach, I believe we can develop smart solutions that address both the root causes and the symptoms of wildlife diseases.

Again, Mr. Chairman, thanks for bringing us together. We look forward to hearing from all of you. Thank you.

[The prepared statement of Senator Carper follows:]

Senator Barrasso. Well, thank you very much, Senator Carper.

Before we proceed to hear from our witnesses, I would like to introduce Dr. Walter Cook, who currently serves as the Clinical Associate Professor of Veterinary Pathobiology at Texas A&M University, and a Veterinary Corps officer in the U.S. Army Reserves. Dr. Cook's distinguished career includes at least 20 years of service in Wyoming addressing the threat of wildlife disease, and we are very grateful for that service.

His experience in Wyoming includes brucellosis coordinator at the University of Wyoming's College of Agricultura, State Veterinarian for the Wyoming Livestock Board, Wildlife Veterinarian for the Wyoming Game and Fish Department, Regional Veterinary Coordinator for the Wyoming Department of Health, and the large animal veterinarian at Tri-State Large Animal Hospital in Cheyenne, Wyoming.

He has served as an adjunct assistant professor in the University of Wyoming's Veterinary Science Department and Lecturer at Laramie County Community College. Additionally, for seven years, he served as an instructor for the National Center for Biological Research and Training at Louisiana State University.

Dr. Cook's success should come as no surprise, given he received his Ph.D. in wildlife epidemiology from the University

of Wyoming in 1999. Dr. Cook, it is a privilege to welcome you as a witness today before this committee. We want to thank you for traveling to Washington.

Before turning to the witnesses, I know Senator Carper, you would also like to make an introduction.

Senator Carper. Thank you. Dr. Cook, I didn't realize you were Army. So a special welcome to you.

Mr. Chairman, I am grateful for the opportunity to introduce one of our witnesses, Holly Niederriter. Holly has worked for the State of Delaware for nearly 20 years. I think she told me she has lived in five States. But she chose to live for 20 years in a State whose tree is named after her, the holly tree. We have a special fondness for her as a result.

Throughout her time at Delaware's Department of Natural Resources and Environmental Control, well, sitting right behind me is our former secretary of that department, right behind me, Christophe Tulou, Christophe, raise your hand. Christophe was Secretary of the Department, and when he was going out the door, Holly walked in the other door and joined our State in that department.

Holly has worked with a wide array of species, I am told, including bats, beach nesting birds, we have several of those, ospreys, turtles, snakes, salamanders and frogs. She currently oversees Delaware's bat program and Delaware's implementation of

the DelMarVa fox and squirrel conservation plan, which has been a real success.

Holly has worked with other States and regional efforts as well as with the Fish and Wildlife, which would include Maryland, New Jersey, Pennsylvania and one more. I am trying to think of the States you have either worked in or lived in.

Ms. Niederriter. Maryland, New York, did you say New York?

Senator Carper. I did not.

Ms. Niederriter. And New York.

Senator Carper. Okay, thanks. Well, we especially thank you for Delaware, the First State, for making us your last stop. We hope it is your last stop for a long time.

Thanks, Holly, and thanks for being with us today. Again, we are glad that you are all here. Welcome, one and all. Thank you.

Senator Barrasso. Thank you very much, Senator Carper. We welcome all. We will hear from three witnesses today. The first will be Dr. Stephen Guertin, who is the Deputy Director of the U.S. Fish and Wildlife Service at the Department of Interior. Then Dr. Walter E. Cook, Clinical Associate Professor of Veterinary Pathobiology, Texas A&M. And then Holly Niederriter, Wildlife Biologist, Delaware Department of Natural Resources and Environmental Control.

I would like to remind the three of you that your full

written testimony will be made part of the official record of hearing today. But we please ask you to keep your statements to five minutes so we will have time for questions. We look forward to hearing your testimony.

Mr. Guertin.

STATEMENT OF STEPHEN D. GUERTIN, DEPUTY DIRECTOR FOR PROGRAM
MANAGEMENT AND POLICY, U.S. FISH AND WILDLIFE SERVICE

Mr. Guertin. Good morning, Chairman Barrasso, Ranking Member Carper, and members of the Committee. Thank you for the opportunity to discuss wildlife disease and the challenges it poses to wildlife conservation and management.

Wildlife disease is a complex and dynamic issue that presents an enormous challenge to the Fish and Wildlife Service in our work to conserve wildlife for current and future generations of Americans. My written testimony catalogs the large number of diseases that affect wildlife and present serious management challenges to the Service and our partners.

My written testimony also describes in greater detail our management response to these challenges. These include diseases like Chronic Wasting Disease in deer, elk, and moose, white-nose syndrome in hibernating bats, and others. I will speak more about those in a moment.

In the last 50 years, there has been a steady increase in wildlife mortality caused by infectious diseases. The effect of disease on wildlife not only includes the death of individuals, but the weakening of resilience to other environmental stressors, and ultimately can mean the collapse of entire populations. When combined with other stressors, diseases can also necessitate increased species protections.

How does the Service address such a daunting challenge? We can't do it alone, and I cannot emphasize enough that our most important partners in this effort to address wildlife disease are our colleagues in the State fish and wildlife agencies. Partnering with States is key for the Service to be able to address these multi-jurisdictional challenges, and our seamless relationship with the Association of Fish and Wildlife Agencies is a great example of this partnership and our shared goal of combatting wildlife disease.

The impacts of wildlife disease on species are also a threat to the economy. Pollinator species like bats and bees are invaluable to agriculture. Wildlife associated recreation like hunting, angling, and wildlife watching generated \$170 billion in total expenditures in 2016, the most recent data. Wildlife diseases also impact the domestic animals that serve as food resources and as our companions. In addition, the majority of emerging animal diseases that are transmissible to humans originate in wildlife species.

To address this dynamic nature of wildlife disease, the Service houses several nationwide programs that plan for and help respond to wildlife diseases, including our Wildlife Health Office, Aquatic Animal Health Program, and our White-Nose Syndrome Program.

