USGS science for a changing world

USGS National Wildlife Health Center

April 6, 2018

NEWSLETTER

INSIDE:

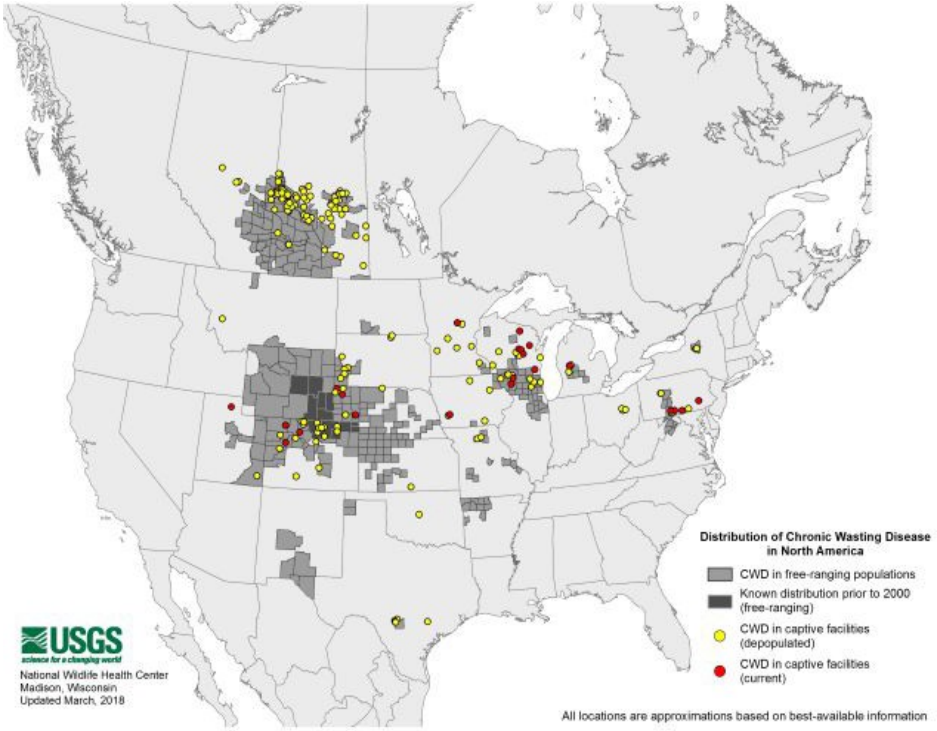
CHRONIC WASTING DISEASE

New USGS Open File Report

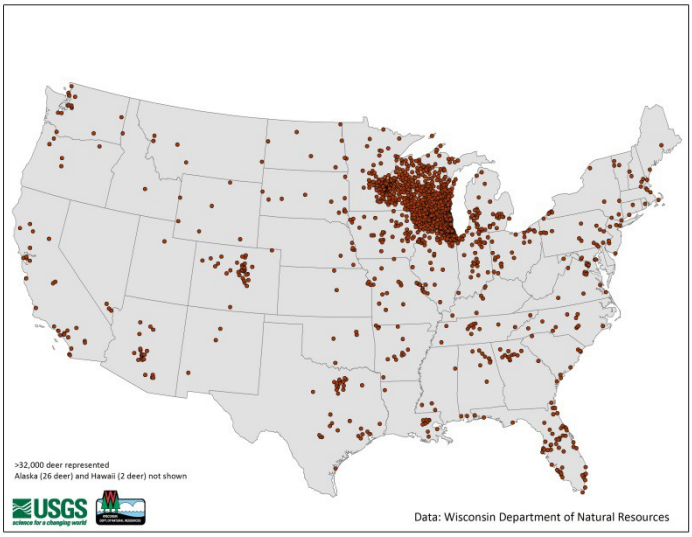
The USGS investigates chronic wasting disease (CWD) at multiple science centers and cooperative research units across the Nation and supports management of CWD through science-based strategies. CWD research conducted by USGS scientists aims to understand the distribution, assess and predict spread and persistence, and develop tools for early detection, diagnosis and surveillance of CWD in North America.

