Update for the Association of Fish and Wildlife Agencies from the USGS National Wildlife Health Center

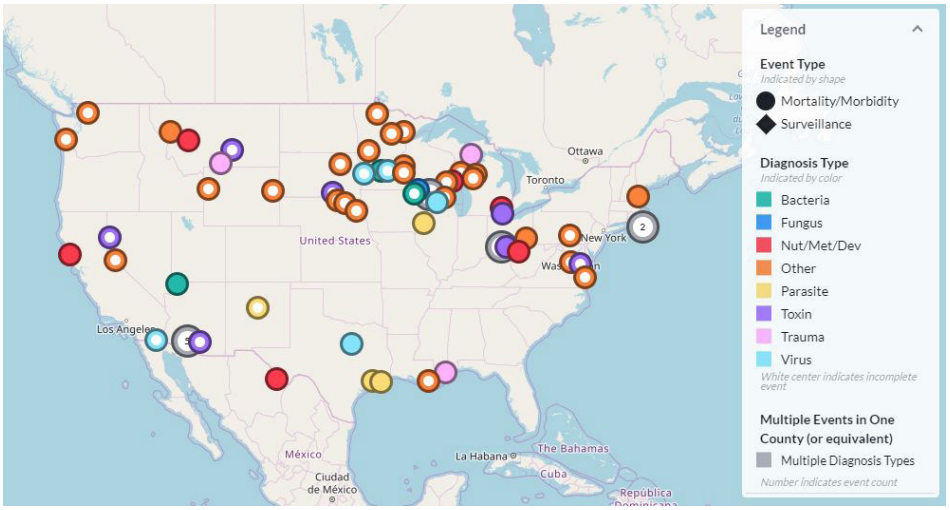
September 2019

Introducing WHISPers 2.0

On July 1, 2019, the USGS National Wildlife Health Center (NWHC) launched an improved version of the Wildlife Health Information Sharing Partnership - event reporting system, WHISPers 2.0 (https://whispers.usgs.gov/home). Built to address needs identified by partners for mapping and sharing basic wildlife mortality information online, WHISPers provides real-time understanding of where and when wildlife disease events occur. WHISPers 2.0 was completely rebuilt on a robust and secure platform to support new functionality.

As a national laboratory, NWHC receives reports of wildlife morbidity/mortality events from State, Federal, Tribal, and other partners involved in managing or studying wildlife and ecosystems from across the country. Since 1981, the NWHC has provided basic summary information on these events, such as county location, species, number affected, and primary cause of the event in "Quarterly Mortality Reports" (available in print or downloadable PDF) to help partners better understand where and when disease outbreaks occurred. In 2015, NWHC released the first version of WHISPers, which made this basic information on thousands of historical wildlife die-offs publicly viewable and searchable online.

WHISPers 2.0 outpaces 1.0 by introducing new features that allow authorized partner users to document, manage, and seek assistance with wildlife morbidity/mortality events involving one or more animals. As the "Event Owner", authorized partner users can contribute to national situational awareness in real time by entering event information directly into WHISPers as they observe wildlife health events occurring on the landscape. In WHISPers 2.0, users can control whether or not the public sees summary event information, update observations as the event unfolds, organize and store detailed event information, as well as share information with colleagues within and across agencies for better communication and event response coordination.



WHISPers 2.0 homepage showing wildlife health events in the conterminous US, June-July 2019.

WHISPers 2.0 will also be used to streamline requests of NWHC's diagnostic services and assistance with wildlife disease issues. Version 2.0 allows NWHC and authorized users to view and collaborate together on WHISPers events to facilitate timely data sharing and communication. Future development plans include additional communication features, report options, and bulk data upload.

NWHC would like to thank the dedicated group of natural resource management professionals who provided guidance during WHISPers development. Now that the site is live, we are inviting other partners to become early adopters. Please contact us at whispers@usgs.gov for more information.