I would now like to talk more about our efforts to address

two serious and prominent disease threats: white-nose syndrome and chronic wasting disease. White-nose syndrome, or WNS, is a fungal disease affecting hibernating bats that is estimated to have killed more than 6 million bats in the U.S. and Canada alone. The fungus responsible for this disease has now spread to 38 U.S. States and 7 Canadian provinces. Twelve hibernating bat species, including two endangered and one threatened species, have been confirmed with WNS in the United States.

Through annual appropriations language, Congress designated the Service as the lead agency to manage the national response to WNS, working with federal, State, tribal, and international partners. Since 2008, the Service has been coordinating the response to this disease and leading the implementation of a national multi-agency response plan. To date, we have awarded over \$35 million to researchers and State agencies to contain the spread of WNS and develop tools to increase the survival of affected bat species.

In the past decade, the WNS response community has made extraordinary progress to understand the disease and to develop tools to study and reduce the devastating effects on bats in North America.

Chronic wasting disease is a contagious, fatal disease that is becoming more prevalent in wild North American cervid populations, such as deer, elk, and moose. Unfortunately, there

is no known treatment or cure for CWD. Therefore, prevention of the disease and limiting its spread is essential.

To date, there have been no reported cases of CWD interaction or infection in people, but research on this subject is ongoing. Currently, 48 national wildlife refuges, 24 waterfowl production areas, and 8 fish hatcheries are located in counties already affected by CWD. We are working to ensure that activities on Service-managed lands and the larger DOI portfolio are focused on preventing the further spread of CWD and minimizing the impacts on already-affected populations.

A high level of collaboration between federal and State agencies, tribes, NGOs, and academia is needed to address the growing threat of CWD. States are the ultimate leaders for CWD, but the Department can contribute significantly by supporting the States and taking prudent actions on lands managed by the Department. We have a number of initiatives, including those led by our Wildlife Health Office.

In conclusion, the many challenges posed by wildlife diseases are diverse in their nature and inevitably present surprises. We will continue to work closely with our partners at home and abroad to address these challenges, because wildlife diseases do not respect political boundaries and threaten every corner of the Country.

Thank you, Mr. Chairman, Senator Carper, for your

leadership in convening this hearing. We look forward to answering your questions as best we can.

[The prepared statement of Mr. Guertin follows:]

Senator Barrasso. Thanks for that very thoughtful testimony. We are very grateful.

Dr. Cook.

STATEMENT OF WALTER E. COOK, CLINICAL ASSOCIATE PROFESSOR,
VETERINARY PATHOBIOLOGY, TEXAS A&M UNIVERSITY

Mr. Cook. Good morning, Chairman Barrasso, Ranking Member Carper, members of the committee. Thank you for the opportunity to provide my perspective on disease challenges to wildlife management and conservation.

Today, I will highlight some of the lessons I have learned over the last 25 years dealing with wildlife diseases and many of them have been mentioned already.

Chronic wasting disease is a prion disease that affects the cervid or deer family. Although related to Bovine Spongiform Encephalopathy, it is a distinct disease. Prions are infectious proteins that convert normal proteins found in the brain into their abnormal prion form. Over time, microscopic holes appear and changes in behavior and body condition develop, and ultimately result in death.

CWD can be transmitted to other cervids, directly via saliva, urine, or feces, or indirectly when the environment gets contaminated. Since this disease was first recognized 50 year ago, it has been reported in 24 States, 2 Canadian provinces and several other countries.

Chronic wasting disease has caused declines in some populations in Colorado and Wyoming, but not in others. There is no evidence that CWD is a human health threat, or that it can

be naturally transmitted to livestock, but concerns remain.

The public remains confused and concerned about chronic wasting disease. There is a lack of understanding about the potential impacts of the disease. There is a feeling among some interest groups that regulations are overly stringent. The fact that different States manage CWD differently also adds to this confusion. Finally, there is a multitude of different messages concerning CWD's impact to humans and animals.

Bighorn Sheep Respiratory Disease Complex was also previously mentioned by the chairman. Bighorn sheep are extremely susceptible to respiratory pathogens. Huge outbreaks have occurred, in some cases eradicating entire populations. In a typical scenario there is a die-off that affects large proportions of the population, then subsequently, that population fails to rebound because young animals fail to get recruited into the population, even though lambs are being born.

While clearly not absolute, there is an association with domestic sheep having close contact with bighorns prior to an outbreak. This has caused a great deal of contention between domestic sheep producers and wildlife managers and enthusiasts.

Wyoming resolved this conflict via the Wyoming Statewide Bighorn/Domestic Sheep Interaction Working Group, which included representatives of State and federal wildlife and livestock agencies, producers groups, wildlife non-governmental

organizations, and enthusiasts. By working from a set of common ground rules and common goals, the group became very effective.

White-nose syndrome of bats is a fungus that was first detected in New York and the disease remains most common in the northeast and mid-Atlantic States. It kills by invading the skin of hibernating bats and leads to emaciation, which causes the bats to wake from hibernation early in the year and subsequently succumb to starvation, cold exposure or both.

The fungus for white-nose grows well in cold, dark environments, the type of environments that bats choose to hibernate. As mentioned, it has wiped out over 90 percent of the common little brown bat colonies in the northeast, and has led to the northern long-eared bat becoming listed as a threatened species. And there is concern that it may threaten many other species with extinction.

And as also mentioned, bats are important economically for agriculture. The value that they may contribute ranges from \$22 billion to \$53 billion per year to agriculture across the U.S.

Chytrid fungus of amphibian is the most important disease to wildlife populations. Estimates are that chytrid may have already led to the extinction of 100 species, and may threaten populations of 200 more. When susceptible species are infected, chytrid causes reddening and thickening of the skin, thus preventing its normal function, which also disrupts water and

electrolyte balance, leading to death.

The chytrid fungus is sensitive. It prefers moist environments, and will not survive below freezing or above 29 degrees Celsius.

Anthrax, the one disease that has not been previously mentioned, is caused by a bacterium and can be a major cause of livestock and wildlife mortality worldwide. Animals typically ingest anthrax spores on vegetation or soil. In the bloodstream, these replicate as vegetative cells and release toxins that rapidly kill the animal. When the tissues or blood from the carcass is exposed to air, the vegetative cells return to the spore form, and these spores are extremely hardy. They can literally survive for hundreds of years.

