

Facilitating Early Detection and Rapid Response

AN ALERT SYSTEM TO COMBAT EMERGING HERPETOFAUNAL DISEASES

By Matthew J. Gray, Matthew C. Allender, Katherine H. Haman, Reid N. Harris and Deanna H. Olson

Emerging infectious diseases represent a substantial threat to wildlife biodiversity in the 21st century. Not only is their prevalence increasing, their geographic range also is expanding and the number of host species they affect is rising.

Amphibian and reptile populations, which have already suffered great losses, are especially at risk. Amphibian chytridiomycosis — caused by the fungal pathogens *Batrachochytrium dendrobatidis* (*Bd*) and *B. salamandrivorans* (*Bsal*) — has caused several species to go extinct and led to population declines in more than 200 other species (Skerratt et al. 2007, Stegen et al. 2017). Ranaviruses have been implicated in mass die-off events in reptiles, amphibians and fish on five continents (Gray and Chinchar 2015), and our understanding of the prevalence and risk of snake fungal disease in North America is rapidly expanding (Allender et al. 2015, Lorch et al. 2016).

As wildlife professionals, we are uniquely positioned to take action against the spread of herpetofaunal diseases. That's why in 2015, the Partners in Amphibian and Reptile Conservation formed a North American Disease Task Team to facilitate communication about detection and management of pathogens affecting amphibians and reptiles.

Composed of 14 disease experts from across North America who hold positions in federal, state and provincial agencies, and academia and non-governmental organizations, we all share an interest in researching, monitoring and responding to emerging diseases that affect the health of amphibians and reptiles. With our collective expertise, we hope to guide wildlife professionals who may be unfamiliar with monitoring and responding to herpetofaunal diseases.

Our goal is to help facilitate quick, integrated responses based on management plans that combine



◀ A wildlife student performs a venipuncture of a narrow-headed garter snake (*Thamnophis rufipunctatus*) as part of a comprehensive health assessment and snake fungal disease surveillance in New Mexico.

Credit: Michelle Christman/USFWS



How to Submit a Report

Anyone who finds an amphibian or reptile with suspicious lesions or observes an unusual die-off event can report it to the Herpetofaunal Disease Alert System. Send an email to herp_disease_alert@parcplace.org with the following information:

1. Name and e-mail address of the observer.
2. Date of observation.
3. What was seen.
4. Where it was seen, ideally latitude-longitude coordinates.
5. The types of animals involved, including species if certain of the identification and life stage, e.g., eggs, larvae, sub-adults or adults.
6. Photos of dead or decayed animals or live, sick-looking animals.
7. Photos of any other relevant information.



Credit: Matthew Niemiller

▲ Reports of die-offs of amphibians and reptiles such as this one of larval marbled salamanders (*Ambystoma opacum*) in the Great Smoky Mountains National Park help monitor the incidence of herpetofaunal diseases.

epidemiological knowledge, pathogen surveillance, population monitoring, biomedical diagnostics and disease intervention strategies.

Creating an alert system

Last year, the team launched the Herpetofaunal Disease Alert System, a unique online system that helps the public communicate with wildlife disease professionals within their jurisdiction. Wildlife professionals may be the ones trained to respond, but the public is often first to spot diseased animals. That's why we welcome submissions from anyone who observes an amphibian or reptile with a suspicious lesion or an abnormal die-off event.

The alert system provides a network of professionals who can review submitted reports and contact federal, state and provincial wildlife professionals about a possible disease event. When possible, a team member follows up with the managing agency about the outcome of any investigations. These findings are logged in a centralized database that allows the team to monitor the occurrence of pathogens as well as disease outbreaks and transmissions across geographical areas and species.

The new alert system does not replace long-term disease monitoring programs

such as the [National Wildlife Health Center's](#) database. Instead, it seeks to provide a rapid response network not previously available to help with reports of suspected pathogen-related events.

Surveying disease response activities

Recently, we surveyed our state and provincial contacts and several national and regional wildlife disease diagnostic centers to identify current herpetofaunal disease activities. Twenty-one states (42 percent) and six Canadian provinces and territories (46 percent) responded, for a total response rate of 43 percent.

Most respondents were keenly aware of pathogen threats to amphibians and reptiles, and many provided data on confirmed mortality events that occurred in their jurisdiction. Seventy-seven percent of respondents had ongoing herpetofaunal disease surveillance programs.

However, only a few — just 8 percent — were looking beyond the major pathogens associated with mass mortality events, which could miss important surveillance information. Less virulent pathogens can play a role in disease dynamics, especially if the immune system of the host is compromised, such as during exposure to stressors or when co-infection with another pathogen occurs.

We were pleased to find that most respondents (82 percent) expressed interest in the Herpetofaunal

Where to Find Additional Resources

Several [guidance documents](#) are available on the Partners in Amphibian and Reptile Conservation's [website](#) to help wildlife professionals in the field deal with herpetofaunal diseases. Two recent papers published by team members also provide guidance on designing surveillance studies, biosecurity precautions that should be followed and standard response procedures if a suspected disease outbreak occurs ([Duffus et al. 2017](#), [Gray et al. 2017](#)).



Disease Alert System and working with our team should outbreaks occur in their jurisdictions.

Additional resources

To spread the word about the alert system, team members frequently deliver workshops on herpetofaunal diseases, sampling designs and techniques for disease surveillance and approaches to analyzing infection and disease prevalence data.

We also have been involved in other activities to help wildlife professionals. The [Global Ranavirus Reporting System](#), launched by the team, provided a template for the new [Bd and Bsal mapping system](#) organized by University of California-Berkeley. In addition, we helped create brochures on *Bsal*, biosecurity strategies for sampling at high-risk sites and approaches to disinfecting heavy equipment that comes in contact with contaminated water or soil. In the Northeast, team members produced a [video](#) to illustrate equipment-disinfection procedures for wildlife professionals working in amphibian and reptile habitats.

As we continue to adapt and expand our resource materials in the future, we invite wildlife profes-

sionals to contact us with ideas about tools that can help them respond to the broad spectrum of herpetofaunal diseases. Requests to organize workshops or provide information can be made by contacting the team at parc_coordinators@parcplace.org. ■



Matthew J. Gray, PhD, CWB[®], is a professor of wildlife ecology in the University of Tennessee Institute of Agriculture and associate director of the institute's Center for Wildlife Health.

Matthew C. Allender, DVM, PhD, is an assistant professor and director of the Wildlife Epidemiology Lab at the University of Illinois College of Veterinary Medicine.

Katherine H. Haman, DVM, PhD, is a wildlife veterinarian with the Washington Department of Fish and Wildlife.

Reid N. Harris, PhD, is professor emeritus at James Madison University and director of international disease mitigation for the Amphibian Survival Alliance.

Deanna H. Olson, PhD, is a research ecologist with the U.S. Forest Service Pacific Northwest Research Station and the team leader for the Pacific Northwest Aquatic Ecology and Management Team in the Land and Watershed Management Program.

WILDLIFE MATERIALS
PROTECT • MONITOR • STUDY

QUALITY PRODUCTS SINCE 1970
Thanks to All Our Loyal Customers

Distributor
RECONYX
SEE WHAT YOU'RE BEING HIBING...

RECEIVERS AND TRANSMITTERS FOR WILDLIFE RESEARCH
800-842-4537
1202 Walnut Street • Murphysboro, Illinois USA • www.wildlifematerials.com