More Information from the NWHC

Visit our website at www.usgs.gov/nwhc and follow us on Twitter @USGSWILDLIFE

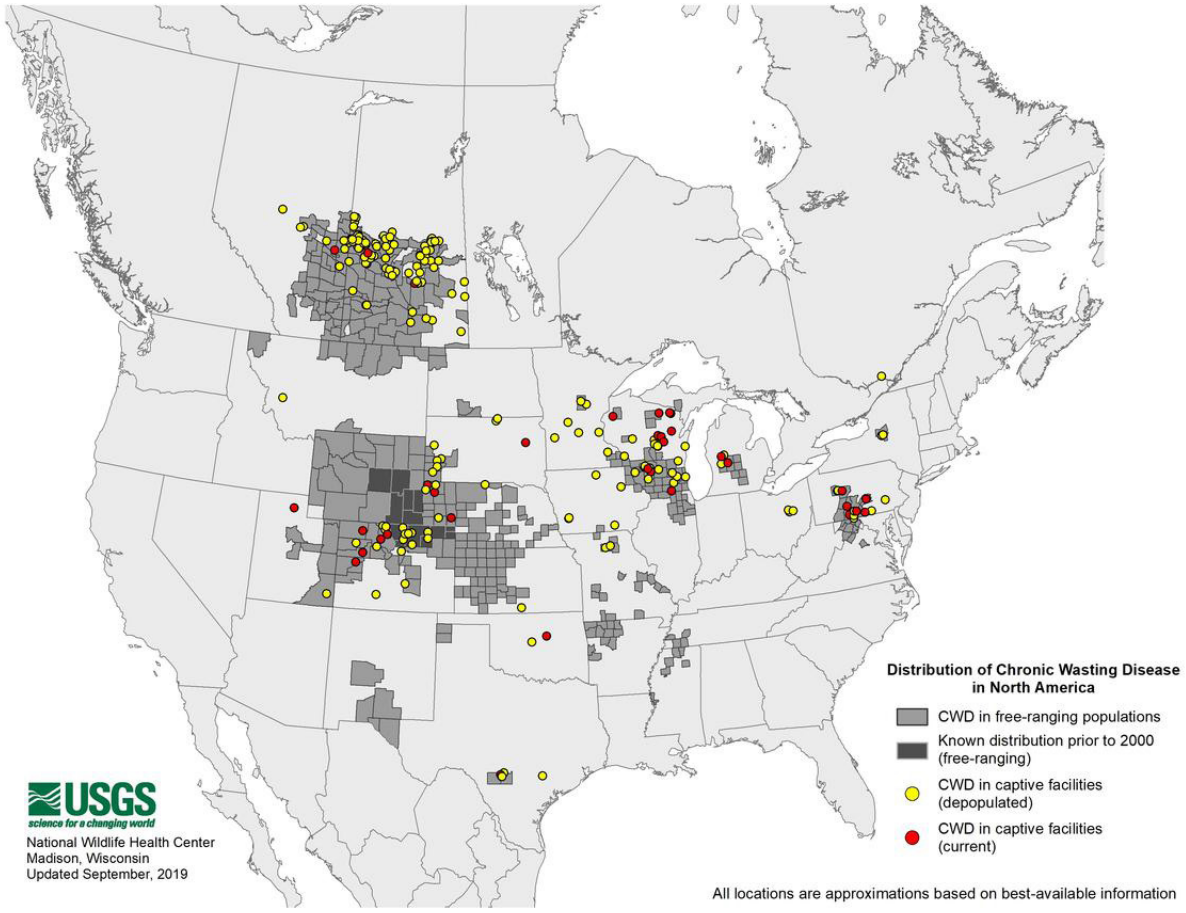
To sign up to receive Newsletters and Wildlife Health Bulletins from the NWHC, please email nwhcoutreachdb@usgs.gov.

Chronic Wasting Disease Expanded Distribution

From January 2018 through August 2019, the documented distribution of chronic wasting disease (CWD) has expanded. In 2018 new detections of CWD in free-ranging cervids occurred in 51 counties from 16 states in the US. In 2019, CWD has been detected in free-ranging cervids in an additional seven counties from five states. The most recent additions include Lincoln County, MT, and Tipton County, TN. The distribution of CWD in captive cervid facilities has also expanded, with 14 new facilities in five states in 2018 and 11 additional facilities in six states in 2019. The most recent report was from an elk farm in Wisconsin (Burnett County). In Canada (2018), CWD was initially detected (free-ranging) in eight Wildlife Management Zones in Saskatchewan and five Wildlife Management Units in Alberta. CWD was detected in six commercial captive facilities in Canada (Alberta, Saskatchewan, and Quebec) in 2018, and three additional facilities (all in Alberta) in 2019. The current CWD distribution map is also available from the USGS National Wildlife Health Center: https://www.usgs.gov/centers/nwhc/science/expanding-distribution-chronic-wasting-disease.

