


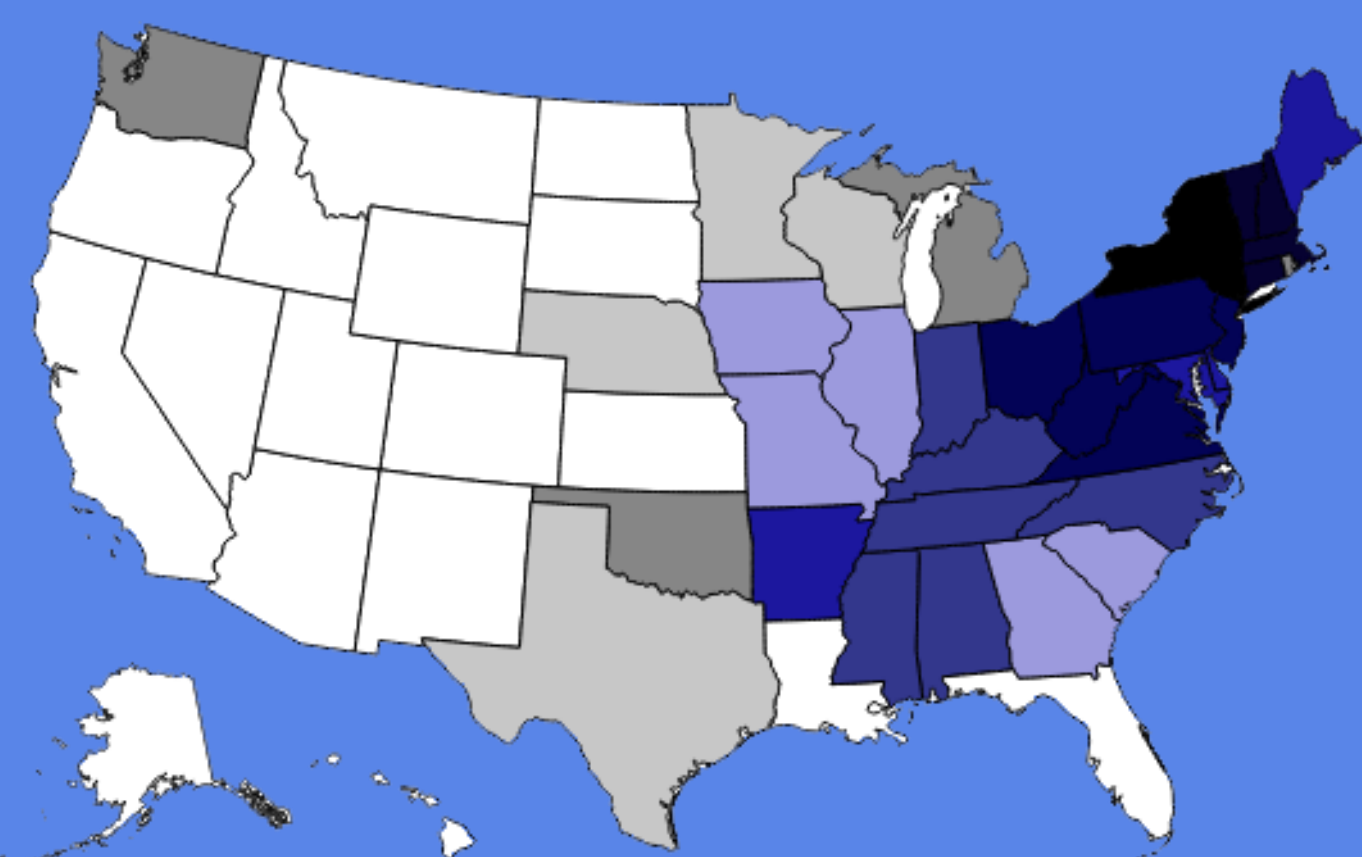
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ABSTRACT

White-nose syndrome (WNS), an epidemic disease caused by the fungus *Pseudogymnoascus destructans* (*Pd*), is threatening hibernating bat populations in North America with local extinction. As of 2017, no treatments for WNS have been implemented. By comparing existing research on WNS, our team, Students Combating WNS, aims to create an optimal strategy to combat the spread and severity of WNS. Based on our research, we suggest further study of probiotic bacteria as a viable biocontrol agent to inhibit *P. destructans*, and the usage of roost-heating as a macroscale population recovery method.

THE PROBLEM

 90-100% mortality rate in many hibernacula. Over 6 million bats have died since 2006 from WNS.