Endemic areas in the U.S., which include parts of Texas, Montana, and the Dakotas, normally only experience an occasional death. But occasionally, when conditions are right, huge outbreaks can occur. Such was the case in Texas this past summer. It is estimated that 10,000 animals may have died of anthrax, with an economic impact of over \$15 million.

There is a safe and effective vaccine available to livestock. However, it is impractical to capture and restrain thousands of wild animals every year to vaccinate them. This is why researchers at Texas A&M University are working on an oral vaccine that can be fed to wildlife.

In conclusion, I would like to state how important it is that funding be made available to address wildlife diseases. I am particularly concerned with the lack of federal funds available for research aimed at real world management dilemmas.

And with that, I thank you for inviting me here today.

[The prepared statement of Mr. Cook follows:]

Senator Barrasso. Thank you very much, Dr. Cook. We are delighted that you would accept the invitation to be with us and share your knowledge. Thank you. We will get to questions in a bit. But first, Ms. Niederriter.

STATEMENT OF HOLLY NIEDERRITER, ENVIRONMENTAL SCIENTIST IV AND
NON-GAME MAMMAL BIOLOGIST, DELAWARE DIVISION OF FISH AND
WILDLIFE, DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL
CONTROL

Ms. Niederriter. Good morning, and thank you for this opportunity to discuss this very important issue of wildlife disease and its impact on wildlife conservation and management.

The information that I will present today will reflect my experience with bats, amphibians and reptiles and the diseases they encounter, and is not intended to diminish the importance of any of the other wildlife diseases mentioned here today or those not mentioned. Certainly, diseases such as chronic wasting disease that affect deer, elk and similar species, rabies, avian influenza, which has the potential to substantially the billion dollar poultry industry, mosquito-borne diseases, such as malaria, West Nile and Zika viruses, and a host of other diseases are of concern and can benefit from actions taken by this committee today and others. However, I will only address the issues with which I am most familiar.

Although disease is a normal part of life and the battle between pathogen and host has been going on since the beginning of time, the rapid transport of pathogens over vast distances is a relatively new phenomenon, at least for the species I am responsible for. As technology has promoted human travel as

well as international commerce, to include pets, foods and wildlife, pathogens have hitchhiked along and been accidentally introduced into wildlife populations. Wildlife exposed to new pathogens lack the immunity necessary to fend off disease and the results can be catastrophic, as was seen and is still seen with white-nose syndrome in bats.

Examples include white-nose syndrome in bats, which has killed millions of bats at this point, chytrid fungus, which has been mentioned today also. There has also been widespread declines in amphibians from chytrid fungus, and ranavirus has been impacting frogs, salamanders and turtles and is one of those emerging diseases.

Recently, snake fungal disease has been documented on many snake species in the United States and a new species of chytrid fungus has resulted in die-offs of salamanders in Europe. The impact of an emerging disease on wildlife managers at the state level has profound impacts on our projects. The need to immediately address diseases often derails other important objectives and funds are diverted from more proactive projects.

In Delaware, the introduction of white-nose syndrome diverted over half the time of one of the biologists, which was a substantial operational impact in a State as small as Delaware. The effects of wildlife diseases extend to other species, habitats, human health, agricultural health and even

economic health. As mentioned before, bats consume insects that feed on crops and can save farmers billions of dollars in pesticide application costs.

And that really does not include the environmental and pesticide development costs of the increased need for pesticides to sustain productive agriculture. White-nose syndrome has been mentioned several times already, but it is worthy of those mentions. It has decimated bat populations. As has been mentioned before, it has killed millions of bats and it continues to spread throughout North America. I have a map here. The disease itself has been documented in 33 States and 7 Canadian provinces, and the fungus that causes it, *Pseudogymnoascus destructans*, has been reported in five additional States, including North Dakota and California this year.

Northern long-eared bats, now federally listed as threatened due to white-nose syndrome, were once one of the most abundant bat species in the United States. Losing them would be analogous to the American robin and northern cardinal suddenly disappearing from people's back yards and feeders.

The white-nose syndrome response has been unique in that the United States Fish and Wildlife Service was appointed the lead agency to manage the national response. They have played a key role in planning, coordinating partners, funding research,

and monitoring efforts by State agencies, universities and others. Major progress has been made as a result, and many tools for combating white-nose syndrome are being tested.

None of this would have been possible without a central federal lead and consistent funding. However, none of this funding is dedicated, as it is appropriated yearly, which puts many of the proposed solutions at risk of not reaching their full potential.

The northeast region has a strong, collaborative network of federal and state biologists, supported through regional taxa groups such as Northeast Partners in Amphibian and Reptile Conservation, Northeast Bat Working Group, and the Northeast Wildlife Disease Cooperative. Delaware is involved with all of those groups and has participated in many of these projects.

One of those projects was led by Maryland's herpetologist, Scott Smith. And the goal was to determine the extent of ranavirus in a five-State area. Ranavirus is a deadly virus that affects frogs, turtles and salamanders, and it can kill all the tadpoles present in a given pond in a matter of days.

The results of this project were alarming, with over 25 percent of the breeding ponds tested in five States positive for ranavirus, and 40 percent of the ponds in Delaware tested positive. All of the States had ponds that experienced full die-offs for all the tadpoles in the pond that year.

Despite the results of this and other studies, continued sampling and research in our region has been limited. Although there are many organizations and people dedicated to protecting wildlife of all kinds, and there are many effective disease response teams, targeting specific diseases, the United States lacks a central organizing group that can quickly coordinate and mobilize in the event of another catastrophic wildlife disease.

Diseases transcend political boundaries and the issue would benefit from a dedicated, fully funded, federally based wildlife disease task team to assist States when novel pathogens are encountered, and with ongoing research and surveillance efforts for existing and imminent diseases. Additionally, expanding and strengthening federal laws to prevent the introduction of foreign wildlife could greatly reduce the chances of new diseases being introduced.

