The Possible Spread of WNS in SC

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I. Introduction

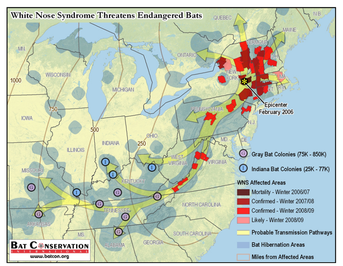
White Nose Syndrome (WNS), a fungus called *Geomyces destructans,* has an immense fatality rate for hibernating bats in North America. Since its discovery, WNS has spread across sixteen states in the US and Canadian providences and has killed over 5.7 million bats. The fungus primarily affects seven bat species in North America: the big brown bat (*Eptesicus fuscus*), the eastern small footed- bat (*Myotis leibii*), the little brown bat (*M. lucifugus*), the northern long-eared bat (*M. septenrionalis*), the tricolored bat (*Perimyotis subflavus*), the Gray bat (*M. gricescens*) and the Indiana bat (*M. sodalis*). The potential regionally extinct bat populations in North America will not only greatly affect the ecosystem, but agriculture and the use of insecticides. Although WNS has not yet reached South Carolina, it has the possibility. This map predicts the possible spread of WNS in South Carolina and identifies what regions could be at a potential for agriculture consequences.

II. Literature Review

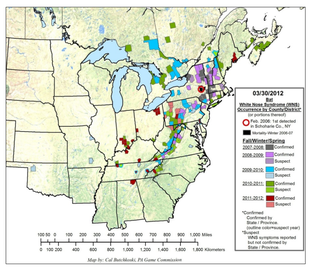
White Nose Syndrome, first discovered near Albany, New York in February 2006, was introduced to the United States through human factor from European caves. The fungus, *Geomyces destructans*, is present in Europe , but does not have the mortality rate for hibernating bats like in North America. This may be due to the coevolution of European bats and the fungus. This explains why North American bats have no resistance to the fungus and have a 75-95% or higher mortality rate.

The fungus initially is cultured at 3 degrees Celsius and grows at 5-15 degrees Celsius. The typical infected WNS regions range between 2-14 degrees Celsius. This explains why the WNS has spread to these regions and why bats that hibernate in caves and abandoned mines are primarily affected with the fungus.

WNS has been detected in: Canada, Connecticut, Delaware, Indiana, Kentucky, Maine, Maryland, Massachusetts, North Carolina, Ohio, New Hampshire, New York, Pennsylvania, Tennessee, Vermont, Virginia, and West Virginia. Affected bats have declined so rapidly that over 5.7 million bats have died since 2006. The decline of these bats will greatly affect ecological roles in insect control, plant pollination, and seed distribution. Economically, the Department of Zoology and Entomology estimated that the value of insect suppression provided by bats is roughly $74 per acre, or $12-$173 per acre. This gives bats an agricultural value of roughly $3.7 billion per year, or $53 billion per year, depending on the agricultural region. Just one million bats that have died from WNS created 660-1320 metric tons of insects that are no longer consumed each year. Thus, scientists state that the future further decline of bats will create a greater need of pesticides for agriculture. The increased usage of pesticides can impact ecosystems, hydrology, ground water, and the potential for insects to evolve and resist pesticides. Furthermore, it will impact the cost and quality of food in the United States.



Possible spread of WNS in the US since 2006 according to bat migration patterns



Spread of WNS since 2006 in the US and potential areas where WNS has been detected

III. Methodology

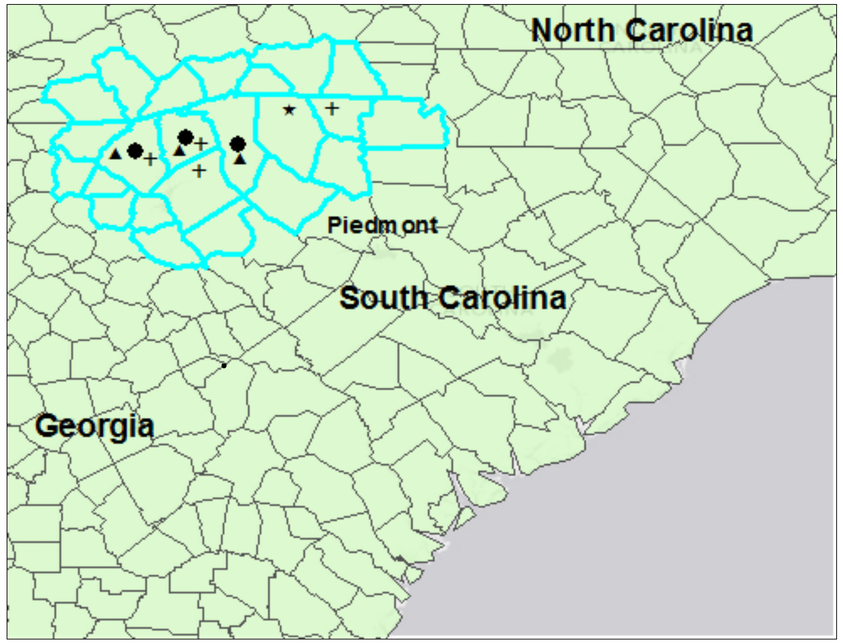
Focused primarily on the potential spread of WNS in South Carolina and based information off of previous hibernating locations in South Carolina. Focused on the potential for locations where the fungus could potentially cultivate and grow.

Discovered that hibernating bat populations in South Carolina are primarily located in the piedmont region and involve the little brown bat, the big brown bat, the eastern small footed bat, and the northern long ear bat.

The regions identified with bat hibernating locations were cross referenced with the agriculture in these areas and their dependence on insecticides.

Estimated the potential loss of bats eliminating insects from these areas and the potential increase in insecticides needed to combat a higher insect population and the increase of food costs

IV. Results and Discussion



Legend
- ● Little Brown Bat
- ▲ Northern Long eared bat
- * Eastern small footed bat
- + Big Brown Bat

V. Conclusion

South Carolina does not have a great potential of possible locations of WNS compared to other states. Its limited hibernating locations and already small bat population. However, due to its proximity with North Carolina, which has WNS, the possibility is still likely. Furthermore, the areas that do have hibernation sites for bats offer a great economic importance to the agricultural industry in South Carolina. Therefore, the potential absence of insectivorous bats from these regions will allow a huge increase in the insect population and cause farmers in these areas to use more insecticides and essentially increase the cost of food.

V.I. Future Research

Scientists continue to research the etiology, ecology, and epidemiology of WNS in an attempt to fully understand it and prevent the spread of WNS in the United States. This includes studying how to detect the fungus early on, and how to prevent anthropogenic spread through cave and mine closures and develop better fungal decontamination protocols. Furthermore, the Bat Conservation International (BCI) is using ESRI software to configure a data set for plotting the spread of WNS in the United States. However, additional grants are needed to further document the spread of this no longer regional, but national crisis. In South Carolina, greater knowledge of bat habitat associations is needed to understand the potential spread of WNS in the state. Few studies have been conducted based on bat habitat, although several bat species are considered endangered in South Carolina. Research on the possibility of spreading the WNS to bats not in hibernating habitats is being conducted.

VII. References

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