 Darker colors represent an earlier occurrence of WNS.
Darkest: Arrival in 2006
White: No confirmed cases

 \$3.7 billion in pest control services saved per year due to bats' consumption of insects.

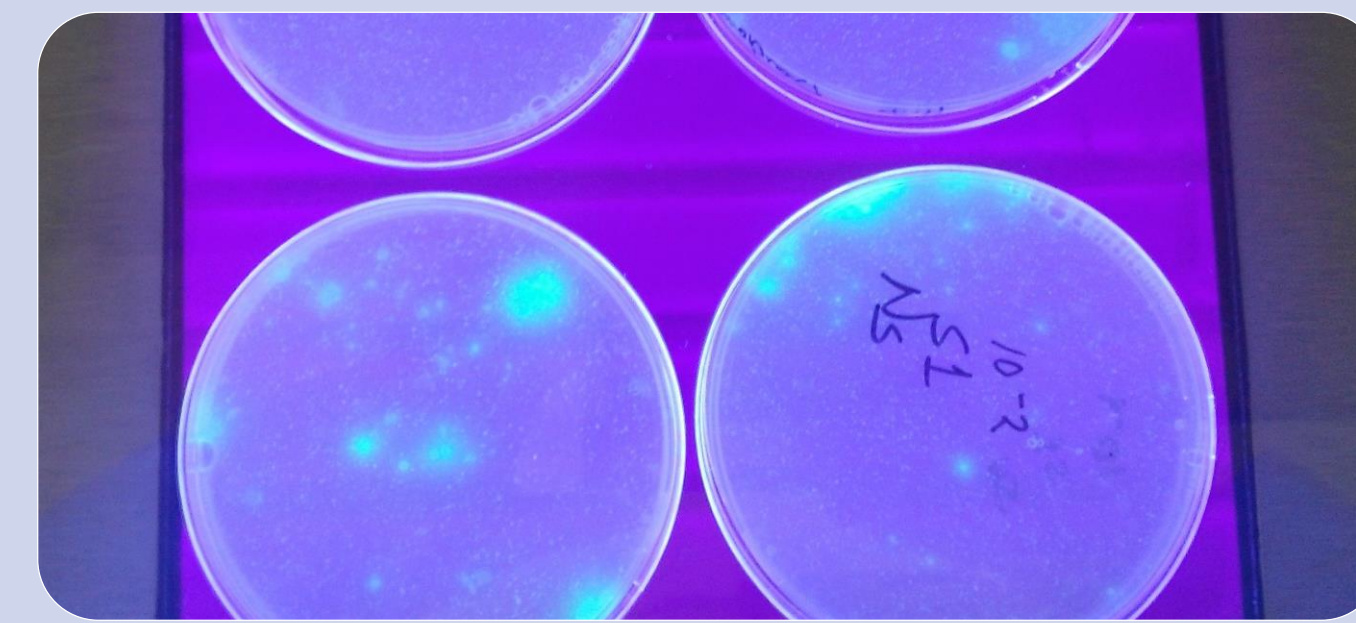
METHODOLOGY



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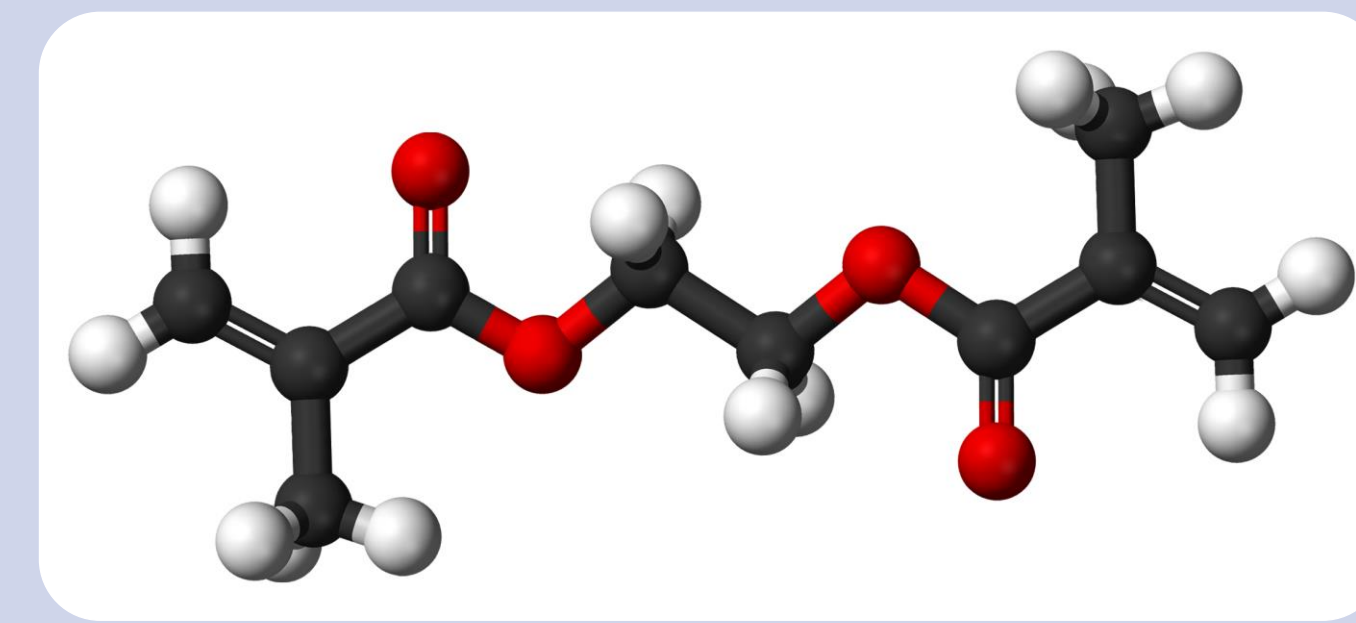
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POTENTIAL MANAGEMENT SYSTEMS



