



# One Health

NPS/ADAM KRAMER



## *DOIT at MACA: protecting bat and human health*

By CAPT David Wong

“Please tell the park how impressed I am that they were so concerned about my health,” said the MACA visitor who had found a bat on her jeans after finishing a cave tour. That bat was captured, tested on the same day, and found to be rabies-negative. The visitor was both relieved and sincerely appreciative.

This incident occurred in February 2014 and, at the time, was an unusual event for MACA. In the prior 6 years, the park had responded to a total of 2 bat-human contact events. Park staff, however, were aware that white-nose syndrome (WNS), a fungal disease of bats first detected at MACA in 2013, was continuing to spread throughout the park. Although WNS is not transmissible to humans, it can cause bats to exhibit unusual behavior (e.g. flying erratically), which increases the risk for bat-human contact.

How many more bat-human contacts might occur in 2014? In preparation, the park arranged numerous calls with wildlife and public health experts at NPS, the Centers for Disease Control and Preven-

tion (CDC), the Barren River District Health Department, the Kentucky Department for Public Health, and the Kentucky Department of Fish and Wildlife. Response protocols were streamlined, and additional signs were posted informing visitors to view wildlife from a safe distance and to notify a ranger if they have contact with bats or other wildlife.

Over the next 10 weeks, 10 additional bat-human contacts were reported, mostly among visitors. Bats were not available for testing in any of these incidents, and most of the visitors were recommended to receive costly rabies post-exposure prophylaxis. The fact that no bat-human contacts occurred after the bat hibernation season suggests a link to WNS as a primary cause for bat behavioral changes.

During the off-season, MACA Superintendent Sarah Craighead discussed with her staff the need to have a more specific and detailed plan in place for both preventing and responding to bat-human contacts in 2015. By late 2014, WNS had affected virtually every cave

system in the park. It was possible that the number of bat-human contacts might increase in 2015.

On December 10, 2014, Superintendent Craighead requested on-site assistance from the NPS Disease Outbreak Investigation Team (DOIT). DOIT is comprised of subject matter experts from multiple disciplines, including public health, wildlife health, and environmental health. The team approaches health issues from multiple perspectives and provides guidance and broad-based, comprehensive, and practical recommendations.

*(Continued on page 5)*

### In this Issue

DOIT at MACA	1
Tick borne disease	2
Bat-human encounters	3
One Health and the OPH Director	3
Ebola response	4
Contacts	6



An ebola survivor places his handprint on a billboard; CAPT Radtke discusses response with the acting Surgeon General; worker in PPE

# NPS and DOI officers assist in ebola response

By CAPT Tim Radtke

This is what we do. If it means leaving home for 67 days and missing the Christmas holidays, birthdays, and anniversaries, this is what we do. Where there is a need, officers of the U.S. Public Health Service (USPHS) Commissioned Corps respond.

USPHS officers, including 3 NPS officers and a civilian NPS employee, have been serving at the forefront of the U.S. Government response to the Ebola outbreak in Liberia. USPHS officers currently staff the Monrovia Medical Unit (MMU), a 25-bed field hospital that has been reconfigured to function as an Ebola Treatment Unit (ETU), located in Margibi County, Liberia. The focus of the MMU is to provide care to Liberian and international healthcare workers and responders who become infected with Ebola Virus Disease (EVD) and to continue to build capacity for responding and treating EVD.

The mission in Liberia is to provide care to healthcare workers and responders, they, in turn, can care for other Ebola patients throughout the region, providing hope and a commitment to care for those who are fighting Ebola on the front lines. The focus of the MMU is to reassure and create a safe environment for professionals who are working to combat EVD.

I was part of the 74 officers deployed to the MMU. As the Chief of Safety and Preventive Medicine I had responsibility for ensuring these officers came home safe and healthy. It was a pressure that I would intensely feel until the moment we flew out of Roberts Airfield, Monrovia Liberia. I felt a second level of relief when all officers completed their 21 day

post deployment monitoring period.

Safety and Preventive Medicine was the focus of the deployment. We were involved with every decision and activity at the MMU. As one of the fellow officers noted, this was the “Super Bowl” of Safety and Health. The lives of our fellow officers were at stake and it was everyone’s responsibility to protect them. One slip with a needle, sloppy donning or doffing, or a breach in the hot zone could result in someone contracting this horrific disease. The importance of safety, health, and force protection during a mission has never been clearer.

