

Visitor Perceptions of White Nose Syndrome Management in the Daniel Boone National Forest

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Introduction

When creating wildlife management policies, the wildlife and their habitats are important to consider, but the human dimensions are crucial as well. If the affected humans are not supportive, policies are difficult to implement and enforce. The field of human dimensions, defined as the attitudes and behaviors of humans toward wildlife and wildlife management, arose to aid in effective wildlife and natural resource policy creation through stakeholder input.

Historically, human dimensions research involves managing human-wildlife conflict or hunter satisfaction, but sometimes policies are needed to protect wildlife. This may manifest by creating hunting limits to preserve bear populations or providing compensation to farmers when their livestock are killed so that the farmers do not kill the predator in revenge. In other cases, wildlife need protection from unintentional human damage. One example is White Nose Syndrome, a fungal disease decimating bat populations.

WNS was likely brought from Europe to the United States in 2006 by humans and has spread rapidly, because no effective treatment or policy to stop the spread by humans or bats has yet been developed. Bats play many vital roles, including pollination and eating insects, many of which are vectors for deadly diseases or are plant pests. In addition to the loss of biodiversity caused by the death of around 7 million bats to date, bats save the agriculture industry an estimated \$22.9 billion per year in pesticide savings. This also reduces the environmental harm caused by pesticides.

The Daniel Boone National Forest spans 21 counties in eastern Kentucky and is managed by the U.S. Forest Service, whose goal is to optimize the care of the land as well as the people. The DBNF is home to fourteen bat species, of which three are endangered and seven have been documented with WNS. Thus far, the only policy implemented has been to declare caves closed. While this is a good first step, it is difficult to enforce and research is needed to determine if this policy is

effective, as well as which useful policies will be accepted by the public.



Cumberland Falls, in the London District

Methods

The research was conducted by administering a survey to visitors throughout the London and Cumberland Districts of the Daniel Boone National Forest due to their high visitor use. The survey was constructed based on a previous WNS survey administered to visitors at Carter Caves State Resort Park in Olive Hill, KY and modified to investigate correlations between knowledge of WNS and beliefs about conservation and WNS management. The survey included some questions about general demographics, some asking visitors whether they had heard of WNS, and opinion statements about conservation values and specific WNS beliefs ranked using a Likert scale. The last question on the survey listed several management policies and treatments and asked visitors which they would support, if the Forest Service were to act against WNS.

Survey results were entered into Qualtrics survey software to create the final database. Using Microsoft Excel and IBM SPSS software, general demographic statistics, descriptive statistics, and Kruskal Wallis tests were conducted to facilitate data analysis.

Results

Over eight sites, 116 survey responses were collected, yielding a response rate of 73.42%. Visitors traveled a mean of 297.4 miles one way to



reach a site and the average number of visits per year was 2.3 visits. The average visitor age was 41.9 years old. Of the respondents, only five did not report as white/Caucasian. Males comprised 57 of the respondents and females comprised 58. Four visitors had less than high school education, 24 were high school graduates, 29 had some college, 13 had a two-year college degree, 23 had a four-year college degree, and 22 had a graduate or professional degree.

As the purpose for visiting, 56 visitors responded as visiting to hike, one to fish, and 57 for other reasons, many of which were site specific, Ninety-four visitors reported having ever seen a bat, whereas 21 had not, while 51 visitors had heard of WNS and 62 had not.

Kruskal Wallis tests showed a significant correlation between awareness of WNS and a visitor's willingness to tell others of the disease, as well as their belief that bats are important in both their lives and to the environment, the number of initiatives that they support, and their mean conservation beliefs. Education level had no significant correlation with these responses, but was significantly correlated to the belief that WNS is a serious problem. There was no significant correlation between how often a person visits the site and their willingness to close caves during the active bat season or all year. In total, visitors supported an average of 2.1 WNS initiatives, and the number of initiatives supported was significantly correlated to visitors' mean conservation beliefs.

No significant correlation was found between the number of initiatives supported and having ever seen a bat or education level. The former factor also had no correlation with mean conservation beliefs. The most supported WNS management policy was rehabilitation (24%), followed by decontamination (18.7%) and bacterial treatment (13.4%).

Discussion

Although visitors seemed to most support rehabilitation, this is not a realistic management policy to implement. Long term, rehabilitation is costly and time-consuming, with only limited success, whereas other treatments or policies may be more effective and feasible. When the Forest Service introduces a management strategy, education for the public will be critical so that visitors understand why the measure is being taken

and how it will help. This is especially important because although many visitors supported closing caves during bat active seasons (despite this not helping prevent WNS spread), most did not support closing caves all year, even though all caves in the DBNF are currently closed to visitors. Examining the mean responses to questions will help identify areas to focus education on, and the demographics data will show which groups to target.

Because of the correlation between knowledge of WNS and telling friends and family about the disease, spreading information about the disease is important. As more people learn about WNS, they in turn will tell others and the information will disperse more rapidly and broadly than would otherwise be possible. Furthermore, sharing information has been shown to increase its meaning (Hughes 2011), so information about WNS will not only become more widespread, it will also have a greater impact on visitors. Providing pamphlets and other take home materials would be a useful step for visitor education.

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