Statement of

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Chairman Porter, Ranking Member Moore, and Members of the Subcommittee, thank you for the opportunity to appear today to testify on wildlife diseases, including zoonoses, which are pathogens that spread between humans and animals. The U.S. Geological Survey (USGS) conducts wildlife disease surveillance and research, supporting the Federal response to zoonotic diseases that circulate in wildlife and the environment. As the science agency of the Department of the Interior (DOI), USGS research supports other bureaus, including the U.S. Fish and Wildlife Service (USFWS) and National Park Service (NPS), to protect the health of wildlife and the health of both employees and visitors to our public lands. Furthermore, the USGS fills a unique role in supporting national zoonotic disease efforts led by the Department of Agriculture (USDA) and the Department of Health and Human Services.

A review of emerging human infectious diseases going back to the 1940s found that approximately sixty percent were zoonotic, and more than seventy percent of those originated in wildlife.[1] Because of this, USGS wildlife disease surveillance and research support a One Health approach to national zoonotic disease response. The Centers for Disease Control and Prevention (CDC) defines One Health as "a collaborative, multisectoral, and transdisciplinary approach —

[1] Jones K., Patel, N., Levy, M. et al. Global trends in emerging infectious diseases. *Nature* 451, 990-993 (2008). https://doi.org/10.1038/nature06536

working at the local, regional, national, and global levels — with the goal of achieving optimal health outcomes recognizing the interconnection between people, animals, plants, and their shared environment."[2]

One Health recommends that the Nation improve biosurveillance of wildlife diseases, including zoonoses. The USGS is working with partners to develop a network that encompasses all aspects of wildlife disease biosurveillance including prediction of threats, assessment of their impacts, and selection of management options to apply scientific findings more quickly. This effort is being undertaken in collaboration with the USFWS, the Association of Fish and Wildlife Agencies, and other partners who have also identified expanded biosurveillance needs as a priority. As with many complex challenges, a whole-of-government approach is ideal. Most of the examples we will discuss today illustrate that enhanced capabilities and additional science could better ensure stakeholders receive early warning and sound data to inform disease response efforts. The national wildlife disease biosurveillance network envisioned by USGS would be adaptively refined as scientific gaps are identified. This will strengthen the capabilities of all network partners, Federal agencies, States, Tribes, academia, and our international partners, to predict, assess, and respond to disease threats quickly and effectively.

The USGS has taken the first steps toward developing this network. Through an interagency agreement with USFWS, the USGS has begun development of a national wildlife disease database as called for under the American Rescue Plan Act. The database will include two components: first, the enhancement of the Wildlife Health Information Sharing Partnership-Event Reporting System (WHISPers) database, and second, development of the new Aquatic Disease and Pathogen database (AquaDePTH). In addition to the situational awareness provided by AquaDePTH and WHISPers, there are also collaborative tools for Federal, State, and Tribal partners to share information, and we are working to increase participation in those databases. Using the national wildlife disease database, the USGS will be able to provide an early warning for wildlife diseases, including those species that serve as sentinels for ecosystem health. The USFWS added a requirement to its upcoming zoonotic disease grant program that agencies receiving funding utilize the WHISPers platform, further enhancing the national wildlife disease

[2] One Health Zoonotic Disease Prioritization Workshop Report. December 2017. www.cdc.gov/onehealth/pdfs/us-ohzdp-report-508.pdf

database. The USFWS also maintains the National Wild Fish Health Survey, which partners with natural resource managers to assist in inspections, diagnoses, and publishing results of aquatic diseases.

DOI funding provided by the Coronavirus Aid, Relief, and Economic Security Act (CARES Act) was used to initiate biosurveillance of coronavirus in wildlife and the environment. This included integrating SARS-CoV-2 surveillance into USGS cause-of-death investigations as well as active field surveillance, including sampling wildlife around mink farms to support USDA's response. USGS took advantage of bat ecology research that includes white-nose syndrome surveillance to also collect samples for SARS-CoV-2 surveillance.

These are recent examples of the role the USGS plays, providing scientific information to resource managers and planners, emergency response officials, and the public. Over the decades, USGS science has supported federal responses by detecting zoonoses, improving our understanding of their ecological dynamics, and informing mitigation strategies which help protect both wildlife and public health.

To do this, the USGS and the USFWS maintain several important labs across the country. The National Wildlife Health Center (NWHC) in Madison, Wisconsin, which was established in 1975, is the only Federal biosafety-level three (BSL-3) lab dedicated to wildlife health, and it is an affiliate lab in several national and international networks. The USGS also has two aquatic high-containment laboratories, the Eastern Ecological Science Center (EESC), in Kearneysville, West Virginia, and the Western Fisheries Research Center, in Seattle, Washington. The USFWS has six fully functional Fish Health Centers conducting regular inspections, diagnostics, and cutting-edge research to actively manage diseases in captivity and the wild.

In addition to these facilities, the USGS and the USFWS develops innovative technologies and methods to support response to zoonoses. A well-known example is our development of capabilities to detect and track wildlife species and pathogens using environmental DNA, or eDNA. This is an example of investments we have made in new methods for monitoring invasive species, which can spread zoonoses. Our research on toxins and contaminants and their spread through the environment includes pathogens, and we maintain a variety of remote sensing capabilities to monitor environmental conditions that inform assessments of zoonotic disease

spread. We have even helped design better citizen science campaigns to improve the collection of data. Also, the USFWS hosts a Genetics Community of Practice well known for advancing new technologies and applying them to actively managed fish and wildlife populations. Their expertise in eDNA protocol development, applied to fish and wildlife management and detection of aquatic invasive species, will play a critical role in future disease surveillance.

