

Title: Developing and Testing the Efficacy of a Topical Probiotic on Captive Bats to Prevent White Nose Syndrome.

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Abstract:

Wildlife diseases can have drastic consequences for species at an unprecedented rate. Without proper intervention, diseases can threaten population viability and result in species extinction. The delicate balance of an ecosystem is associated with individual species' niche's and can quickly become unstable upon the introduction of an invasive disease. Managing these diseases is often quite challenging and typically requires immediate action to prevent further ecological loss. The psychrophilic fungus, *Pseudogymnoascus destructans*, *Pd*, is known to cause devastation to several North American bat species throughout hibernation. White Nose Syndrome (WNS) is a deadly disease that indirectly causes hibernating bat mortality by growing on the cutaneous surfaces of the bat and causing more frequent arousal periods. In addition to physiological imbalances caused by the degradation of wing tissue, the decreased torpor length and associated increased metabolic rate will burn precious fat stores, cause rapid dehydration, and lead to bat mortality. Reducing the severity of the *Pd* infection could result in lower mortality rates. In this study, we are conducting captive bat experiments to alter native wing microflora found on *Myotis yumanensis*, using a prophylactic topical probiotic cocktail. The probiotic contains *Pseudomonas* bacterial species that were isolated from wings of healthy British Columbia bats and were found to inhibit *Pd*. The three main objectives of this study are, (1) to develop a technique of applying the anti-*Pd* microbes to high risk *Myotis* bats; (2) to test whether an altered microbiome can be sustained on their wings with persistent anti-*Pd* microbes during and after probiotic applications; (3) and to test whether the altered wing skin can better resist the growth of *Pd* than wings that do not receive the prophylaxis. A preliminary captive bat trial was conducted at the B.C. Wildlife Park and the results suggest that application of a concentrated prophylactic aerosol to bat wings successfully shifted the wing microflora. We will continue to work on the above objectives with a second captive trial in spring 2019; pending outcomes of these tests, our next step will be working with collaborators who would apply the probiotic to wild bats at summer roosts. Our goal is to reduce the spread, or at minimum the severity, of WNS in western North America.

Key-words: bats, conservation, *Pseudogymnoascus destructans*, *Myotis yumanensis*, *Pseudomonas*, white-nose syndrome, disease management, captive trial, microbiome, probiotic.