



One Health



NPS/MOJAVE NATIONAL PRESERVE

Desert Bighorn Sheep Pneumonia Outbreak, 2013

By Dr. John Bryan

In May of 2013, several desert bighorn sheep (*Ovis canadensis nelsoni*) were found dead in the Kerr region of Mojave National Preserve (MOJA), California. Shortly thereafter, additional carcasses were discovered in the Vermin region of the MOJA Old Dad Mountains, and the National Park Service Disease Outbreak Investigation Team (NPS DOIT, see page 3) was officially engaged to assess the situation. By June, several more regions within MOJA had revealed similar findings, and a bighorn sheep pneumonia outbreak was suspected. Confirmation of pneumonia soon came from test results of two bighorn sheep, identifying *Mycoplasma ovipneumoniae* -a non-native and invasive pathogen associated with bighorn pneumonia- in both samples. A collaborative disease response plan among multiple stakeholders began, including the NPS, California Department of Fish and Wildlife (CDFW), Oregon State University (OSU), and additional key players in the desert bighorn sheep community.

Bighorn sheep pneumonia complex is characterized by high morbidity, high mortality, and low lamb recruitment, which has threatened the continued success of this species throughout the west-

ern United States. Moreover, affected populations have sometimes been depopulated once disease is detected in attempts to stop transmission to adjacent naïve populations. Several different species of bacteria, including *M. ovipneumoniae*, *Pasteurellaceae* spp.; e.g., *Mannheimia haemolytica*, *Bibersteinia trehalosi*, and *Pasteurella multocida*, have been implicated in “pneumonia disease complex” of bighorn sheep. These bacteria also exist in domestic sheep and goats, often times without resulting in disease in these species. However, when transmitted to bighorn sheep during co-mingling events, the same organisms can result in significant morbidity and mortality in bighorn sheep.

By June of 2013, the joint collective of the NPS, CDFW, OSU, and several bighorn support organizations developed a collaborative framework to identify, assess, and react to the outbreak. Veterinarians, biologists, and staff from each of the stakeholder agencies provided broad experience that coalesced into a unified response coordinating a general database, veterinary diagnostics, field activities, disease surveil-

lance, animal welfare issues, press, and funding among other issues. This concerted interagency effort culminated in a very successful field action that provided valuable epidemiologic and diagnostic information regarding this outbreak. Moreover, the coordinated effort involving various agencies will also provide a template for future multi-stakeholder responses.

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Applying One Health to Injury Prevention

By CDR Sara Newman

The idea of injury prevention fitting into the concept of *One Health* has not been widely considered within the One Health movement. The critical link between humans, animals and the environment is mainly a discussion around the environmentally sound prevention and control of cross species disease transmission. Few would consider the impact that drowning, falls, car crashes or other human injury outcomes might have on wildlife or the environment.

Furthermore, few might consider that the health and wellbeing of animals and the environment could be impacted by any human injury prevention strategy. However, just as we consider the impact that disease transmission has on all species and the environment, injuries that occur in outdoor environments have an impact on the ecosystem that should be considered and managed.

Motor vehicle crashes and road safety management provide a good example of how the *One Health* concept is applied to injury prevention in parks and why this concept should have greater attention in public health and among leaders in the *One Health Initiative*. With more than 5,000 miles of paved roads and a combined 10,000 miles of paved and unpaved roads weaving through areas with abundant and protected wildlife and fragile ecosystems, the possibility for motor vehicle and wildlife interaction is great. And the data demonstrate this. The most recent study conducted on motor vehicle crashes (MVC) in the NPS found that wildlife collisions were the most common type of single vehicle crashes. Of all reported crashes in NPS, approximately 11% involve animals, compared to an estimated 4.6% nationally (NPS 2009; Huijser et al. 2008). Furthermore, because many collisions with small animals are not reported, wildlife-vehicle collision rates may be much higher.

In parks, using a *One Health* approach to road safety means that addressing the road and traffic hazards is not as simple as meeting industry road safety standards. Because many of the NPS road



systems incorporate important natural resources that would be threatened by a standard engineering approach, an exception to the design standards may be issued in order to accommodate the resource. These types of design exceptions undergo comprehensive review by transportation planners and include mitigation measures to address safety.