Probiotic Bacteria

- Naturally occurring on bats' skin
- Antagonizes and inhibits fungal growth



Hibernacula Modification

- Chemicals and cave-dwelling fungi
- Removes *Pd* from cave



Genetic Approach

- Analyzing gene expression of European bat species
- Breed beneficial traits



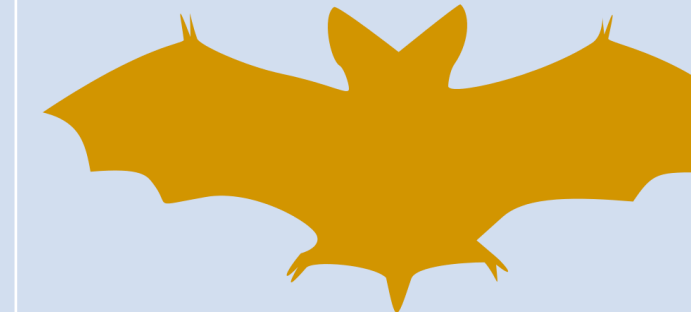
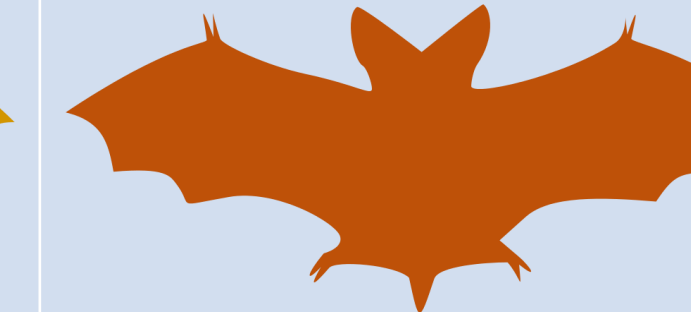
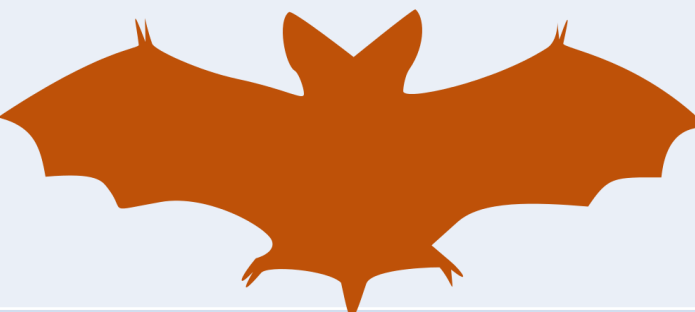
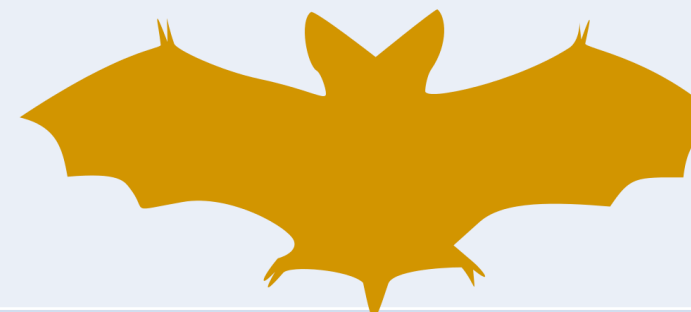
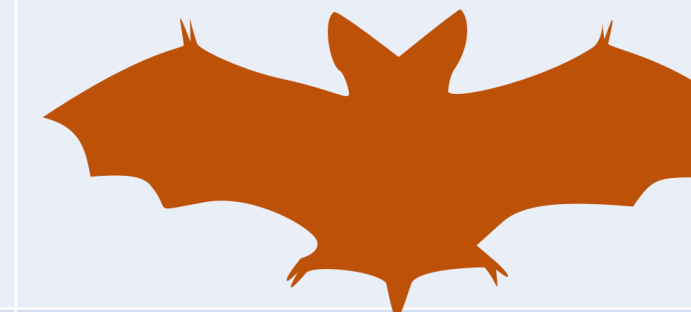
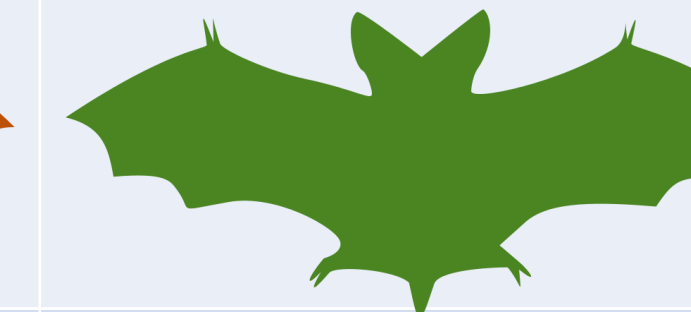













