



**Report to the Fish and Wildlife Health Committee of the  
Association of Fish and Wildlife Agencies from the  
USGS National Wildlife Health Center**

**September 13, 2017**

*The USGS National Wildlife Health Center provides national leadership to safeguard wildlife and ecosystem health through dynamic partnerships and exceptional science.*

## Contents

EMERGING WILDLIFE DISEASE SURVEILLANCE AND WILDLIFE DISEASE UPDATES	3
Surveillance for Invasive Pathogens to Protect our Nation’s Amphibians	3
National Surveillance Continues to Detect Spread of White-Nose Syndrome in Bats	3
Avian Influenza 2016/2017 Update	4
Avian Cholera Winter 2016/2017 National Summary	5
Canine Distemper in Wisconsin	5
Large Die-Off of Red-eared Sliders in Louisiana caused by Trematode	6
Salmonellosis in Florida Cardinals	6
DEVELOPING WILDLIFE HEALTH CAPACITY AND TOOLS	6
WHISPers: Building a National Wildlife Health Database	6
WILDLIFE HEALTH RESEARCH UPDATES	7
Experimental Research on Bat Rabies Vaccine	7
Sylvatic Plague Vaccine for Prairie Dogs	7
Snake Fungal Disease: Causative Fungus Also Found in European snakes	8
Understanding Outcomes of Monkeypox Virus Infection in African Rope Squirrels	8
Emerging Amphibian Disease Can Further Jeopardize Frogs	8
Engineered Reptile Skin Helps in Study of Disease of Endangered Green Turtles	9
SERVICES TO PARTNERS AND OTHER INFORMATION	9
Disease Investigation Services	9
Disease Webinar Series Sponsored by USGS Ecosystems Mission Area and AFWA	9
Fact Sheet about the USGS National Wildlife Health Center	10
Request for Wildlife Mortality and Morbidity Event Reporting	10

## EMERGING WILDLIFE DISEASE SURVEILLANCE AND WILDLIFE DISEASE UPDATES

### ***Surveillance for Invasive Pathogens to Protect our Nation's Amphibians***

On-going national wildlife disease surveillance is essential for early detection and rapid response to diseases that threaten the lives of wildlife, humans, and livestock. *Batrachochytrium salamandrivorans* (*Bsal*) is an emerging fungal pathogen that has decimated populations of some salamander species in Europe. Salamanders contribute to forest health through invertebrate predation that results in increased litter retention and carbon capture in the soil. The U.S. has the highest biodiversity of salamanders in the world; the translocation of *Bsal* to the U.S. could result in ecosystem disruption in the many regions where salamanders reside.

In 2016, the USGS National Wildlife Health Center (NWHC) and the [USGS Amphibian Research and Monitoring Initiative](#) conducted a spatial risk analysis to determine where *Bsal* would most likely be introduced to the U.S. and which regions of the country would be the most impacted. The risk assessment was used to direct a coordinated collection and analysis of approximately 9,000 samples from 49 amphibian species in 35 states to determine whether the pathogen had already been introduced. All samples were negative for *Bsal*. Our surveillance effort increases the confidence that *Bsal* is not present in the U.S., but does not eliminate the risk that *Bsal* is present and undetected nor reduce risk of future introduction. In the future, the NWHC will begin development of methods to test the environment for *Bsal* and other chytrid fungi. These methods will allow for more efficient and widespread sampling by reducing the need to capture animals to determine pathogen presence and will also have potential applicability to other pathogens. For additional information on *Bsal*, please see this [Wildlife Health Bulletin](#) and a USGS fact sheet titled "[Early action to address an emerging wildlife disease.](#)" For questions regarding *Bsal* surveillance, please contact Daniel Gear, 608-270-2478, [drgear@usgs.gov](mailto:drgear@usgs.gov), or Natalie Nguyen, [ntnguyen@usgs.gov](mailto:ntnguyen@usgs.gov).

### ***National Surveillance Continues to Detect Spread of White-Nose Syndrome in Bats***

The USGS National Wildlife Health Center (NWHC) continues to assist State and Federal wildlife agencies nationwide with early detection of *Pseudogymnoascus destructans* (*Pd*), and to address specific research priorities identified by partners in conjunction with the [White-Nose Syndrome National Plan](#). During annual bat population surveys, participating state agencies collect swabs of bat skin, guano, hibernaculum sediment, and environmental substrate. If clinical signs of white-nose syndrome (WNS) are observed in the population, carcasses or wing biopsies from affected bats are collected for diagnostic testing.