Expanding distribution of Chronic Wasting Disease

In 2017 and early 2018, distribution of CWD in North America significantly expanded. The numbers of new counties (24 out of 215 positive counties) and captive facilities (11 out of 90 total farms) where CWD was detected were the highest on record for a single year. There have also been 4 positive captive facility detections in 2018 (as of March 2018). In 2017, ten (of 40 total positive) new Wildlife Management Zones (WMZ) in Saskatchewan also had their first detection of CWD in free-ranging cervids. The current CWD distribution map is also available from the USGS National Wildlife Health Center (NWHC). For more information contact Bryan Richards: brichards@usgs.gov.



Documented distribution of CWD in North America in 2018:
25 States and 2 Canadian Provinces



Home Zip Codes of hunters harvesting deer in Dane, Iowa, Richland and Sauk Counties, Wisconsin, 2016-2017

Potential to spread prions through carcass movement

To explore potential risks associated with carcass movement, we collaborated with Wisconsin Department of Natural Resources (DNR) to examine a subset of their deer harvest data from 2016-2017. Over 32,000 deer were taken by hunters from the region of Wisconsin with the highest incidence of CWD in free-ranging deer (Dane, Iowa, Richland and Sauk counties). We then plotted the home zip code of each successful hunter who harvested deer in these counties and found that hunters were from 49/50 states. This cursory examination suggests that there is an opportunity for the inadvertent movement of infectious material within and across jurisdictions. Human dimensions research will be required to characterize actual risk associated with carcass movement. For more information contact Bryan Richards: brichards@usgs.gov.

CWD and human health

In 2017, the CDC issued new guidance on potential risk of CWD to human health and suggested that hunters in areas with CWD strongly consider having their deer tested and avoid consuming meat from animals testing positive. To explore adherence to this guidance, we examined 2017 data from Wisconsin in collaboration with the Wisconsin Department of Natural Resources. In the Southern Farmland Zone, a 20-county area where the majority of CWD has been detected in Wisconsin, approximately 8% of harvested deer were tested. In Iowa County (highest CWD incidence in the state), approximately 23% of deer were tested. These data suggest that hunters in areas with higher CWD incidence more frequently submit samples for testing, but the majority of hunters do not. Reasons for not testing deer potentially include lack of awareness of the CDC recommendations, lack of knowledge about CWD in general, and perceived lack of availability and inconvenience of CWD sampling. Human dimensions research could help elucidate hunter behavior patterns with respect to CWD testing. For more information contact Bryan Richards: brichards@usgs.gov.

Population effects of CWD on free-ranging deer

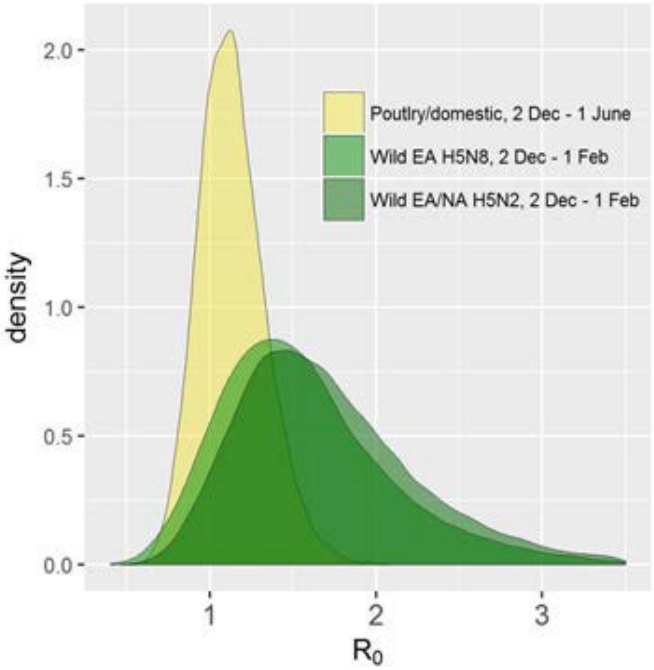
USGS National Wildlife Health Center and University of Wisconsin are collaborating on a Wisconsin Department of Natural Resources project to develop an integrated population model for white-tailed deer that incorporates chronic wasting disease and other factors potentially impacting survival and population performance in southern Wisconsin. This is a 5-year study, which involves annual tracking of 200 adult deer and 100 fawns (cumulatively up to 1200 deer) inside the Wisconsin CWD core area. Data from this study will be used to create a modeling tool that accounts for the potential effects of CWD when assessing population trends, impacts of harvest structure, and the effectiveness of disease management activities. States interested in assessing this type of information for their populations should contact Dr. Daniel Walsh: dwalsh@usgs.gov.