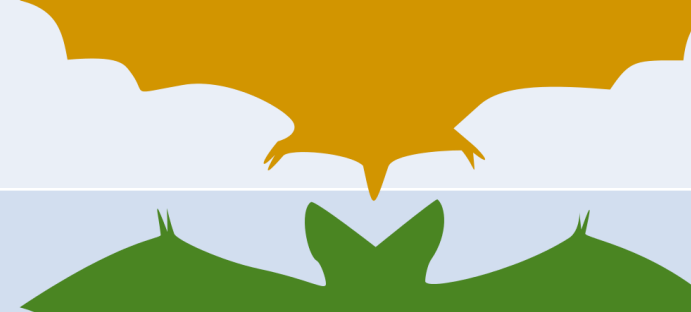
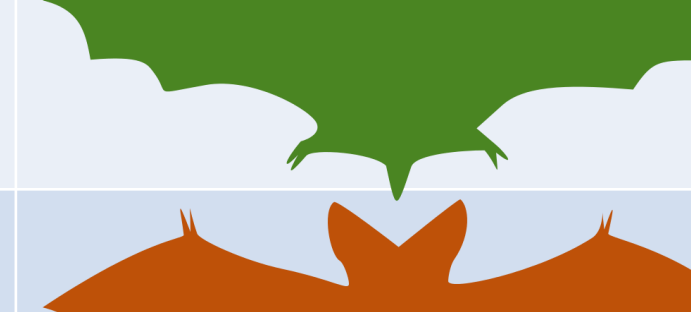