Since winter 2013/2014, NWHC has evaluated samples from target species of bats and the environment at 303 unique hibernacula surveyed nationwide. These samples have resulted in the detection of *Pd* at 118 hibernacula of previously unknown *Pd* status from 16 states, including 44 sites where there was no physical or behavioral evidence of WNS observed in the bat populations. In addition, NWHC evaluated samples from bats trapped at more than 50 above-ground roost sites or foraging pathways during spring and early summer in areas where access or knowledge of winter hibernacula is limited. More than 90 percent of all detections of *Pd* originated from samples collected from bats rather than from environmental substrates collected inside of hibernacula. Data analysis and modeling of risk factors associated with *Pd* movement from data collected during the past three years of the project are currently underway.

This past winter (2016/2017), WNS was confirmed for the first time in Nebraska (Cass County) and Oklahoma (Delaware County) where *Pd* was first detected in 2015. These findings increase the number of states with confirmed cases of WNS to 31, while the number of affected Canadian provinces remains at five. Alabama reported the first confirmation of WNS in a southeastern myotis (*Myotis austroriparius*) and Washington reported the first confirmation of WNS in a Yuma myotis (*M. yumanensis*) collected from the same county (King) where a little brown bat (*M. lucifugus*) with WNS and a silver-haired bat (*Lasionycteris noctivagans*) with *Pd* were detected in spring 2016. The search for environmental reservoirs of the fungus in Washington and other northwestern states is on-going. Finally, Texas announced detection of *Pd* at hibernacula in six counties (Childress, Collingsworth, Cottle, Hardeman, King, and Scurry) and on two new bat species: cave myotis (*M. velifer*) and the western sub-species of Townsend's big-eared bat (*Corynorhinus townsendii townsendii*). No clinical signs or mortality were observed in the bat populations at the Texas sites. Mississippi is the only other state where *Pd* has been detected in hibernacula in the absence of confirmed WNS to date. Northern long-eared bats (*M. septentrionalis*), little brown bats (*M. lucifugus*), and tricolored bats (*Perimyotis subflavus*) remain the species that most often test positive for *Pd*.

Despite active national surveillance efforts to detect the spread of WNS, the 2016 detection of WNS in Washington State illustrates the ongoing importance of investigating wildlife mortality events as part of a comprehensive wildlife disease surveillance strategy, and we encourage wildlife managers to report unusual bat mortality or bats displaying clinical signs suggestive of WNS to the NWHC for further investigation. We can also answer questions about designing WNS surveillance and response plans relevant to your state and help with testing samples collected as part of opportunistic or targeted surveillance efforts in accordance with the national *Pd* surveillance strategy. Tribal, State, and Federal agencies with questions about ongoing surveillance efforts, or who may wish to participate, should contact Dr. Anne Ballmann (608-270-2445, [aballmann@usgs.gov](mailto:aballmann@usgs.gov)).

A recent publication entitled “[Dispersal hazards of \*Pseudogymnoascus destructans\* by bats and human activity at hibernacula in summer](#)” by Anne Ballmann and others resulted from a study done in 2012 in which scientists collected swabs from bat wings, cave walls, and equipment used in and near the study sites in Kentucky, Indiana, Ohio, Tennessee, and Virginia. They also collected guano from individual bats and floor sediment in underground summer roost sites. They found that bats occupying hibernation sites in summer can harbor *Pd* on their skin, and that *Pd* is more readily detectable in their guano. More findings are summarized in a USGS News Release: [Deadly fungus affecting hibernating bats could spread during summer](#).

Please visit [www.whitenosesyndrome.org](http://www.whitenosesyndrome.org) for more information about the national multi-agency WNS response effort. A USGS fact sheet titled “[White-Nose Syndrome in North American Bats – USGS updates](#)” is available online. For paper copies, please contact Gail Moede Rogall, [gmrogall@usgs.gov](mailto:gmrogall@usgs.gov). Also, a WNS poster and handout are available at <https://www.whitenosesyndrome.org/resource/white-nose-syndrome-poster-available-your-use>.