I want to thank you again for the opportunity to testify today.

[The prepared statement of Ms. Niederriter follows:]

Senator Barrasso. Thank you very much to all three of you.

We are now going to proceed with questions, if we may. I would like to start with Dr. Cook.

Are there lessons that State and federal wildlife managers can learn from the many years of brucellosis trials when creating a cohesive plan for trying to do what we are trying to do now, with fighting chronic wasting disease, lessons from the one that may apply to the other?

Mr. Cook. Yes, thank you, Chairman Barrasso, for that thoughtful question. I worked on the brucellosis issue for a number of years. It is a frustrating disease, with economic impacts and wildlife impacts as well.

There was a group known as the Greater Yellowstone Interagency Brucellosis Committee which was very successful for a number of years. That group consisted of stakeholders from the Federal Government, both wildlife agencies and agriculture agencies, as well as their State counterparts, and livestock interest organizations, wildlife interest organizations. They worked collaboratively, to borrow the phrase from Ranking Member Carper, they worked cooperatively and collaboratively to achieve some really good successes.

So I think that that kind of shows you, as a role model, the way that one of these committees can work. By including all the stakeholders, by having common ground and common interests,

and respecting one another, and working in good faith, they were able to accomplish a number of things.

We also had some funding that was available through that. One of the things that we saw that has occurred with brucellosis more recently is that as funding has declined, some of the interest, particularly at the federal level, has subsequently also declined. So that GYABC group has basically ceased to exist.

In its place, at the State level, in Wyoming at least, there is a governor's brucellosis task force, but just consisting of the State interest groups and stakeholders, trying to accomplish more or less the same thing.

Senator Barrasso. Thank you very much.

Mr. Guertin, fighting wildlife disease your whole life, you have been a long-time, dedicated public service, sometimes necessitates measures that impact the environment. Specifically, spraying for mosquitos to reduce risks to public health of mosquito-borne disease. We have seen that, certainly, in Wyoming. Mitigating environmental impacts is important, so is protecting the public health.

So how does the U.S. Fish and Wildlife Service balance protecting the environment, also protecting humans from wildlife diseases and the insects that then transmit them?

Mr. Guertin. Thank you, Mr. Chairman. The Service, first

and foremost, works with all of our partners on the landscape to develop a shared vision and a shared, overarching response to get at the root cause of the disease outbreak, and then apply the appropriate treatment as necessary.

There have been cases where the Service, with our partners, has had to use pesticides and other strong tools. With the recent screw worm outbreak in the Florida Keys, for example, like any other partner on the landscape, we have to go through the necessary NEPA requirements, as well as obtain permits. But we worked together to apply the best treatment where necessary and move on.

Senator Barrasso. Dr. Cook, what are some of the biggest obstacles in getting relevant stakeholders, including the Federal Government, State government and local governments on the same page when potential pandemics like chronic wasting disease threaten wildlife populations? How do we get everybody working together?

Mr. Cook. Thank you, Chairman. It is my belief that the federal agencies need to facilitate more and regulate less. They can serve very valuable functions in bringing some of these interest groups together and show some leadership. But again, we need to have all the different interest groups there to give their perspectives. And we need to appreciate and respect the fact that these different interest groups come at these diseases

with different values and different concerns, even different beliefs.

So they all need to be represented, we need to choose those leaders that we have representing those interest groups wisely, so that we have respected leaders but also ones that we can depend on to facilitate that communication back to their constituency groups.

Senator Barrasso. Mr. Guertin, what challenges do you face, U.S. Fish and Wildlife, on the National Wildlife Refuge System, when wildlife diseases encroachment becomes an issue?

Mr. Guertin. Thank you, Mr. Chairman. Again, we have to work with all of our partners on the larger landscape to get to the root cause of these. These diseases and these vectors do not recognize the political or planning framework that is in place out there. So we approach them at a larger scale.

We work with all the other partners on the landscape to set priorities, and then we develop either a response plan or a treatment plan. And we have demonstrated that with our efforts to work with the States on chronic wasting disease, under the leadership of the States, working on white-nose syndrome, and some of these outbreaks like fever tick in Texas, or screw worm down in Florida. Shared vision, shared resources, common objective.

Senator Barrasso. I appreciate all of your comments.

Senator Carper.

Senator Carper. Thanks again. I have a question for all of our witnesses, and I will start, if I could, Holly, with you. As we know, climate change is a major impact in the emergence and spread of wildlife diseases globally. Temperature, rainfall, humidity, and other environmental factors all directly influence the incidence, the spread, and severity of wildlife diseases.

Would you elaborate just a bit, each of you, on your understanding of how climate change affects the incidence or spread of wildlife diseases, and provide maybe an example or two, just very briefly, please? Holly?

Ms. Niederriter. Thank you. Climate change has the impact to really exacerbate the problem of wildlife disease. Changing temperatures can expand the ranges for pathogens and parasites, it can expand them northward. I can give you specific examples in a minute. One of them already stressed by other factors are more susceptible to disease, so in cases where the temperature, or there are increased storm events or anything like that, will stress those animals even further, making them also more susceptible to diseases.

Also for animals that are highly mobile, timing and availability of resources can be impacted. There was a study of winter bird counts taken over the past 40 years, and it showed

that 22, nearly 20 percent of the species recorded shifted their migration route 100 miles north. When they do that, if their resources don't shift with them, they can get there and not have enough food or not have enough water or not have enough habitat. And that is another avenue for, again, being stressed and having disease take over.

Then there are those species with restricted ranges, like a lot of the species I have worked with, with amphibians and reptiles in particular, which use specific ponds in woodlands and other habitat types. If the drought that is associated with climate change can impact those ponds by either making them smaller and less available, so there are a lot of species that are going to die out right away, and the ones that are left are going to be forced into smaller ponds and more individuals in a smaller space is a great way for pathogens to be passed among individuals.

Senator Carper. I'm going to ask you to give just a very few examples and give your fellow witnesses a chance. Okay, thank you very much. For the record, we will want the examples, please.