Although the core Safety/PM team consisted of 10 officers with varying backgrounds from a Virologist to a Veterinarian to Epidemiologists to Industrial Hygienists, we couldn’t have done the work without officers from other sections pitching in and supplementing our section. Nurses, Behavioral Health Professionals, Pharmacists, Logistics and Public Information Officers all became part of the safety team. We staffed the hospital on two twelve-hour shifts which frequently turned into 14-15 hours. The remainder of the time was back in the Living Support Area for an hour or two of down time before hitting the bunk then getting up and starting another day. You really get to know your team by spending every moment with them for 67 days. They are like-minded, selfless officers with whom we have worked and lived shoulder to shoulder and have entrusted our lives.

You can imagine the breadth of safety and health issues to address. Of course what was in the forefront of eve-

ryone’s thoughts was the risk of contact with blood, body fluids, or contaminated surfaces. The mantras in the hot zone were to “be slow and deliberate” and “trust your chlorine and trust your PPE”. We took precautions to limit any contact with other people. Handshakes were replaced with elbow bumps. Besides the obvious risk of exposure to the Ebola virus, two other risks at the top of the list were chlorine exposure and heat stress. Hydrating and controlling time in PPE was our primary way to control heat stress. Imagine being in a plastic suit in 95° heat with a heavy solar load. Chlorine concentrations had to be trusted. Too strong and officers quickly develop respiratory effects; too weak and you risk having an ineffective disinfectant. Food and water safety, off-site safety and security, fire, became high priority issues at one time or another and could have derailed the mission.

Surveillance of the staff was critical considering a fever, diarrhea, or vomiting could result in being on the other side of the PPE or possibly an expensive flight to ebola isolation back in the States. Twice daily temperature checks and checks for all visitors and contractors entering the camp, and constant hand washing helped ensure sickness of any kind was kept out of the camp.

The MMU Team 2 officers did what was necessary to complete the mission in the safest manner possible. It was grueling work at times, but when you have the opportunity for a life changing experience, make the most of it!

*CAPT Radtke is the DOI Occupational Health Manager in Denver, CO*

# Dealing with Human-Bat Encounters

By Dr. Danielle Buttke

If you read our cover story, you know that White Nose Syndrome (WNS) is causing more bat-human encounters. Even in WNS-free parks, bat-human encounters and conflicts appear to be on the rise as humans and bats share spaces and resources. Whether it be a bat found in a guest room, on a visitor's clothing, or found dead on the ground in a high-use area, these encounters have implications for both bat and human health no matter how minor the encounter may seem at first glance.

Bats are an important resource both ecologically and economically. About 40 species of bats call parks home, and many of these populations are threatened or at risk due to disease, habitat loss, or anthropogenic changes. At the same time, bats can become sick with and transmit the fatal disease rabies to humans. Because of this, any bat-human encounter requires follow-up with a public health professional, and balancing human and resource protection requires special attention and expertise.

On February 5th, the Wildlife Health Branch hosted an inter-agency webinar addressing human-bat encounters. The webinar addressed both emerging issues in bat conservation and health as well as potential human health concerns associated with bat encounters. Dr. Paul Cryan of the United States Geological Survey gave an introduction to bat biology and ecology, Dr. Tom Rodhouse of NPS gave an overview of bat resources in NPS, and Dr. Kevin Castle discussed White Nose Syndrome and other threats to bats. For the human health-focused half of the webinar, Dr. Castle discussed options and issues associated with bats in human-occupied structures, and Dr. Danielle Buttke discussed potential zoonotic diseases from bats, including proper procedures for responding to a visitor bat encounter, techniques for bat collection, and testing protocols should a bat-human encounter occur.

The webinar recording is posted here: <http://nature.nps.gov/biology/bats/index.cfm> and complements a previously recorded and posted webinar on bats in buildings. Additional materials to assist parks in these types of scenarios, including employee and visitor education, are forthcoming.

For more information, or specific guidance and technical assistance in your park, please contact [Danielle\\_Buttke@nps.gov](mailto:Danielle_Buttke@nps.gov).