### **Avian Influenza 2016/2017 Update**

The U.S. interagency surveillance program for the detection of highly pathogenic avian influenza (HPAI) virus in wild birds continued in the 2016-2017 surveillance year. Agencies that comprise the *Interagency Steering Committee for Surveillance for HPAI in Wild Birds* include USDA Animal and Plant Health Inspection Service, U.S. Geological Survey, U.S. Fish and Wildlife Service, Centers for Disease Control and Prevention, the National Flyway Council, and numerous state agencies. Between July 1, 2016 and February 1, 2017 a total of 33,695 birds were sampled, with 96 percent of those samples coming from dabbling ducks. Pursuant to this surveillance effort, HPAI H5N2 was detected in two mallards (*Anas*

*platyrhynchos*) including one from Fairbanks-Northstar Borough, AK, in August 2016, and one from Fergus County, MT, in December 2016. In each case, the HPAI virus was the Eurasian-American lineage H5N2 (clade 2.3.4.4) that was first detected in North America in December 2014.

Globally, HPAI H5 subtype detections have continued in wild and domestic birds in Europe, Asia, and Africa during the fall and winter of 2016-2017 with more than 40 countries reporting outbreaks to the World Organisation for Animal Health (OIE). As of March 13, 2017, there have been 576 reported outbreaks in poultry, with nearly seven million poultry destroyed worldwide. Additionally, during the same timeframe there were 638 reported outbreaks involving more than 75 species of free-ranging or captive wild birds (618 of these were HPAI H5N8 viruses). In January 2017, a mortality event involving more than 1,200 white-winged terns (*Chlidonias leucopterus*) and other wild bird species was reported in Uganda; HPAI H5N8 was isolated from numerous birds from this outbreak. At least five different HPAI H5 subtypes have been detected during these outbreaks worldwide. For additional information on the current global HPAI situation, please reference the following [OIE Situation Report](#). **Contact:** Hon Ip, 608-270-2464, [hip@usgs.gov](mailto:hip@usgs.gov).

### **Avian Cholera Winter 2016/2017 National Summary**

The USGS National Wildlife Health Center (NWHC) investigated eight wildlife mortality events between November 1, 2016 and March 1, 2017 in which avian cholera (caused by the bacterium *Pasteurella multocida*) was either suspected or confirmed as the causative etiologic agent. Five additional events were reported by State wildlife management agencies. The 13 events were spread over ten states (California with four events, and one each in Idaho, Illinois, Missouri, Montana, Nebraska, New Mexico, Oregon, Texas, and Washington) and three flyways (Mississippi, Central, and Pacific). The estimated mortality reported to date in these events ranges from less than ten to over 6,500 birds. The three largest events include Canyon County, Idaho (beginning February 2017) with an estimated mortality of 6,500 dabbling ducks as of March 6, 2017; Yolo County, California (January 2017) with an estimated mortality of 3,750 (primarily American coot [*Fulica americana*] and a small number of dabbling ducks); and McNary National Wildlife Refuge (NWR) and surrounding areas in Washington (February 2017), with an estimated mortality exceeding 2,000 birds. The McNary NWR event primarily involved mallard ducks (*Anas platyrhynchos*), but also included other dabbling ducks, herons, owls (barn owl [*Tyto alba*] and great horned owl [*Bubo virginianus*]), and raptors (northern harrier [*Circus cyaneus*], red-tailed hawk [*Buteo jamaicensis*], and bald eagle [*Haliaeetus leucocephalus*]). More information about avian cholera can be found on the [NWHC website](#). **Contact:** NWHC Field Epidemiology Team, 608-270-2480, [NWHC-epi@usgs.gov](mailto:NWHC-epi@usgs.gov).

### **Canine Distemper in Wisconsin**

Beginning mid-March 2017, the Wisconsin Department of Natural Resources (WI DNR) received reports of unusual mortality involving raccoon (*Procyon lotor*), gray fox (*Urocyon cinereoargenteus*), and striped skunk (*Mephitis mephitis*) occurring in two counties in southeastern Wisconsin. Two raccoons, a gray fox, and a striped skunk were submitted to the NWHC, with subsequent samples tested at the Wisconsin Veterinary Diagnostic Laboratory and the Wisconsin State Laboratory of Hygiene. NWHC scientists determined that canine distemper virus was the cause of death (with rabies ruled out). The WI DNR continued to receive reports of unusual small mammal mortality through early June, including cases in central and northern Wisconsin counties. Similar suspected distemper outbreaks in the spring of 2017 involving raccoons have been reported and investigated by the Minnesota Department of Natural Resources (six counties) and Virginia Department of Game and Inland Fisheries (two counties).