Dr. Cook, same question, please. Would you elaborate on your understanding of how climate change affects the incidence or spread of wildlife diseases, and maybe provide an example or two? Just very briefly.

Mr. Cook. Yes, thank you, Ranking Member Carper, and Chairman Barrasso.

I will start off by saying I am not a climatologist. This is not my area of expertise. But let me say that the diseases that I talked about, at least, are all infectious diseases. They are caused by an agent. And that is regardless of climate change, that won't change.

We may see, as was previously mentioned, a change in the distribution of disease. So for example, with the chytrid fungus, we know that that fungus has an ideal temperature requirement. So as climate change occurs, we may see areas that previously didn't have that correct temperature now consequently do, so we may see the chytrid spreading into those areas that hadn't been previously impacted.

Conversely, though, you may see that as other areas get too warm for the chytrid fungus, it may die out from other areas. Those are things I really can't predict, but that is a possibility.

As somebody else mentioned, the role of stress, and when I think about the bighorn sheep pneumonia issues, I don't think that climate change will directly increase or decrease the spread or the transmission of that disease. But what could happen, bighorn sheep live in fragile environments, environments that don't necessarily have adequate nutrition all the time.

And climate change could stress those environments even more to where there is less nutrition available, and clearly, an animal that has less nutrition is going to be less capable of fighting off any kind of infectious agents.

Senator Carper. All right, thanks, Dr. Cook. Mr. Guertin, same question, please.

Mr. Guertin. Thank you, Senator. As a land management agency, we look a lot at our operations, we look at lot at our land management planning. We are evaluating a lot of stressors on the landscape, fire, drought, disease, invasive species, and climatic changes that we are observing out there. Our job is to see how the species and our response to those challenges and then design resilient landscapes for the future and design proactive management strategies to safeguard these natural resources.

Senator Carper. All right, thanks. My hope is we will have a chance to ask maybe one other question of you in the second round. We will see. Thank you very much.

Senator Barrasso. Senator Braun.

Senator Braun. Thank you, Mr. Chair. I have been a manager of timberland for a long time, and didn't appreciate invasive species until we are now contending with it in probably a way that doesn't have the significance and seriousness behind it, because it isn't dealing with a live animal or a human

being.

But what I have seen in the last 15 years from the emerald ash bore almost completely wiping out the ash population, hoping that there is going to be some resistance there, and there might be. But basically the end result has been, we have lost all of our ash trees. I look at the most venomous of all the invasives, Japanese stiltgrass, that looks like a regular weed growing in the woods. Most people have no idea that it will suffocate all regeneration.

So there is no doubt about it, and I am sure climate is involved. It is mostly the fact that we are such an interconnected world that the isolation that kept us from having all these issues, that is gone. So we don't know what the solutions are going to be for our forests. Basically no idea, other than it is geometrically exploding across that context.

Chronic wasting disease, which to me is one of the things that, due to the nature of the disease, of course, we want to be absolutely certain and know if that can ever hop from a deer to a human being. So far, looks like maybe not.

But I want to focus in on it, because as an owner of timber ground, that is one of our biggest sources of income, leasing hunting rights to mostly deer hunters. I know it is on the doorstep of Indiana. I will start with you, Mr. Guertin, then we will go across the panel. How serious is it, in the sense

of, have we had any tools that have worked, and what can we do through conservation groups, hunting groups, to get the word out that it is potentially going to be a deal breaker for deer hunters?

Mr. Guertin. Thank you for your question, Senator. Unfortunately, at this point, there is no cure or treatment available. We are focused primarily on halting the spread of the disease and containing it where found. We have very aggressive strategies in place, in partnership with our States who are the lead on this. We work very closely with the outdoor recreation industry, with the hunting community, to get the word out. There are a number of protocols that have been established, including test tools and things like that.

But our real strategy is one of containment and eradication if need be.

Senator Braun. We tried that on the emerald ash bore, and sooner or later it just cascaded into all forests. Dr. Cook, can you explain to us here, when you do have it, does it completely wipe out a deer herd? Do some survive it? Has there been any indication of any type of immunity from within the herd?

Mr. Cook. Thank you, Senator Braun, Chairman Barrasso. That is actually an excellent question.

As far as we know, all cervids, all deer species are

susceptible to chronic wasting disease. We haven't found a subtype that is immune. There are some genotypes, animals with certain genetic makeup, that have a degree of resistance, in that it takes them longer to develop disease. Once they have the disease, they live longer with it, but they ultimately do die of it. There isn't a true resistant form out there that we have identified at this point, anyway.

One of the things that is really concerning about chronic wasting disease is that when it gets into the environment, once the environment becomes contaminated, it is basically there forever. At least we haven't discovered any ways to clean up the environment. So that is one of the things that is really concerning about it.

What is interesting to me is that, as I have mentioned, we have noticed some populations that are clearly impacted where the population levels are going down because of chronic wasting disease. Yet there are other populations where that has not occurred. And we don't know why that is. I think one of the keys to really understanding this disease is understanding why it seems to increase in prevalence in certain environments and not so much in others. Because that would be our first step in trying to predict where it is going to go, and maybe getting a handle on trying to control it.

Senator Braun. What is a host, when it survives in the

ground or whatever, is it just there? Or does it have to, is it parasitic on something to where it would then reinfect a revised deer herd?

Mr. Cook. Excellent question, Senator Braun. The prion basically exists on its own. So we know the prions are shed in saliva, urine and feces. They also accumulate in the brain and spinal cord of an animal. So when an animal dies of CWD, as that animal disintegrates, deteriorates over time, those prions are released as that body decomposes and then contaminate the soil. They exist in the soil, essentially perpetually.

Senator Braun. Thank you. And real quickly, Holly, is there any connection between chronic wasting disease and climate change, that you are aware of?

Ms. Niederriter. The chronic wasting disease is not a disease that I know much of anything about. I am also not a climatologist, but I don't know of any particular connection for that one.

Senator Braun. Thank you.

Ms. Niederriter. Some other deer diseases, though.

Senator Barrasso. Senator Boozman.