# One Health from the new director of the Office of Public Health



A Q&A with CAPT Sara Newman

**The NPS is uniquely situated to practice and promote One Health due to our dual mission to protect both the health and safety of our visitors and employees as well as the natural resources of our parks. Where does One Health fit into your new position?**

One of the most exciting aspects of this new job for me is the opportunity to have a significant role with the One Health Program. One Health is not just a program, it's a way of thinking and doing business in our parks. This became clear to me when I was in the Office of Risk Management and worked with One Health on issues related to visitor injury prevention. What are likely simple solutions to preventing injury in any other context (installing lights on roads/or putting up guard rails) may be wrong for our parks, as they may have detrimental impacts on wildlife migration or breeding. Our prevention decisions cannot be made in isolation; they require expertise from varying disciplines. It is widely understood in public health that human health is impacted by much more than simply biology and human behavior. We are successful when we rely on what we call a "systems approach," which is closely related to the One Health concept and recognizes that we need the input of various disciplines to effectively address the interconnected safety and health issues that impact our entire ecosystem. One Health fits into my portfolio as a critical effort that should be supported.

**It was the goal of your predecessor to make the NPS Office of Public Health**

**the nation's premier ecologically-based public health institution. How do you plan on furthering this goal?**

There is no organization in the federal government better suited to achieve this vision. It's my job to ensure we document the positive impacts of the One Health approach and communicate it to our executive leaders to build the support needed for it to continue to be a viable program at NPS. We will achieve this vision when One Health is no longer a program, but a decision making process understood and adopted by all park staff.

**What are your main priorities?**

My background includes both public health and strategic planning. I believe if we are all clear about where we are going and why, we can achieve our goals and even our vision more effectively. A big priority for me this year is to connect with staff in the Office of Public Health to ensure we have clarity on our goals and objectives, that they align with our leadership's priorities, and that we have defined those together. While not everyone in our Office will always agree on the priorities, I will work openly to ensure there is opportunity for dialogue, input, and feedback so that it is clear why and how decisions are made.

**What excites you most about leading the Office of Public Health?**

Most exciting is the prospect of working with this incredible team of highly skilled and capable staff in the Office of Public Health. What makes a program great is the people, and because I have been at NPS for eight years, I have the benefit of knowing many of the OPH staff. They are phenomenal. And as I have the opportunity to meet staff I didn't know, I am increasingly impressed. I am thrilled about what we will be able to accomplish together and the positive impact this program will continue to make in the parks and in this nation.

# Tick-borne diseases: a changing landscape

By LCDR Danielle Buttke

Ticks, and their associated pathogens, are a natural part of the landscape in many NPS units. However, ticks are sensitive to changes in their environment, and multiple human-induced changes are impacting tick persistence and spread in many parts of the U.S. This has implications for both human and wildlife health.

Climate change can have significant and dramatic impacts on tick ranges. Because tick development and activity is temperature- and humidity-dependent, warmer temperatures have and will result in range expansion as well as longer questing seasons for ticks in many areas. This could result in some ticks, such as the Lyme-vectoring black-legged tick, maturing faster and more ticks on the landscape for a greater proportion of the year. Higher average ambient temperatures can also promote more tick survival in areas where humidity is sufficient.

Vegetation changes can have dramatic impacts on tick densities and the percent of ticks infected with pathogens. In parts of the northeastern United States forests, Japanese barberry (*Berberis thunbergii*) has become the dominant understory shrub. Colonization with Japanese barberry is associated with higher numbers of ticks compared to barberry-controlled or barberry-free areas, and a greater percentage of ticks infected with *Borrelia burgdorferi*, the causative agent of Lyme disease.

The shrub provides favorable habitat for both the white-footed mouse and black-legged ticks and in turn allows for higher tick infection rates because the white footed mouse is the main reservoir for *B. burgdorferi*. Similar vegetation

*Continued on page 5*

# NPS-CDC project to study ticks and associated pathogens



By LCDR Adam Kramer

The National Park Service (NPS) has partnered with the Centers for Disease Control and Prevention (CDC) and other partners in the Mid-Atlantic and Northeast regions to conduct tick and tick-borne pathogen surveillance. The intent of the study is to determine the number and types of ticks that are present and the presence and prevalence of four tick-borne diseases. This study is the first to determine the prevalence of *Babesia microti*, *Anaplasma phagocytophilum*, and *Borrelia miyamotoi* in this part of the United States and will improve outdated information from Lyme disease prevalence, and will be the first study with a large enough geographic area and timeframe to address questions regarding local environmental changes. This data can be used to provide locally-relevant information for public health prevention efforts, and participating parks are provided with public health and employee education materials.