CWD has attracted substantial attention in the 116th U.S. Congress. A total of nine bills (to date) have been filed and are under consideration, including the Chronic Wasting Disease Transmission in Cervidae Study Act (H.R.837 and S.382), the Chronic Wasting Disease Management Act (H.R.1550 and S.689), the Chronic Wasting Disease Research Act (H.R.2081 and S.1326), the DEER Act (H.R.1919 and S.613), and a portion of the ACCESS Act (H.R.1326). CWD also was addressed in the Agriculture Improvement Act of 2018 (H.R.2, "Farm Bill") as a "High Priority Research and Extension Initiative" (Sec. 7209) and "supporting research projects at land-grant colleges and universities … with established deer research programs for the purposes of treating, mitigating, or eliminating chronic wasting disease." Finally, CWD funding was addressed in appropriations bills for both Agriculture and Interior, as passed by the House of Representatives (the Senate has yet to pass similar appropriations). The progress of these bills can be tracked at https://www.congress.gov.

For more information contact: Bryan Richards, brichards@usgs.gov.



Development of Wildlife Disease Forecasts

Early detection and rapid response is critical for reducing spread and impact of a disease epidemic. New technologies are being developed that provide early warning systems for important agricultural and human diseases, either through symptom-based surveillance for early detection or better model predictions for forecasting short-term potential for outbreaks. The NWHC is developing a short-term (one to three month) forecast for avian botulism in waterfowl of the United States. Avian botulism was selected to pilot these forecasts as this disease kills hundreds to thousands of waterfowl each year and the environmental risk factors have been well researched. In addition, the NWHC curates a large existing spatio-temporal dataset on botulism collected in partnership with State, Federal, and Tribal natural resource agencies. The resulting forecasts will provide early warning to decision makers and could enable them to take proactive management actions to reduce or prevent mortality from this disease. For more information please contact: Dr. Dan Grear, dgrear@usgs.gov or Dr. Katie Richgels, krichgels@usgs.gov.

Avian botulism event on the shores of Lake Michigan. Photo courtesy of Damon McCormick.

Effects of *Bd* on Amphibian Survival

USGS National Wildlife Health Center in collaboration with USGS Amphibian Research and Monitoring Initiative (ARMI) recently published a report titled "Effect of amphibian chytrid fungus (*Batrachochytrium dendrobatidis [Bd]*) on apparent survival of frogs and toads in the western USA" in the journal Biological Conservation. The report consolidates several long term data sets from four threatened or endangered ranid frog species (*Rana draytonii*, *R. muscosa*, *R. pretiosa*, and *R. sierrae*) at 14 study sites in California and Oregon and one bufonid toad (*Anaxyrus boreas*) at two study sites in Wyoming and Montana to investigate the effects of disease on individual survival rates. Evaluating the population-level effects of a disease is important for providing wildlife managers with information on the relative importance of the disease on overall population dynamics of a species.

California red-legged frog (*Rana sierrae*). Photo courtesy of Devin Edmonds, USGS.

Despite this, estimating the effects of disease on individual survival rates of amphibians is a difficult task. For amphibian chytridiomycosis (caused by the *Bd* fungus), there are few robust estimates of disease effects on individual survival rates. Our analyses provided evidence that the detection of *Bd* on an individual reduced apparent survival of ranid frogs by ~6-15% depending on species and sex. For toads, this difference was larger, 19% for the Montana population and 55% for the Wyoming population; however, uncertainty surrounding these estimates was large and included zero. Our results indicate that even in the absence of observed large die-offs *Bd* may be having an effect on overall population dynamics of amphibians. Estimating the magnitude of the effects of *Bd* on wildlife populations and what other stressors may mitigate or exacerbate these effects is an important next step toward identifying management actions. For more information please contact: Dr. Robin Russell, rerussell@usgs.gov