Deer radio collared for CWD study in Wisconsin (Credit: Alison Ketz, Univ. of Wisconsin)

AVIAN INFLUENZA

Minor spillover of avian influenza between wild and domestic birds

In a new study, we analyzed the genomes of highly pathogenic avian influenza viruses (HPAIV) that spread in the United States during 2014-2015 and resulted in over $3 billion in losses to the U.S. poultry industry. As infection and transmission of pathogens in wild birds are difficult to measure during a fast-moving outbreak, this study used cutting-edge modeling techniques to analyze genetic similarity between HPAIVs infecting wild birds and poultry. Analyses indicated that even though the viruses likely evolved in Asia, they easily infected and spread among North American wild birds. The viruses were also able to spread between domestic and wild birds (i.e., spillover). However, the rate of spillover was minor, and the poultry outbreak persisted without need for ongoing transmission from wild birds. Techniques used in this study can also be used to examine transmission and adaptation of avian influenza within waterfowl populations and between waterfowl and poultry. For more information contact Dr. Dan Grear: dgrear@usgs.gov.



The basic reproductive number (R0) for HPAI in poultry suggests that the outbreak persisted without ongoing transmission from wild birds.

Wild-bird avian influenza surveillance

During the 2017-2018 surveillance effort, the U.S. Department of Agriculture (USDA), U.S. Geological Survey (USGS), and U.S. Fish and Wildlife Service (USFWS), and state agencies sampled and tested over 30,000 ducks across the U.S. for avian influenza viruses and detected no highly-pathogenic strains. This effort included 7,713 samples from the Atlantic Flyway states. The Canadian Wildlife Health Cooperative has also been performing HPAIV surveillance with no HPAIV detections in 2017. We anticipate that HPAIV surveillance in wild birds will continue with similar or decreased effort during 2018. For more information contact Dr. Hon Ip: hip@usgs.gov.

AMPHIBIAN AND REPTILE DISEASES

Emerging disease of tadpoles

In a new study, we found that Severe Perkinsea Infection (SPI), an emerging parasitic disease, is the third most common infectious disease of frogs in the United States. The disease affects tadpoles and is caused by a protist parasite in the genus *Perkinsus*. We found that SPI caused 21 of the 247 frog die-offs from 43 states that occurred during 1999–2015. All of the SPI-associated events involved tadpoles and occurred in ten states from as far north as Alaska and south to Florida. Impacted tadpole populations experienced up to 95% mortality during the SPI mortality events. Although SPI was first described in 2003, this study provides the first epidemiologic context for SPI as a widespread health-threat to frogs. For more information contact Dr. Dan Grear: dgrear@usgs.gov.

Tadpole with severe Perkinsea infection, which causes abdominal distention and skin distension and skin redness (Credit: William Barichivich, USGS)

Surveillance for Batrachochytrium salamandrivorans

Between January 2016 and December 2017, the USGS National Wildlife Health Center and Amphibian Research and Monitoring Initiative (ARMI) sampled 10,000 amphibians in 34 U.S. states for *Batrachochytrium salamandrivorans* (*Bsal*). The majority of samples from the eastern and western U.S. were eastern newts (*Notophthalmus viridescens*) and Pacific newts (*Taricha* spp.), respectively. We also tested species from 15 other salamander and frog genera at sites where they were opportunistically available. Because *Bsal* was not detected in any of the samples, our results increase the confidence that *Bsal* is not present in the U.S., but this does not reduce future introduction risk. Continuous efforts to (1) develop mitigation plans in the event of a *Bsal* introduction, (2) increase knowledge of susceptible North American species, and (3) iteratively use surveillance information to direct ongoing monitoring will be necessary to decrease the risk that *Bsal* exists undetected or is introduced into North America. For more information see the Bsal fact sheet or contact Dr. Dan Grear: dgrear@usgs.gov.