Senator Boozman. Thank you, Mr. Chairman. Thank you and Senator Carper for holding this hearing today. This really is a big deal for our State and so many States throughout the Country. In fact, I think we have 700,000 hunters and anglers

in Arkansas that create 25,000 jobs, billion dollars in income, which again, much of that money is put back into conservation. So it is something that is not only good for the economy, but it is great for trying to protect the species that we are talking about.

Mr. Guertin, in regard to that, a billion dollars is very important to the State. I guess what I would like to do is for you to comment on the economic impact that you see.

Mr. Guertin. Thank you for your question, Senator. We are seeing a lot of concern in the outdoor recreation economy, in the sport hunting community in particular. People make policy choices, whether they want to invest in a big hunt, buy arms, equipment, hotels, et cetera.

We are doing a lot of proactive work with the State fish and game agencies and others to make sure people know it is still safe to hunt. There are some questions with CDC and others about whether this will be transmitted to humans or not. And many people wait to get their carcass tested. But for us, it will be a lot of education, outreach, and keeping alive the American tradition of sport hunting through the support we can offer.

Senator Boozman. Very good. I think in Arkansas we have had 619 positive cases. Some of the things that the Arkansas game and fish has done is come up with innovative ways, the drop

boxes, so that you can test elk and deer. Last year, I believe they tested 1,400 samples. This season they plan to install at least one drop box in every county.

Are there things like that that your agency is doing that you have come up with, some innovative ideas to address the problem?

Mr. Guertin. Senator, a lot of the testing is under the auspices of the State fish and game agencies. They are deploying some very innovative solutions, they get some test kit responses very quickly, while people wait, whether or not they can have that animal processed there.

The Fish and Wildlife Service provides a lot of technical capacity and funding through various grant programs that support those State efforts. And we will continue to do everything we can to support our colleagues in the State fish and game agencies and the larger hunting community to get quick results back.

Senator Boozman. I mentioned conservation, which is so, so, very important. According to a recent study by the Association of Fish and Wildlife Agencies, an estimated 58.8 percent, or \$3.3 billion of conservation funds to State wildlife agencies came from hunting and fishing related activities, either directly through sale of licenses, tags, stamps, or indirectly through federal excise taxes on hunting, recreational

shooting and angling equipment.

Again, talk to us a little bit about the synergy between those two, regarding conservation, which is so, so, very important.

Mr. Guertin. Thank you for your question, Senator. The U.S. Fish and Wildlife Service is proud to stand shoulder to shoulder with our colleagues in the State fish and game agencies. We work with them under the umbrella association of the Association of Fish and Wildlife Agencies to align our priorities, to align our capacity. We all are here to serve the American people and make sure we have sustainable populations of wildlife for generations to come.

Key to that is, of course, the outdoor recreation industry. Another key driver for us is the larger conservation mission. So the Service provides a lot of grant funding and capacity, as do the States, to share the common objective of conservation to benefit the generations to come.

Senator Boozman. And also, Senator Barrasso, I want to thank you that we are a co-sponsor of your bill concerning chronic wasting. I know that what that does is make it such that when completed, the study would give the State wildlife agencies and wildlife experts better information to conduct targeted research on how the disease is transmitted, and which areas are most at risk, and develop consistent advice for

hunters to prevent further spread.

That to me, and certainly as a physician, you are certainly aware of the importance of getting good information out there. Two, going to the cause. So again, give yourself a pat. We appreciate it.

Senator Barrasso. I am just grateful for your partnership in this, and your cooperation, and being willing to lend your name and support to this bill. Thank you for all your help.

Senator Boozman. Well, thank you all, and again, thank you all for your hard work in fighting these things. The way that you can help us is as you think of things that we can be better supportive, in the areas that you are working on, be sure, and let us know. The nice thing about this is it is not a Republican or Democrat thing. It is something that the entire Country is interested in, and we are interested in doing. Like I said, that is how you can support us and help us. Thank you.

Senator Barrasso. Thanks, Senator Boozman.

Senator Carper, you had an additional question.

Senator Carper. I do. I understand Senator Gillibrand is close by, and if she walks in, I will just yield back to her and pick up my time after she is finished.

Very briefly, from each of you, give us one piece of advice we think you all agree that you would really like to, in the Navy we call it like a foot stomping kind of deal, maybe in the

Marines and Army as well, our instructors in our training, if they had something they really wanted us to remember for the test, they'd stomp their feet. And that was something we should write down.

But in terms of advice you think you all agree on, what would be something you think you would really want us to take home? Do you want to go first, Mr. Guertin?

Mr. Guertin. Thank you, Senator. The key, unifying theme for all of us is the collaborative nature, the partnership nature, the all-hands-on-deck nature of the response. The Fish and Wildlife Service is one entity among many. We are proud to partner with the States, academia, the NGOs, the other federal agencies, to develop a common mission, and all of us deploy our resources as a priority against getting ahead of these wildlife diseases, so we can ensure wildlife and fisheries resources for the continuing benefit of the American people.

Senator Carper. All right, thank you. Same question, Dr. Cook.

Mr. Cook. Yes, thank you, Ranking Member Carper. Coming from a university perspective, I have to put in a plug for more funding for research, of course. But I think this is another good example of the cooperation and collaboration, the idea of a task force that is overseeing this to provide direction.

As I mentioned, one of my concerns is that a lot of

wildlife disease research that is ongoing is very esoteric and not very practical. By having a working group that is overseeing this, that has stakeholders, that provides some direction on where that research ought to go, they can make sure that that research that is being conducted has management implications, will actually help wildlife managers in making their decisions on how to manage not just chronic wasting disease, but others as well.

Senator Carper. Thank you. Holly, same question, very briefly, please.

Ms. Niederriter. My answer is pretty much the same as theirs. That collaborative effort is what is really needed, and having a central, one central entity that can oversee all of that. That helps keep repetition from happening, it really helps focus on specific, the most important aspects of it. In the case of white-nose syndrome, and in the case of Bsal, which is a salamander disease that is happening, there is a central group of people who came up with a specific plan, with really good guidelines for how to move forward. I think that really does help the States, it helps us focus on those things.

But funding really does have to be a part of it as well, especially to States.