Highlights from the 2018/2019 White-nose Syndrome Surveillance Season

The USGS National Wildlife Health Center continues to play a central role in surveillance for white-nose syndrome (WNS) and the causative fungus, *Pseudogymnoascus destructans* (*Pd*). Since 2008, NWHC has tested samples from over 13,000 bats and 5,300 environmental substrates nationwide for the presence of WNS or *Pd*. For the 2018/2019 surveillance season, NWHC evaluated samples collected from 2,633 bats and 967 environmental substrates in 27 states. In all, 2,537 live bats and 72 dead or euthanized bats were tested. WNS was confirmed or suspected in a total of 28 bats while *Pd* was detected in another 41 bats from a total of 15 sites in 11 states. Tested bats belonged to eight species, with tri-colored bats (*Perimyotis subflavus*) and little brown bats (*Myotis lucifugus*) comprising 80% of all positive detections this past season.

Additionally, *Pd* was identified in one or more environmental samples from three hibernacula in three states (NC, OK, and KS); two sites of which also had bats concurrently testing positive for *Pd*. Although environmental samples continue to comprise only a small fraction of new *Pd* detections, this surveillance season all environmental detections originated from environmental swabs rather than sediment samples, which differed from the pattern observed in previous years.

For the 2018/2019 surveillance season, WNS was confirmed for the first time in a western long-eared bat (*Myotis evotis*), increasing the total number of North American bat species confirmed with the disease to 12. Furthermore, WNS was suspected in a fringed myotis (*Myotis thysanodes*) that demonstrated characteristic fluorescence under long-wave ultraviolet light and tested positive for *Pd* by PCR.

Since its 2016 emergence in Washington state, WNS was detected for the first time east of the Cascade Mountains in Kittitas County. The fungus was also detected for the first time in North Dakota (Mercer County) on a single little brown bat captured on the landscape in late May with no signs of disease, and *Pd* was suspected on bats at two *Myotis* spp. summer roosts in northern California (Plumas County). Significant spread of *Pd* was also reported this past surveillance season in multiple counties in central and southern Texas. The total number of states with confirmed cases of WNS, 33, remains unchanged from last year, while the number of states reporting *Pd* in the absence of clinical disease is now five (CA, MS, ND, TX, and WY). Of note, an unclassified species of *Pseudogymnoascus* sp. (not *Pd*) was detected on a skin swab from a hibernating little brown bat observed with fungal growth on its skin at a Montana cave. The significance of this finding remains unclear since histopathology was not available.

For more information please contact: Dr. Anne Ballmann, aballmann@usgs.gov.

Scientists collecting environmental samples and samples from a bat for *Pd* surveillance.

Model-based Surveillance for *Pd*

The USGS National Wildlife Health Center in collaboration with the University of Wisconsin, Kansas State University, and an advisory team comprised of various Federal and State agency partners are leading efforts to develop a model-based, strategic *Pd* surveillance sampling design for the upcoming winter season. The benefits of a model-based approach include improving the efficiency of surveillance over random sampling by targeting high risk areas, making better use of limited resources while reducing the time to find new hotspots of *Pd* on the landscape as it spreads westward, and allowing for more accurate inferences to pathogen presence/absence by leveraging all available information on the growth and spread of *Pd* from on-going surveillance efforts to facilitate more impactful management actions at the regional or national scale.

Additionally, a weighted surveillance calculator tool is being developed similar to that used for chronic wasting disease surveillance in white-tailed deer that accounts for the differences in *Pd* detectability observed among sample types and time of collection. Managers will be able to input what sample types they intend to collect and determine the necessary number of each sampling combination in order to achieve the desired level of confidence for *Pd* detection within their state.

For more information please contact: Dr. Anne Ballmann, aballmann@usgs.gov or Dr. Robin Russell, rerussell@usgs.gov.

Evaluation of a New Sampling Method for *Pd* Surveillance

The USGS National Wildlife Health Center is evaluating the use of guano collected at above-ground summer roosts of susceptible bat species as another potential tool for managers in their quest to detect the spread of *Pseudogymnoascus destructans* (*Pd*). Currently, surveillance primarily involves collecting skin swabs or environmental substrate at underground sites during winter hibernation. However, there are regions where hibernacula are unknown or inaccessible, particularly in the western United States. Results of preliminary field and laboratory experiments indicated that analyzing pooled guano collected at summer roosts may be a promising alternative surveillance strategy for early detection of *Pd* as it spreads to new regions.