The focus on park units in the Mid-Atlantic region is purposeful. These parks are within the southern expansion of Lyme disease and the northern expansion of the lone-star tick (and its associated diseases) making this an ideal area to study these ticks. Furthermore, the well-documented vegetation and

wildlife studies in these areas provide insight into other factors that may affect tick populations. Through cooperative sampling of NPS units (including: Manassas National Battlefield; Rock Creek Park; Prince William Forest Park, Catcotin Mountain Park; Gettysburg National Military Park; Fire Island National Seashore; and others), other State and Local sampling data (such as with Fairfax County, VA), we hope to gain a better understanding of tick populations and disease prevalence.

Preliminary test results from sampling that occurred in 2014 have identified *Borrelia burgdorferi* in all of the sampled Park units, with prevalence data forthcoming. *Anaplasma* and *Babesia* were not as widespread as *Borrelia*. This localized information can assist managers in understanding the risks posed by tick-borne diseases and developing targeted interventions for their specific risks.

This is truly a One Health effort combining wildlife, human health, and the environment to gain a better understanding of how differing activities can change risk. This joint NPS-CDC partnership is being conducted under the MOU signed between Director Jarvis and Director Frieden and significantly contributes to the science of vector-borne disease ecology and public health risk.

# DOIT at MACA

*Continued from page 1*

A DOIT site visit was conducted December 15-19, 2014 and was led by David Wong (medical epidemiologist) and Cara Cherry (veterinary epidemiologist). Others on the team included Kevin Castle (wildlife veterinarian), Adam Kramer (environmental health officer), Tim Pinion (wildlife biologist), and Jessica Sharpe (public health consultant who participated remotely). Additional health experts were invited from state and local health departments and nearby parks.

The DOIT team was charged to address 3 specific tasks: 1) conduct a risk assessment for bat-human contact, 2) identify new and enhance existing prevention and response activities, and 3) define circumstances (i.e. triggers) where specific prevention and response actions should be taken. The team conducted cave walk-throughs; interviewed key informants; and reviewed data, maps, WNS reports, bat-human contact incidents, park visitation, and cave tour operations.

Key findings include:

- WNS activity will likely increase at MACA in 2015 and may be associated with increases in bat-human contact.

- Surveillance data—both systematic and opportunistic—are important to collect and will help inform decision making as well as demonstrate pro-active efforts the park is taking to learn about potential health risks.

- Given the complex and dynamic nature of bat behavior, the development of rigid “triggers” leading to specific interventions is not recommended; instead, we recommend an open approach where specific data trigger further investigation and discussion by park managers.

- Decisions regarding management actions, which may be needed in response to changing levels of risk in conjunction with other key park man-

agement variables, should be made as circumstances evolve and with continuing expert advice and support.

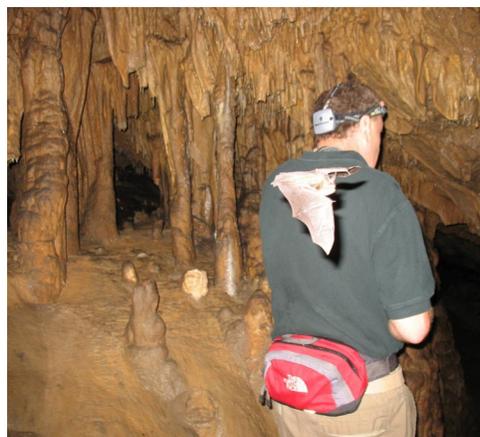
- Primary interventions to consider for reducing the risk of bat-human contact include increased surveillance, education/communication, and tour modifications. These interventions are all scalable and adaptable, depending on the current situation.

- The DOIT team will continue to consult with MACA, the Kentucky Department for Public Health, and the Barren River District Health Department for bat-human contact incidents.

- Ongoing support will be provided to MACA as decisions are made regarding specific interventions to prevent or mitigate bat-human contact.