Senator Carper. Thank you. I reserve the balance of my time and yield to Senator Gillibrand.

Senator Gillibrand. Thank you, Mr. Chairman, Mr. Ranking Member, for the hearing.

Lyme disease is a serious problem in New York and across the Country. The Cary Institute of Ecosystem Studies estimated that more than 400,000 people are diagnosed with Lyme disease in the United States each year. And this number is increasing rapidly due to a number of factors, including climate change.

According to Centers for Disease Control and Prevention, New York is one of the top States in the Country for reported cases of Lyme disease. Lyme disease is transmitted to humans by deer ticks, and can have debilitating and life-long health effects. Mr. Guertin, what can Fish and Wildlife Service do to help States and localities address the prevalence of Lyme disease?

Mr. Guertin. Thank you for your question, Senator.

The Fish and Wildlife Service can provide a lot of technical assistance. We can provide grant funding to our colleagues in the State fish and game agencies. A lot of the management authority for whitetail deer is vested with our colleagues in the State fish and game agencies. So in this space, we are more of a technical assistance provider and can help in a larger outreach and education and eradication campaign, coordination, so to speak.

Senator Gillibrand. Thank you. Ms. Niederriter, can you

talk about the impacts that climate change is having on the habitat and range of deer ticks and what effect that could have on the spread of Lyme disease in the United States?

Ms. Niederriter. I don't really know the answer to that specifically. But I would expect, and it certainly has been the case with some tick species and some animals that are being impacted by them, that as the climate warms and it gets warmer in places that weren't warm before, more ticks, ticks are active when it is warm out. And they thrive in warmer climates, so they are most likely to be a worse problem, based on what we know about climate change and ticks.

Senator Gillibrand. Would you do some research for me and submit a letter to the committee with a fuller answer on that question?

Ms. Niederriter. Yes.

Senator Gillibrand. Thank you.

Are there any additional resources that States need to address the factors that contribute to the spread of Lyme disease, in your opinion?

Ms. Niederriter. Would you repeat the question?

Senator Gillibrand. Are there additional resources that States need to address the factors that contribute to the spread of Lyme disease?

Ms. Niederriter. I am sure that they could use more

funding to look at that. I know in Delaware, we recently hired a biologist who is focusing mostly on ticks. So that is a huge help, and I am not sure where the funding came from for that. But if each State had that, and there was like a central overseer to help collaborate all that information, that would be helpful.

Senator Gillibrand. Interesting. I want to move to salamander disease. Ms. Niederriter, in your testimony, you mentioned Bsal, a fungal disease that is currently devastating salamanders in Europe. Fortunately, this disease has not yet made it to the United States. A few weeks ago, I received a letter from a five-year old constituent of mine named Earl, who wrote to ask that I help salamanders, his favorite animal. Here is the letter; I ask unanimous consent to submit the letter and his parents' letter into the record.

Senator Barrasso. From a five-year old, absolutely, there is no objection.

[The referenced information follows:]

Senator Gillibrand. Thank you.

So I would like to ask you what we can do to help prevent the spread of Bsal to the United States. As I am sure you are aware, the U.S. Fish and Wildlife Service established the North American Bsal Task Force in 2015. Acting on recommendations from the task force, the Fish and Wildlife Service banned the importation of 201 different species of salamander.

However, recent reports in scientific literature show that many species of frogs, toads and newts may carry Bsal without any signs of infection. Should the work of the task force be restarted to consider further restrictions on imported amphibians?

Ms. Niederriter. To answer that very shortly, yes. I do think that that would be a helpful thing to do for sure. And additional research into how the disease can be transmitted between those different species. I know there is research going on right now looking at specific species that are likely to carry it and to have it. But restricting the disease from getting in is priority one right now.

Senator Gillibrand. What can we as the committee do to ensure that the task force takes a more active posture in surveillance and response to Bsal?

Ms. Niederriter. I am not sure how the committees really work and at what level they can work. But I would think that

reaching out to the individual States and to the task force would be helpful.

Senator Gillibrand. Okay. And would additional resources for the partners in amphibian and reptile conservation, or the regional State wildlife grants, be an option for preventing Bsal introduction?

Ms. Niederriter. Can you repeat that question? I'm sorry.

Senator Gillibrand. More money, would that be helpful?

Ms. Niederriter. Yes, absolutely. Always.

[Laughter.]

Senator Barrasso. All three members have testified to that effect already.

Senator Gillibrand. That is always a good idea.

Mr. Guertin, some of the current, this is now moving to honeybees -- oh, I am out of time.

Mr. Guertin, I would like to submit two questions for the record for you on the colony collapse disorder and other things affecting our honeybees.

Mr. Guertin. We would be glad to respond for the record. Thank you, Senator.

Senator Gillibrand. Thank you. Thank you again, Mr. Chairman.

Senator Barrasso. And Dr. Cook, as an academician, also requested additional funding.

Senator Gillibrand. Excellent. More experts.

Senator Barrasso. Senator Carper.

Senator Carper. Thanks very much.

We are expected to know, as Senators, a little bit about almost everything. I like to say, a mile wide and an inch deep. Some issues, some areas we are expected to know more. For those of us on this committee, we focus on a lot of environmental issues, and a lot of infrastructure, transportation and infrastructure issues. The Chairman is going to from here to the Foreign Relations Committee. So he is expected to know a whole lot more about that, and more in depth.

I know in your job, I suspect in your job, Mr. Guertin, you are expected to have a whole lot of information about a lot of stuff in the area of your jurisdiction. What I would just ask from each of you, how important would you say, and we will start with you, Holly, how important would you say is a director's expertise in wildlife management and wildlife laws in addressing wildlife disease and other complex wildlife challenges? How important is that?

Ms. Niederriter. How important is their --

Senator Carper. How important is a director's expertise in wildlife management and wildlife laws in addressing wildlife disease and other complex wildlife challenges? How important is it?

Ms. Niederriter. I think it is very important, because understanding them is really the first step in how to address any of the issues that occur.

Senator Carper. All right, thank you. Dr. Cook, any thoughts?