A National Strategy for Amphibian Diseases

The USGS National Wildlife Health Center and Amphibian Research and Monitoring Initiative are leading a nationwide study to address patterns, drivers, and management options for amphibian diseases. Disease has been recognized as one of several primary factors in amphibian decline for nearly two decades, but our ability to manage disease in amphibians and other wildlife remains limited. This study will examine the role of community structure and environmental stressors in host-pathogen relationships. Through the involvement of multiple USGS science centers, this study will leverage broad expertise and the large geographic footprint of the USGS Amphibian Research and Monitoring Initiative. Goals of this project are to address knowledge gaps in mechanisms and population impacts of amphibian diseases, as well as to translate them into management strategies that improve survival of amphibians in the presence of pathogens. For more information contact Dr. Mike Adams: mjadams@usgs.gov.

A NWHC biologist collects a skin swab sample from a central newt (*Notophthalmus viridenscens lousianensis*) in Wisconsin. (Credit: Dan Grear, USGS)

WHITE-NOSE SYNDROME

Development of a vaccine for white-nose syndrome

The USGS National Wildlife Health Center is investigating the potential for a fungal vaccine to protect bats against *Pseudogymnoascus destructans* (*Pd*), the cause of white-nose syndrome (WNS). This experimental vaccine uses a recombinant raccoon poxvirus vector (which was successfully used for the sylvatic plague vaccine) and includes two potential antigens, calnexin and serine protease. Initial testing shows promise in reducing morbidity and mortality of bats from WNS. Additional experimental trials are on-going to fine-tune the vaccine and develop feasible field applications. For example, a small field trial was conducted to explore whether a sticky paste that the bats consume while grooming would be effective for delivering vaccines to wild bats. For more information contact Dr. Tonie Rocke: trocke@usgs.gov.

Fluorescent tags were used to identify bats vaccinated for *Pd* in a pilot study. (Credit: Tonie Rocke, USGS)

National surveillance and new strategies to detect white-nose syndrome

Through collaborations with state, federal and tribal wildlife agencies, we continue to implement nationwide surveillance for white-nose syndrome. Since 2014, *Pseudogymnoascus destructans* (*Pd*) has been detected at 117 hibernacula, including 44 sites where clinical signs of the disease were not apparent at the time of sampling. Preliminary characterization of risk factors associated with *Pd* movement suggest that new detections are related to the distance to nearest known *Pd*-positive sites and only mildly associated with the size of a site's hibernating bat population. We are also investigating use of pooled guano samples from bat houses for *Pd* surveillance. This strategy has particularly utility for areas where bat hibernation sites are not known or are difficult to access. For more information contact Dr. Anne Ballmann: aballmann@usgs.gov.

Tables are placed below bat boxes to collect guano from roosting bats during spring/summer. (Credit: Kyle George, USGS)

DID YOU KNOW?

The USGS National Wildlife Health Center (NWHC) receives approximately 1,300 carcasses annually to assist state, federal and tribal natural resource partners to investigate wildlife morbidity and mortality events in the United States. For routine services, the only cost incurred by partners is for collection and shipment of carcasses to NWHC. Analyses for each diagnostic case are initiated within an average of 48 hours following receipt of carcasses, and initial findings are communicated back to the submitter within 24 to 48 hours following necropsy. Additional significant results are then communicated as they become available, and a final case report is sent, on average, 17 business days after necropsy.

Investigation of morbidity and mortality events in wildlife is a collaborative effort, and NWHC thanks AFWA partners for the privilege to assist you in your management decisions. If you are a new partner interested in exploring the services we provide, or if you currently work with us and would like to know more about other capabilities at NWHC that may meet your agency needs, please contact us at nwhc-epi@usgs.gov or visit us at https://www.nwhc.usgs.gov/services/. For more information contact Dr. David Blehert: dblehert@usgs.gov.