- The DOIT site visit and report does not eliminate the risk for bat-human contact, but provides a thoughtful and solid framework for responding to issues in a step-wise and practical manner. The report may also be useful to other parks dealing with WNS in the future.

If parks would like to discuss activating the DOIT team for other complex health issues, please contact Dr. Margaret Wild (NPS Chief Wildlife Veterinarian; [margaret\\_wild@nps.gov](mailto:margaret_wild@nps.gov)) or CAPT Sara Newman (Director, Office of Public Health; [sara\\_newman@nps.gov](mailto:sara_newman@nps.gov)).



# Tick-borne Disease

*Continued from page 4*

changes precipitated by white-tailed deer overabundance may mimic the barberry-infested climate in other parts of the eastern United States.

Lyme disease has a complex ecology. The ticks require three hosts/blood meals in order to lay eggs. Some potential hosts, such as the white-footed mouse, are more likely to transmit Lyme disease than others, such as an opossum, which is also more likely to remove and kill ticks that attach. The role of other hosts is more complex. Feeding on a deer actually clears the tick of infection. However, deer can support lots of adult ticks, which can then lay eggs to generate a new population of larval ticks. If these larval ticks feed on Lyme-infected white-footed mice, the cycle can begin again. Some models suggest that by decreasing or replacing Lyme-infected or competent hosts on the landscape, overall Lyme risk will be decreased. But in models where the total number of ticks on the landscape increases, Lyme risk may still remain the same or even increase despite having a lower percentage of Lyme-infected ticks.

The controversy over how exactly changes in wildlife community structure influence human Lyme risk is an area of intense scrutiny but few long-term, large-scale, and ecologically-based studies. Because of their multi-year life cycle and sensitivity to environmental conditions, multiple years of study on a large landscape scale is needed to better understand exactly how ecological changes influence Lyme dynamics in complex systems and scales. Turn to page 4 to find out how work at several NPS units is helping to address these questions.

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# NPS-CDC partnership brings new resources to NPS

By LCDR Danielle Buttke

In an atmosphere of limited resources, disease detection and response is subject to the same limitations as other aspects of resource management. A new partnership between NPS and the Centers for Disease Control and Prevention (CDC) helps to alleviate some of those limitations.

The NPS One Health Network was recently named a CDC Epidemic Intelligence Service (EIS) training site. This has allowed an epidemiologist to be stationed with NPS for two years to assist with public health protection and promotion. CDC covers all salary, travel, and outbreak investigation costs while NPS provides training, mentorship and supervision, and opportunities for the EIS officer to gain first-hand experience in responding to public health needs.

NPS is fortunate to have Dr. Cara Cherry assigned to the One Health Network through July of 2016. She joined in July of 2014 and has already investigated norovirus surveillance reporting, responded to an outbreak of the emerging mosquito-borne disease chikungunya in the US Virgin Islands National Park, and spent two months in west Africa responding to the ongoing ebola outbreak.

Dr. Cherry joins NPS after receiving her Doctorate of Veterinary Medicine from Virginia Polytechnic Institute and State University and her Masters in Public Health and residency from the University of Minnesota.



**OneHealth**

# One Health Network: Partners in Health

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## Interested in collaborating in One Health?

Please contact the One Health Coordinator, Danielle Buttke, at [Danielle\\_Buttke@nps.gov](mailto:Danielle_Buttke@nps.gov) or 9790-267-2118.

## More One Health!

NPS staff co-authored a recent publication on the potential impacts of One Health communications on wildlife conservation. The article describes possible positive and negative outcomes of One Health communication around zoonotic disease and is available through the Journal of Wildlife Diseases or by emailing [Danielle\\_Buttke@nps.gov](mailto:Danielle_Buttke@nps.gov).

Seven U.S. Senators recently sent a letter to President Obama recommending a One Health approach to disease prevention and response. The letter can be found here: <http://www.onehealthinitiative.com/publications/15%20%2012%20Letter%20to%20POTUS%20-%20One%20Health.pdf>

An international One Health journal was recently established and is currently soliciting articles for peer review: <http://www.onehealthjournal.org/>

A One Health Newsletter is also published by the One Health Initiative and available at: <http://www.onehealthinitiative.com/newsletter.php>.