Distemper is a highly contagious, systemic, viral disease that infects a wide variety of mammalian species with domestic dogs considered to be the natural reservoir species. The disease is common and can cause significant outbreaks in susceptible wildlife species. Vaccination is essential for the prevention of disease

and outbreaks in domestic dogs. Because the clinical signs of distemper can mimic rabies, contact with sick animals should be avoided. People and their domestic pets/livestock should avoid contact with sick or dead wildlife and contact the appropriate wildlife officials in their area for further guidance. **Contact:** NWHC Field Epidemiology Team, 608-270-2480, [NWHC-epi@usgs.gov](mailto:NWHC-epi@usgs.gov)

### ***Large Die-Off of Red-eared Sliders in Louisiana caused by Trematode***

An extensive mortality event involving red-eared sliders (*Trachemys scripta elegans*) occurred in multiple locations across Acadia Parish in southern Louisiana. Mortality was first reported in February 2017 with the number of dead sliders likely in the hundreds. Morbid sliders were observed swimming in circles and exiting the water onto levees. They were lethargic and unable to flee when approached and had signs of respiratory disease, including clogged nares and open mouth, shallow breathing. Healthy fish, crawfish, birds, frogs, and salamanders have been observed in the ponds with affected sliders. The NWHC examined several dead sliders submitted by the Louisiana Department of Wildlife and Fisheries and found severe pathology associated with a trematode in the genus *Spirorchis*. Internal lesions were found in brain, lung, spleen, and vascular system tissue associated with granulomas surrounding large numbers of trematode eggs. *Spirorchis* trematodes of turtles have a complex life cycle with turtles as the definitive host and snails as an intermediate host. Turtles examined at the Southeast Cooperative Wildlife Disease Study (SCWDS) and the Louisiana State University Animal Disease Diagnostic Laboratory found similar evidence of trematode infection. *Spirorchis* trematodes are common parasites of North American turtles; it is currently unknown why they have caused such an extensive mortality event in this instance. **Contact:** NWHC Field Epidemiology Team, 608-270-2480, [NWHC-epi@usgs.gov](mailto:NWHC-epi@usgs.gov).

### ***Salmonellosis in Florida Cardinals***

Citizens throughout Florida's Panhandle region (Jefferson, Santa Rosa, Duval, and Holmes Counties) have reported northern cardinal (*Cardinalis cardinalis*) mortalities. Clinical signs have included lethargy, limited flight, and inactivity on the ground for a few hours before death. While more than 50 cardinals have been reported dead since February 1, 2017, other common passerine songbirds have been largely unaffected. Mortality events have been primarily reported by citizens with backyard birdfeeders. The NWHC recently identified salmonellosis as the cause of death for two cardinals found dead at a Duval County backyard feeder and submitted to NWHC by the Florida Fish and Wildlife Conservation Commission. Salmonella transmission at birdfeeders typically occurs through direct bird-to-bird contact, contact with contaminated environments, or contaminated food. High densities of birds at feeders can increase the risk of salmonella outbreaks. Actions to reduce risk of infectious disease transmission at feeders include placing additional feeders to reduce crowding, routinely cleaning birdfeeders with a 10% bleach solution, and removing waste seed that accumulates under feeders. **Contact:** NWHC Field Epidemiology Team, 608-270-2480, [NWHC-epi@usgs.gov](mailto:NWHC-epi@usgs.gov).

## **DEVELOPING WILDLIFE HEALTH CAPACITY AND TOOLS**

### ***WHISPers: Building a National Wildlife Health Database***

The Wildlife Health Information Sharing Partnership – event reporting system (WHISPers) contains over 40 years of information (including locations, species involved, magnitude, and causes) regarding wildlife morbidity and mortality events in the United States. These data, collected by State, Federal and Tribal natural resource agency partners, and managed by the NWHC, represent the nation's largest collection of information about wildlife disease events. WHISPers data have been used to document disease spread, examine disease trends, provide in-house situational awareness regarding on-going disease events, and inform laboratory and field response to these events. Disease events included in WHISPers range from common recurring wildlife disease threats to emerging concerns (WNS, snake fungal disease, etc.), and

include biological threats which may be, or have been, a threat to human health (West Nile virus, rabies, tularemia, etc.) or agriculture (highly pathogenic avian influenza, virulent Newcastle Disease, etc.).