The NWHC has made significant contributions to national zoonotic disease surveillance efforts in wildlife including SARS-CoV-2, avian influenza, and West Nile virus. For example, the USDA confirmed NWHC preliminary positives for the first U.S. detections of West Nile virus and highly pathogenic avian influenza in wild birds. Following the first detections of those diseases in the U.S., the USGS has collaborated with the USDA and the CDC on surveillance of these zoonoses in wildlife. Notably, experimental research demonstrated that West Nile virus could be transmitted from crow to crow when it was previously thought that it could only be spread by mosquitoes. Additional research and surveillance capacity would be needed to investigate the role of wildlife in other vector-borne diseases. Wildlife vector-borne disease surveillance and research can also enhance management of wildlife diseases like avian malaria, which is the leading driver of population declines and extinctions in Hawaiian forest birds. Five years before the first U.S. detection of highly pathogenic avian influenza, USGS experimental research found that infected native raptors could develop neurological disease and die, providing early warning for the need to monitor raptors in addition to waterfowl. Further research is needed to enhance avian disease risk prediction, mapping, and forecasting tools to inform wild bird management decisions.

USGS disease ecology research provides insight into how zoonoses behave in the environment and affect wildlife. For more than twenty years, we have collaborated with the USDA to support management of bovine brucellosis, a zoonotic disease that circulates in bison and elk as well as domestic cattle, especially in the Greater Yellowstone Ecosystem. The USGS has shown how elk are a key host of this disease and that it affects their reproduction. The spread of the disease can be influenced by the length of the elk supplemental feeding season and elk migratory movements that are linked to greening-up in the spring. USGS science has also shown that maintaining scavenger populations (such as coyotes, foxes, or eagles) can help reduce the spread of brucellosis.

Another example is USGS research into avian influenza ecology. It has provided insights on the genomics of viral lineages that circulate in migratory birds, which informs USDA poultry outbreak traceback investigations and surveillance strategies. USGS waterfowl telemetry and modeling have demonstrated the interface between wild birds and poultry, enhancing situational awareness and risk assessments. USGS research has also confirmed the persistence of infectious avian influenza viruses in surface waters in northern wetlands and determined that diving ducks can play a role in the dynamics of this disease.

USGS science that supports the mitigation of zoonoses can also help protect public health. For example, sylvatic plague is a zoonotic bacterial disease that affects pets, like cats and dogs; wildlife, such as prairie dogs and the endangered black-footed ferret; and also causes several human deaths each year. In addition to improving our understanding of plague ecology, the USGS has developed innovative tools to mitigate this disease in wildlife. The NWHC developed and tested a plague vaccine given to prairie dogs through a peanut-butter flavored oral bait. The license to produce this vaccine was awarded to a U.S. company, Colorado Serum, with a conditional license from the USDA. The USGS also collaborated with the CDC to identify flea resistance to deltamethrin dust, an insecticide and a long-standing plague management tool. We are investigating other options, such as fipronil pellets, for reducing flea abundance in prairie dog burrows. In another example of vaccine development, the USGS and our partners developed a rabies vaccine that has been shown in the lab to be effective in big brown bats, providing a proof-of-concept for a white-nose syndrome vaccine, which is now in field trials.

These and other examples of USGS research contribute to public health and inform our understanding of impacts humans have on wildlife. For example, the USGS published an online tool[3] to provide rapid SARS-CoV-2 risk assessments for human-to-bat transmission (*i.e.*, reverse zoonosis) to guide decision-making for bat biologists, wildlife rehabilitators, and animal control operators who regularly work with bats. In the case of the Zika virus, the USGS provided science to guide management actions that reduce risk to non-target species, like pollinators, but allow for control of insect vectors, such as mosquitos and ticks. We have also helped integrate

[3] www.usgs.gov/apps/SARSCOV2BATRISKCALC/

mathematical models and statistical tools based in natural resource management for COVID-19 public health mitigation planning.

Chronic wasting disease (CWD) is a good example of a One Health approach. CWD is a fatal neurological disease of deer, elk, and moose caused by infectious prions. While CWD has not been shown to affect humans, variants of other animal prion diseases do, such as Creutzfeld-Jakob disease. The USGS has worked with the NPS, the USFWS, USDA, States, and Tribes for many years to enhance the understanding of CWD dynamics in deer and elk and develop tools for monitoring the spread of CWD and making management decisions. Our work has focused on mitigating the spread of CWD in wild cervid populations, including reducing environmental prion contamination, and developing customizable surveillance and mitigation planning tools for States and Tribes. Currently, the science community is hopeful that a test will soon be deployed that can be used to detect small numbers of prions, that is achieve early detection, in live cervids rather than the current testing standard that uses post-mortem tissues. All of this requires collaboration across all levels of government and robust public outreach efforts — and it all needs to be done not just for known diseases but also for novel, emerging pathogens yet to be discovered.

The USGS, along with our partners, is leading research on wildlife disease and spearheading monitoring efforts that address diverse stakeholders needs. As the One Health approach implies, understanding wildlife disease is a crucial step in protecting the public from known and emergent diseases. That idea, of studying the natural world to benefit all people, is very much within our tradition. Thank you for this opportunity to testify today. I would be happy to answer any questions you may have.