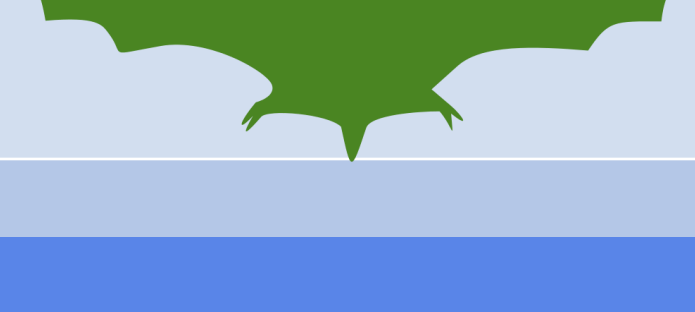

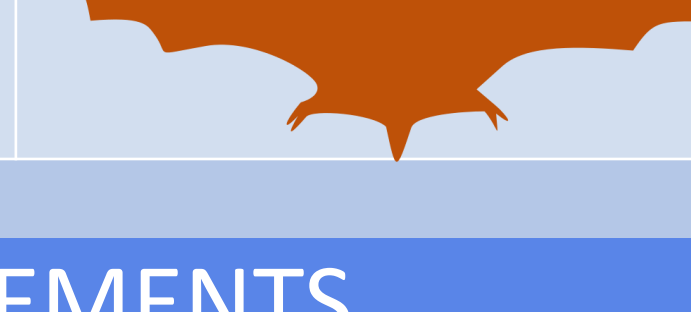
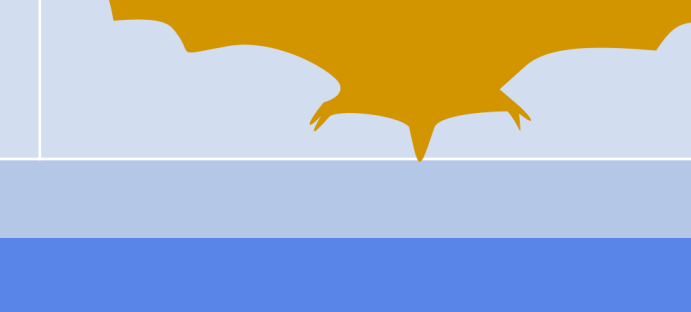


Roost Heating

- Helps in recovery from WNS during the summer
- Reduces energetic costs of recovering bats

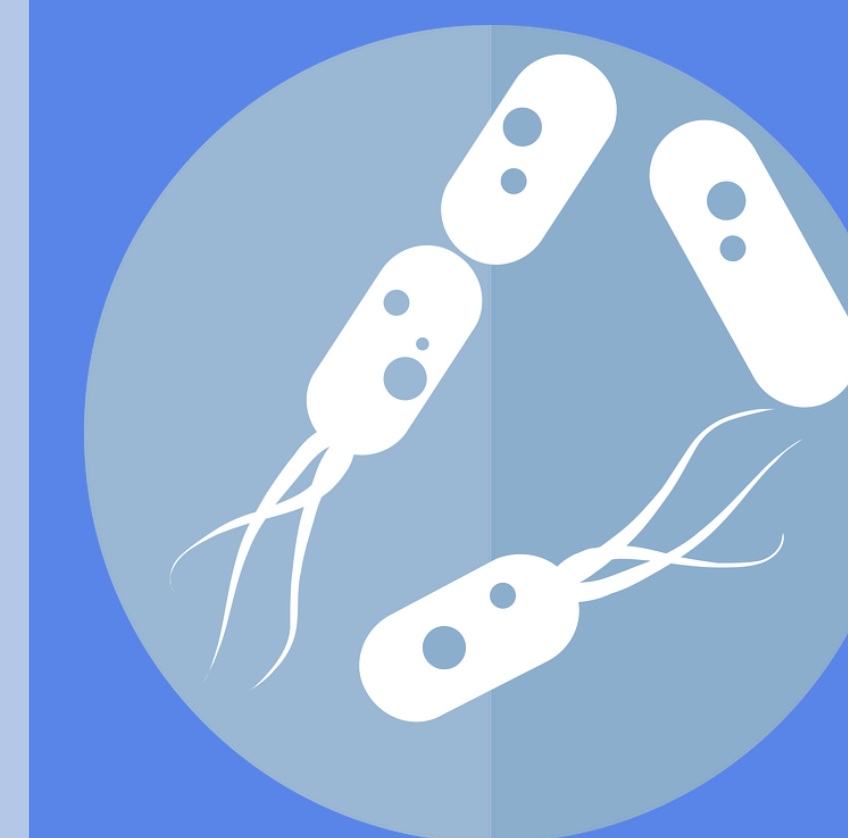
COMPARISON

 = ideal  = fair  = poor

	Probiotic Bacteria	Hibernacula Modification	Genetic Approach	Roost Heating
Inhibition of <i>P. destructans</i>				
Ease of Use				
Cost				
Environment Safety				
Bat Safety				
Long Term Effect				
Available Research				

CONCLUSION

We found that a combination of short-term probiotic bacteria inoculation and long-term heated roost construction would be ideal for combating WNS and revitalizing North American bat populations.



Probiotic Bacteria

- Local biocontrol agent
- Short-term cave stability
- Potential for sticking to bats for permanent inoculation

Roost Heating

- Speeds up recovery from infection
- Facilitates *Pd*-resistant hereditary traits
- Allows for long-term population recovery



ACKNOWLEDGEMENTS

We would like to thank our advisors Professor Bakermans and Professor Spanagel, and our peer-learning assistant Kaitlyn Valla for their constant guidance. We would also like to thank our contacts, Dr. Susan Loeb, Dr. Luanne Johnson, Mr. Donald Solick and Dr. Craig Willis for discussing the issue of White-nose syndrome with us.