We conducted pilot field studies during summers 2018 and 2019 in states along the leading edge of the pathogen's distribution to provide proof-of-concept for this sampling strategy. Sites that were within 200 km of the nearest *Pd* detection and that contained *Myotis* species were targeted. Partners were instructed to collect fresh guano after a four-week accumulation period starting in mid-May, shortly after bats started to arrive from hibernation, to optimize detection probability based on preliminary experiments. Although *Pd* was not detected at any of the field sites during summer 2018, several challenges were encountered that led us to repeat the field trials in 2019, with improvements to site selection criteria and sampling guidance. While analysis is still ongoing, we have been able to detect *Pd* in several of our summer study sites in 2019. Given the time and cost of processing samples, we are still evaluating the benefits of this sampling method for potential inclusion in national surveillance efforts. For more information please contact: Kyle George, kgeorge@usgs.gov.

Examples of guano "traps" deployed by partners for pilot field studies.

White-nose Syndrome Diagnostic Harmonization

White-nose syndrome (WNS) in bats is caused by the fungal pathogen *Pseudogymnoascus destructans* (*Pd*). Since its initial discovery the pathogen has spread rapidly and caused staggering population-level impacts on many species of hibernating North American bats. Managers depend on consistent laboratory results to make decisions, but currently diagnostic testing for *Pd* is conducted by multiple agencies and institutions that lack a shared governance for setting testing standards and overseeing reporting. Scientists at the USGS National Wildlife Health Center, in cooperation with the WNS National Response Team Diagnostic Working Group, the U.S. Fish and Wildlife Service (USFWS), and State and Federal resource managers, are building consensus around how *Pd* diagnostic tests should be conducted, and how results should be interpreted and communicated. To date, this effort has involved coordinating voluntary participation in assay performance testing, collating and analyzing the testing data, and facilitating Working Group conversations regarding common language for classifying *Pd* qPCR results that will be incorporated into a revised WNS case definition. Additional steps will further formalize a WNS Diagnostic Laboratory Network by initiating voluntary *Pd* qPCR proficiency testing (first round to take place in the Spring of 2020) and compiling newly agreed-upon testing and communication standards into a WNS Laboratory Best Practices Handbook that will be available publicly. Whether for people, domestic animals, or wildlife, confidence in diagnostic results is a cornerstone of disease management. We hope that this work will improve the confidence of management agencies in reported *Pd* diagnostics, while also serving as an example of national diagnostic coordination for other, non-reportable, wildlife diseases.

For more information please contact: Katrina Alger kalger@usgs.gov.

Development of Vaccine for White-nose Syndrome

USGS National Wildlife Health Center scientists are developing several topically applied vaccine candidates against the fungus, *Pseudogymnoascus destructans* (*Pd*), that causes white-nose syndrome. Several vaccine candidates have been tested to determine which provides the best protection to hibernating bats. Scientists have conducted animal trials in hibernating, captive little brown bats (*Myotis lucifugus*), to ensure that the vaccines are safe and effective. After careful review of potential environmental impacts, the U.S. Department of Agriculture Center for Veterinary Biologics recently approved the experimental vaccines for field testing in wild bats. Scientists will deliver the oral vaccines to bats residing in hibernacula known to harbor *Pd* and monitor survival during and after hibernation. Once developed, the goal is to use the vaccine to confer disease resistance and to safeguard vulnerable bat populations.

For more information please contact: Dr. Tonie Rocke, trocke@usgs.gov.

We are Here to Assist

The USGS National Wildlife Health Center assists State, Federal and Tribal natural resource partners in the investigation of 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 the 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. The NWHC can provide management recommendations as well as assist partners with communication and messaging during wildlife mortality events.

Investigation of morbidity and mortality events in wildlife is a collaborative effort, and the NWHC thanks AFWA partners for allowing us 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 the NWHC that may meet your agency needs, please contact us at nwhc-epi@usgs.gov or visit our Diagnostic Services page at www.usgs.gov/nwhc/services.