For example, where industry standards would dictate certain lighting on roadways, or specified guardrail sizes and materials be used, on park roads and parkways, decisions to use lighting, install guardrails, and to make other engineering decisions that might mitigate crashes, could also have detrimental impacts on the ecosystem. Using artificial lights on parkways all night can disrupt flora dormancy, may prevent trees from adjusting to seasonal variations, can put small nocturnal animals at risk of predators, and can negatively impact natural behavior patterns such as mating rituals or reproductive cycles. And guardrails that are not carefully constructed or placed, could disrupt animal migration patterns and animal access to needed food sources.

The critical relationship between injury prevention and resource protection is clear. When visitors recreate on public lands, decisions they make to engage with the resource, have implications far beyond their individual experiences. While a decision to cross a guardrail to obtain a better view, for example, may not always result in a tragic fall for that individual, it could mean trampling on fragile plants that does have harmful environmental consequences. Therefore, our efforts to encourage our visitors to consider how

their behavior impacts the environment, also serves to prevent possible injury and vice versa.

Currently the Office of Risk Management, Public Risk Management Program and NPS One Health Program within the Biological Resource Management Division/Wildlife Health Branch and Office of Public Health are collaborating on a project to include the *One Health* concept when we educate our visitors about hazards of recreating in outdoor and wilderness environments. The two programs have combined efforts to develop a "Safe Adventure Library" using *One Health* concepts and illustrations. The document will provide NPS park managers and staff with holistic, ecologically based science guidance that can be used when making decisions about wildlife, the environment and visitor protection. Ultimately, the library will serve as a source of safety information on a range of recreational activities that can be used by park staff to prevent park-related injuries and illnesses.

While the interaction of human, flora and fauna and injury prevention is not a concept that has received broad attention, the NPS is on the leading edge to demonstrate that the *One Health* concept may just be as important in injury as it is in disease transmission.

1 "Wildlife-Vehicle Collision Reduction Study: Report to Congress." No. FHWA-HRT-08-034. 2008 <http://www.fhwa.dot.gov/publications/research/safety/08034/index.cfm>

Internal National Park Service Report: *NPS Traffic Safety Overview*, prepared by CH2M Hill, Final Draft, 2009

2 Chepesiuk, R. missing the dark: health effects of light pollution, *Environ Health Perspect*. 2009 January 117 (1) A20-A27.



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Field activities in response to the outbreak included on-foot surveillance, collection of carcasses for necropsy and diagnostics, helicopter survey capture and collaring for telemetry data, and the on-site evaluation of sick bighorn sheep. All procedures were submitted to, reviewed, and approved by the NPS Institutional Animal Care and Use Committee to bring the overall effort into compliance with the United States Animal Welfare Act. The successful execution of field activities from this collaborative response will provide a strong dataset foundation from which future bighorn pneumonia disease surveillance and monitoring efforts can gain predictive value; perhaps resulting in the mediation of this or future outbreaks in the region.

DOIT: Disease Outbreak Investigation Team

The NPS Disease Outbreak Investigation Team is a pre-formed, multidisciplinary team of experts ready to respond to any human, wildlife, or environmental health event or concern in parks. DOIT is an initiative of the One Health Network and one way that NPS is putting One Health into action. By promoting interdisciplinary response, the Wildlife Health Branch and Office of Public Health can better assist parks and promote the health of all species at the same time. For more information:

Bats in Buildings in the NPS

By Dr. Kevin Castle

What is that scratching in the ceiling? Mice? Now it sounds like it's in the walls; ghosts? And what is making those little piles of droppings on the windowsill and just outside the door? Or, what is causing that stain in the ceiling and that strong smell of ammonia? If you find yourself asking these questions, it could very well be that a colony of bats has taken up residence in your building. Aren't you lucky? What to do, what to do?

The issue of bats in NPS buildings is of growing interest, based on the increasing number of calls received by the WASO Biological Resource Management Division (Wildlife Health Branch and Integrated Pest Management Program primarily), NPS Office of Public Health, and park and regional biologists. No one can say for sure why reports of human-bat interactions appear to be increasing. Potential causes include enhanced attention on bats and improved communication networks about bats; displacement of bats from disturbed natural or human habitats; and bats affected by disease, such as white-nose syndrome. Members of the NPS One Health Group have had several calls with parks, regions, and WASO to discuss this increasingly reported issue. In some instances, parks have been given specific guidance on how they may best manage bats in their buildings, or have been pointed towards local experts who can provide the necessary help.