In the coming year, WHISPers functionality will be expanded to provide State, Federal, and Tribal partner agencies with tools to directly input, manage, and analyze data regarding wildlife health events and designed surveillance investigations. WHISPers will also serve as a platform for collaboration as partner agencies will have the ability to input data about an event as it unfolds and set automatic notifications for select diseases. A user-friendly query tool will allow users (public and NWHC partners) to query and export WHISPers event data. Data visualization tools will include interactive maps and summary tools such as histograms and line graphs. These enhancements will allow for timely entry and monitoring of event information, enhancing situational awareness capabilities for the wildlife health and biosurveillance communities.

NWHC also recently began collaborating with the Department of Homeland Security - Office of Health Affairs - National Biosurveillance Integration Center (NBIC) to develop advanced WHISPers functionalities including a data portal to the Biosurveillance Ecosystem (BSVE). BSVE is a virtual biosurveillance analyst workbench being developed by NBIC and the Defense Threat Reduction Agency that integrates multiple data streams (not all health related) and provides customized data analytics and visualizations to support informed decision making within the national biosurveillance and biodefense communities. The incorporation of publicly available WHISPers data into this system will fill a critical data gap regarding wildlife diseases, which are the root of, or precursor to, the majority of emerging diseases of humans. **Contact:** Neil Baertlein, 608-270-2460, [nbaertlein@usgs.gov](mailto:nbaertlein@usgs.gov).

## **WILDLIFE HEALTH RESEARCH UPDATES**

### ***Experimental Research on Bat Rabies Vaccine***

Rabies remains a significant and costly zoonotic disease worldwide. While control of canine rabies can significantly diminish the threat to human health, spillover of rabies and related lyssaviruses from bats into terrestrial animals and humans continues to be an important issue. NWHC scientists are developing a novel rabies vaccine, using raccoon poxvirus as a viral vector and a computer designed antigen. Initial testing was conducted in wild-caught big brown bats. Results from this study could be adapted to target other bat species and may be directly applicable toward control of vampire-bat associated rabies in Mexico and Central and South America. **Contact:** Tonie Rocke, 608-270-2451, [trocke@usgs.gov](mailto:trocke@usgs.gov).

### ***Sylvatic Plague Vaccine for Prairie Dogs***

Laboratory studies have demonstrated that oral vaccination of prairie dogs against plague using raccoon pox-vectored vaccine is feasible, resulting in significant protection against challenge with *Yersinia pestis*, the bacterium that causes sylvatic plague. The Sylvatic Plague Vaccine (SPV) Subcommittee, under the direction of the Executive Committee of the Black-footed Ferret Recovery Implementation Team, is continuing its work to complete development and delivery of the sylvatic plague vaccine as a management tool to combat plague in prairie dogs and promote the recovery of the endangered black-footed ferret. Field trials completed by Colorado Parks and Wildlife and the NWHC in 2012 confirmed the safety of the vaccine in wild prairie dogs and non-target animals. NWHC and numerous Federal, State, and Tribal partners have recently completed field trials in seven western states (Arizona, Colorado, Montana, South Dakota, Texas, Utah, and Wyoming) to assess vaccine efficacy in free-ranging prairie dogs. Analysis of data and samples demonstrated that relative abundance of prairie dogs in general was

higher on SPV treated sites and survival was improved during plague outbreaks, suggesting SPV may be useful as a management tool to advance prairie dog conservation and possibly the recovery of the endangered black-footed ferret. Additional field trials to determine optimal use of SPV began in 2016 in western states and continued in 2017. Dr. Tonie Rocke and others recently published [SPV field trial results](#) in the journal *EcoHealth*, which was accompanied by a USGS [media release](#). **Contact:** Tonie Rocke, 608-270-2451, [trocke@usgs.gov](mailto:trocke@usgs.gov).