Mr. Cook. Yes, I would agree, thank you, Senator Carper, for the question. I would agree that it is important. I think they have to have the 30,000-foot view. We can't expect them to be completely up to date on all the intricate details, but certainly to understand the broad implications of disease management. I would consider that to be important, yes, sir.

Senator Carper. All right. Mr. Guertin, any thoughts?

Mr. Guertin. Thank you for your question, Senator. In the federal agencies, for the executive level positions, we are also looking at the executive core qualifications, leading change, leading people, these executive functioning skills, leadership communications, project management, as well as the technical credentials of the leadership cadre.

Senator Carper. Thanks. One last question, if I could, Mr. Guertin, dealing with threatened and endangered species. While wildlife disease presents a serious threat to all species, it can be particularly dangerous for threatened and endangered species, as you know. These species are especially vulnerable to disease, because they have small population sizes, lower

genetic diversity, and they are already stressed by factors like habitat loss, invasive species, and pollution.

To what extent is disease a barrier to the Service's implementation of the Endangered Species Act, and how does disease factor into the Service's ability to recover threatened and endangered species?

Mr. Guertin. Thank you for your question, Senator. When the U.S. Fish and Wildlife Service makes an evaluation, a listing determination of any species, we base it solely on the best available scientific information, and we use what is called a five-factor analysis. We evaluate five prevailing conditions. They include present or perceived destruction of habitat, it includes disease or predation, it involves over-utilization for commercial or other purposes, it involves the status of existing regulatory mechanisms, and then any other man-made factors that would affect its survival.

So disease is one of the big five that we use to make any potential determination for federal protection under the Endangered Species Act.

Senator Carper. Okay, thank you. Thank you all.

Senator Barrasso. Senator Cardin.

Senator Cardin. Let me thank all of you for your service, and for your being here today.

I just want to make a point about how we need to deal with

our environment as it relates to the spread of diseases. When you look at the success that we had on the Eastern Shore of Maryland, on the DelMarVa Peninsula fox squirrel, which was listed as an endangered species, it is now off, it was habitat loss that was the major culprit for the endangerment of that species.

So as we are looking at challenges today, and I look at my own State, look at the Chesapeake Bay watershed, the restoration of wetlands is critically important for many, many reasons. One reason is that it protects our species. Climate change has made it more challenging, because we are now facing different challenges than we did before.

So what type of strategy can we deploy to sensitize our efforts in these areas, recognizing that the health of the species are very much at stake? How can we do a better job in education, and in practical ways that we can help restore habitat to protect species?

Mr. Guertin. Thank you for your question, Senator. The Fish and Wildlife Service, first and foremost, wants to develop a shared vision with all the stakeholders on the landscape we operate in, starting with our colleagues in the local fish and wildlife agency, as well as other primary landowners who have management authority in that area. We then try to work to develop a common vision for conservation, working landscapes.

We then try to bring the tools we can to bear, there are a variety of things, there is our Partners for Fish and Wildlife program, that does a lot of work with private landowners on habitat restoration for priority and trust specie.

We can provide a lot of technical assistance, fish passage and other things. And then the Secretary of Interior has a number of conservation programs, including the North American Wetlands Conservation Fund, the LWCF and others. We can prioritize conservation easement overlays, in some cases, fee title. A variety of tools to deploy in a chosen project area, so to speak, to focus on a larger conservation outcome while balancing that with other uses of the land.

Senator Cardin. One thing I would point out is that we found the success of the Chesapeake Bay program was because the public understands it. They get it, they understand that what they do, how they handle the runoff, how they handle their farming practices, how we handle development, how we handle treatment of waste, all have a major impact on the quality of the Chesapeake Bay.

I am not sure we have done the same degree of educating the public as protection of species in this regard. Can we be more effective in the way that we engage the public as the importance of these programs in regard to the health of species?

Mr. Guertin. Certainly, Senator. The Chesapeake Bay and

all the partners there are really a beacon for conservation for the rest of the Country, all the work that the State of Maryland, Delaware, Virginia have done, the federal partners, unifying around a lot of larger objectives, balancing recreational and commercial fishing, balancing against invasive species control, such as nutria eradication, and then using the necklace of wildlife refuges and other lands.

And the big partnership with private landowners and people have rallied around some of the big species, striped bass, waterfowl and others, as iconic to represent the needs of that areas. We can certainly replicate that type of success story in other parts of the Country to demonstrate the value of a balanced approach to species conservation while Americans make a living on the same landscape.

Senator Cardin. I will look forward to working with you on that. I am out frequently with your people in the community. It is great, I just don't see us concentrating as much, I think, on this area as we should. So I think we should look for opportunities to enhance these areas.

Mr. Guertin. Thank you, Senator. We would welcome the opportunity to work further with you and develop that common vision and move forward to implement with our State partners.

Senator Cardin. Thank you. Thank you, Mr. Chairman.

Senator Barrasso. Thank you, Senator Cardin. Senator

Carper.

Senator Carper. Mr. Chairman, I have no letters from five-year olds, but I do have a unanimous consent request to enter into the record additional written testimony from stakeholders impacted by the spread of wildlife disease. And just as a P.S., the value of agriculture in our State's economy is about \$8 billion a year, \$8 billion, which is a lot of money for a little State.

And people say to me, why do we care about the brown bat, why should it be that important. And I say, agriculture is our number one industry, tourism close, number two. It is important we have those bats, because they are eating mosquitos and a lot of other things that help us as tourists and make Delaware more attractive, and help our farmers be more successful and profitable. Thank you.

[The referenced information follows:]

Senator Barrasso. Thank you, Senator Carper.

I want to thank all the witnesses, thank you for being here, thank you for your exquisite testimony. It was very well received. We appreciate your time answering the questions.

There are no more questions for the panel today, but members may submit questions for the record. The hearing record will therefore stay open for two weeks. We hope that if you receive questions, and I know you have been given a homework assignment by one of the members, if you would please get that in within the amount of time.

I want to thank the witnesses for your time and your testimony. The hearing is adjourned.

[Whereupon, at 11:20 a.m., the hearing was concluded.]