Because of the importance of this issue throughout NPS, participants

on the calls agreed that the NPS One Health group should address this issue and provide broad, consistent, science-based guidance to parks and regions in light of NPS policy, laws, and philosophy, in the form of a written, web-based guidance document. A small working group will soon be coming together (virtually) to get started on this much-needed document. The primary role of the document will be to provide information that parks can use to make decisions about how to address the issue of bats that are found inside NPS buildings (e.g. offices, housing, storage areas, cultural resources, other public areas), and will not directly address management decisions regarding bats occupying natural areas.

In addition to providing information on what park personnel can do right away (or, often as importantly, what NOT to do) when bats are encountered inside NPS buildings, the document will provide guidance on educating park staff and the public about "living with bats" in appropriate circumstances, and "excluding bats" when necessary. This will be a living document and will incorporate new information as it becomes available.

Questions to be addressed in the guidance document, and that NPS One Health personnel can begin to think about include:

- Why should NPS (or anyone) care about bats?
- Should bats, as native species, be managed if found in buildings?



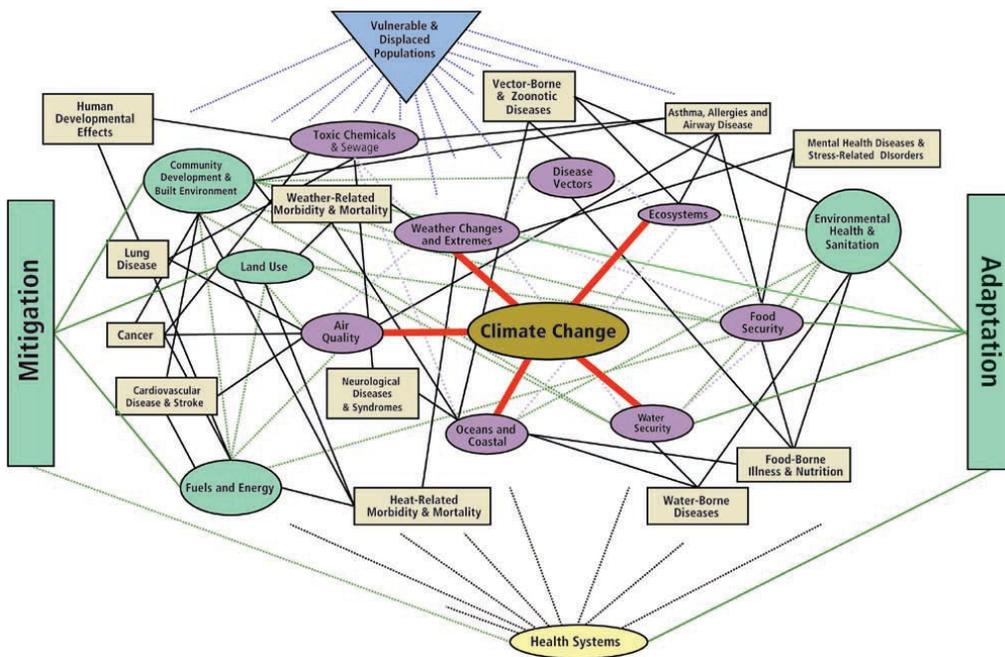


Figure 1. Climate Change directly impacts five aspects of the human environment (red lines and purple circles).

Climate Change and One Health

By Lis Cohen

In mid-July 1995, temperatures in the city of Chicago reached historic highs (106°F on July 13) while humidity levels were oppressive. City residents- who did not have air conditioning- especially suffered. These mostly low income residents, unaware of the safety concerns, neglected to open their windows at night, nor did they opt to sleep outside to escape the heat. This five day heat wave led to approximately 750 heat-related deaths. As the climate continues to change, heat related stress and other health related impacts of climate change will become more apparent in cities as well as in our wildest areas.

Climate change directly affects five environmental components: water, weather, air, oceans and ecosystems. Changes in precipitation and temperatures, and melting of summer ice caps are already occurring and will create changes in the availability and quality of water across much of the planet over the next 30 years. These changes alter the health of ecosystems both indirectly and directly (Figure 1).

Climate change can impact human health in a variety of ways. First, changes in

precipitation can change water quality and quantity. Droughts for example, can cause food shortages and malnutrition and can cause wildlife to move into population centers looking for food which can increase the human/wildlife interactions that may lead to disease transfer. On the opposite end of the spectrum, flooding can cause sewers to clog, and can lead to hazardous chemicals contaminating drinking water, agricultural land, historic sites, and fragile ecosystems. Extreme flooding events like hurricane storm surges, can lead to altered ecosystems, damaged property, and can have consequences for water, food quality and supply. In addition to changes in precipitation, climate change affects air quality. For example, atmospheric chemistry is altered by heat, humidity, UV radiation and other factors. Changes in these quantities can reduce air quality impacting human exposure to toxins.