### ***Snake Fungal Disease: Causative Fungus Also Found in European snakes***

In the past decade, snake fungal disease (SFD) has been increasingly recognized as an important emerging disease of wild North American snakes with potential population-level impacts. Recently, SFD was discovered in wild snakes in Europe. The fungus *Ophidiomyces ophiodiicola* causes SFD, but little is known about the pathogen or ecology of the disease. USGS microbiologist Jeff Lorch co-authored a [recent study](#), led by the [Zoological Society of London](#), that involved an analysis of samples collected from wild snakes in the United Kingdom and the Czech Republic between 2010 and 2016. This study confirmed the presence of the pathogen and SFD in Europe for the first time. The analysis found that the fungus strains from Europe are different to those previously identified in North America – suggesting that rather than being introduced across the Atlantic, or vice versa, the disease could have been present in European snakes for some time. A high diversity of snake species are susceptible to *O. ophiodiicola* infection (over 20 species), including members from at least four of the five snake families that occur in North America. The NWHC reviewed cases of infection by *O. ophiodiicola* (see [Lorch et al. 2016](#)) and reported the pathogen in wild snakes throughout the eastern half of the United States. In Europe, evidence of SFD was found in grass snakes from the U.K. and a single dice snake from the Czech Republic. Snake populations have varying responses to *O. ophiodiicola*. While some populations have experienced severe infections and declines in association with the disease, other populations exhibit predominantly mild infections without obvious detriment. Changing environmental conditions, such as climate change and habitat fragmentation, may exacerbate the disease and be responsible for its recent emergence in some areas. **Contact:** NWHC Field Epidemiology Team, 608-270-2480, [NWHC-epi@usgs.gov](mailto:NWHC-epi@usgs.gov).

### ***Understanding Outcomes of Monkeypox Virus Infection in African Rope Squirrels***

Monkeypox virus (MPXV) is a virus closely related to Smallpox virus that causes a similar, though less severe, disease in humans in Central and West Africa. This disease is particularly dangerous for children and people with compromised immune systems and the mortality rate is estimated to be about 10%. Unlike Smallpox virus, MPXV is primarily transmitted to humans from animals, but it is not known which species commonly carry and spread this virus. Rope squirrels in the genus *Funisciurus* have previously been linked to the virus in Central Africa. NWHC scientists conducted experimental trials to learn more about MPXV infections in rope squirrels and results have been [recently published](#). Experimentally infected rope squirrels became very ill from the infection and shed large amounts of virus in their bodily fluids, suggesting they could be a potential reservoir of infection for humans. Results from the study will help public health doctors and epidemiologists understand the potential risks of contacting rope squirrels for local populations in Africa and will help disease ecologists understand how MPXV is maintained and transmitted between animals and to humans. **Contact:** Elizabeth Falendysz, 608-270-2406, [efalendysz@usgs.gov](mailto:efalendysz@usgs.gov).

### ***Emerging Amphibian Disease Can Further Jeopardize Frogs***

Emerging infectious diseases have an important role in the worldwide decline of amphibian populations along with habitat destruction and degradation. Severe Perkinsea infections (SPI) in tadpoles might represent the third most common infectious disease of anurans (frogs and toads) after ranavirus infections and chytridiomycosis. USGS scientists from the NWHC and the Amphibian Research and Monitoring Initiative (ARMI) studied 247 anuran die-offs of numerous species in 43 states from 1999 through 2015 and found that SPI caused 21 of the mass mortalities in 10 states spanning from Alaska to Florida. Severe Perkinsea infections were systemic and led to multi-organ failure and death. Phylogenetic analysis

demonstrated that SPI is associated with a phylogenetically distinct group of Perkinsea. The findings of this study suggest that this virulent Perkinsea is an important pathogen of frogs in the United States. Given its association with mortality events and tendency to be overlooked, the potential role of this emerging pathogen in amphibian declines across a broad geographic area warrants further investigation. The title of the study recently published in Scientific Reports is “[Pathogenic lineage of Perkinsea associated with mass mortality of frogs across the United States.](#)” **Contact:** Marcos Isidoro-Ayza, 608-270-2369, [marcos.isidoro.ayza@gmail.com](mailto:marcos.isidoro.ayza@gmail.com)