The National Park Service (NPS) is responding to this challenge (see sidebar). The treasured landscapes and important historical sites managed by the NPS are some of the most vulnerable resources to climate change. The health of these sites

and the residents and visitors to these areas is of concern. The NPS can help interpret and disseminate how One Health is impacted by climate change and how we can better prepare to respond, prevent, and adapt to these impacts.

Contact: Lis Cohen, Education and Training Specialist, Climate Change Response Program, National Park Service. Climate_change@nps.gov or <http://www1.nrintra.nps.gov/climatechange/>

Efforts of the NPS climate change response are coordinated around four areas of emphasis:

Using science to help us manage - Park scientists conduct research to help us understand the effects of climate change on national parks. The National Park Service also collaborates with other scientific agencies and institutions to discover the best available climate science. This information is then applied to address the specific needs of park managers and park partners as they confront the challenges of climate change.

Adapting to an uncertain future - Climate change will alter park ecosystems in fundamental ways. The National Park Service must remain flexible amidst this changing landscape and uncertain future. In some cases we must take bold and immediate actions, while in others we may be methodical and cautious. Many techniques will be utilized, evaluated, and refined as new science becomes available and the future of climate change unfolds.

Reducing our carbon footprint - The most effective way to lessen the long-term effects of climate change is to reduce greenhouse gas emissions. The National Park Service aims to be a leader in reducing its carbon footprint through energy efficient practices and integrating climate-friendly practices into administration, planning, and workforce culture.

Educating about climate change - National parks are visible examples of how climate change can affect natural and cultural resources. Park rangers engage visitors about climate change by sharing information concerning the impacts to parks and steps the agency is taking to preserve our heritage.

For more information visit: <http://www.nps.gov/climatechange>

One Health Network: Partners in Health

- Are there public health risks associated with having bats in buildings and if so, what are they?
- If guano and urine pose a health threat, how are they best removed? Using what PPE and other precautions?
- What are the risks to historic or cultural resources and how can they be mitigated or managed?
- If exclusion is recommended, how and when is this best accomplished?
- If people find bats (alive or dead), what are the procedures for handling them safely?

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- Are bat houses a useful tool for mitigating bats in buildings? Why or why not, and under what circumstances?
- Is this within NPS policy?
- How best to educate all park Divisions and the public about dealing with bats?
- How to approach consultation with the states and U.S. Fish and Wildlife Service if threatened or endangered species of bats inhabit buildings?

Please contact Kevin Castle (Kevin.Castle@nps.gov) if you would like to discuss or suggest additional questions the working group should consider.

Additional Resources:

NPS and Bat Conservation International (BCI) “Bats in Buildings Webinar”:

<http://www.nature.nps.gov/biology/wns/webinars.cfm>

BCI and other organizations including regional or state bat working groups; Universities (e.g. Eastern Michigan; Indiana State; Boston University)



Biological Resource Management Division

Wildlife Health Branch

Chief

Dr. Margaret Wild
(970) 225-3593

One Health Coordinator

Dr. Danielle Buttke
(970) 267-2118

Integrated Pest Management

Carol DiSalvo
(202) 513-7183



Office of Public Health

Director

CAPT Charles Higgins
(202) 513-7217

Epidemiology Branch Chief

CDR David Wong
(505) 248-7806

Operations Branch Chief

Sonya Coakley
(202) 513-7215

Health Promotion Branch Chief

Diana Allen
(314) 655-1625

Field Services Branch Chief

LCDR Adam Kramer
202-513-7056

One Health Coordinator

LT Danielle Buttke
(970) 267-2118

Office of Risk Management

Deputy Chief

CDR Sara Newman
(202) 513-7225

Interested in collaborating in One Health?

Please contact the One Health Coordinator, Danielle Buttke, at Danielle_Buttke@nps.gov or 9790-267-2118.

More One Health!

Several articles were recently published on the benefit of a One Health approach in science, medicine, and disease prevention.

These include “Review of Institute of Medicine and National Research Council Recommendations for One Health Initiative” and “Toward Proof of Concept of a One Health Approach to Disease Prediction and Control” in *Emerging Infectious Diseases*. They are available at: http://wwwnc.cdc.gov/eid/article/19/12/12-1659_article.htm.

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