### ***Engineered Reptile Skin Helps in Study of Disease of Endangered Green Turtles***

Fibropapillomatosis (FP) is a tumor disease of marine turtles associated with Chelonid herpesvirus 5 (ChHV5) that has historically been resistant to growth in tissue culture. In an international collaboration, NWHC scientists and others engineered turtle skin in order to grow ChHV5, a tumor disease affecting green turtles worldwide but particularly those in Hawaii, Florida, and Brazil. FP in turtles causes disfiguring tumors on the skin, eyes, and mouth as well as internal tumors. The virus also harms turtles’ immune systems, leading to secondary infections, emaciation and often death. Examining how ChHV5 grows in turtle skin brings researchers closer to fighting viral diseases that threaten imperiled species. The scientists used cells from tumors and normal skin from turtles to reconstruct the complex three-dimensional structure of turtle skin, allowing growth of ChHV5 in the lab. Growing the virus gave scientists an opportunity to observe virus replication in unprecedented detail. Although the existence of ChHV5 has been known for more than 20 years, the inability to grow the virus in the laboratory hampered understanding of how it causes tumors and the development of blood tests to detect the virus. The USGS partnered with the University of Hawaii, the National Oceanic and Atmospheric Administration and the University of Zurich on the new study titled “[In-vitro replication of Chelonid herpesvirus 5 in organotypic skin cultures from Hawaiian green turtles](#)” ([USGS news release](#)). **Contact:** Thierry Work, 808-792-9520, [thierry\\_work@usgs.gov](mailto:thierry_work@usgs.gov)

## **SERVICES TO PARTNERS AND OTHER INFORMATION**

### **Disease Investigation Services**

To request diagnostic services or report wildlife mortality, please contact the NWHC at 608-270-2480 or by email at [NWHC-epi@usgs.gov](mailto:NWHC-epi@usgs.gov), and a field epidemiologist will be available to discuss the case. To report wildlife mortality events in Hawaii or Pacific Island territories, please contact the Honolulu Field Station at 808-792-9520 or email Thierry Work at [thierry\\_work@usgs.gov](mailto:thierry_work@usgs.gov). Further information can be found at <http://www.nwhc.usgs.gov/services/>.

### **[Wildlife Mortality Reporting and Diagnostic Services Request Worksheet](#)**

To view, search, and download historic and ongoing wildlife morbidity and mortality event records nationwide visit the Wildlife Health Information Sharing Partnership event reporting system (WHISPers) online database at <http://www.nwhc.usgs.gov/whispers/>

### **Disease Webinar Series Sponsored by USGS Ecosystems Mission Area and AFWA**

USGS and the [Association for Fish and Wildlife Agencies](#) co-host a monthly webinar series on fish and wildlife diseases. The purpose of this series is to keep partners informed about our current disease research and discuss how USGS science can support disease management efforts. Past Webinar topics include CWD, Avian Influenza, *Bsal*, WNS, Plague, Fish Diseases, and Online Tools. USGS Ecosystems Mission Area Web site: <https://www2.usgs.gov/ecosystems/disease/disease.html#webinars>

### **Fact Sheet about the USGS National Wildlife Health Center**

The fact sheet titled [USGS National Wildlife Health Center: Advancing Wildlife and Ecosystem Health](#) gives readers an overview of the NWHC, including a brief history of its formation, current capabilities, science branches, disease surveillance and science highlights. It is available [online](#) and in paper copies.

**Contact:** Gail Moede Rogall, 608-270-2438, [gmrogall@usgs.gov](mailto:gmrogall@usgs.gov)

To be added to the NWHC list to receive [Wildlife Health Bulletins](#), please contact Gail Moede Rogall at [gmrogall@usgs.gov](mailto:gmrogall@usgs.gov)

### **USGS Wildlife Health Information on Twitter and images on Instagram**

Follow us at [twitter.com/USGSWILDLIFE](https://twitter.com/USGSWILDLIFE) and @USGSwildlifehealth

### **Request for Wildlife Mortality and Morbidity Event Reporting**

The NWHC Quarterly Wildlife Mortality Report, published in the Wildlife Disease Association's newsletter and on the NWHC Web site, is intended to inform wildlife professionals of wildlife events of interest. We kindly request the help of wildlife professionals in submitting investigations of recent die-offs of mammals, birds, amphibians, and reptiles for inclusion in this report. Credit will be given to appropriate diagnostic laboratories and wildlife management agencies. The report can be found online at [http://www.nwhc.usgs.gov/mortality\\_events/ongoing.jsp](http://www.nwhc.usgs.gov/mortality_events/ongoing.jsp).

**To view NWHC Quarterly Wildlife Mortality Reports, please visit:**

[http://www.nwhc.usgs.gov/publications/quarterly\\_reports/index.jsp](http://www.nwhc.usgs.gov/publications/quarterly_reports/index.jsp)

### **THANK YOU**

The NWHC thanks all the State, Federal and Tribal agencies who worked with us. We are at your service to provide technical support, field investigation assistance, diagnostic capabilities, and collaborative research projects.