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Battling For The Little Brown Bat

A flicker of dark movement in a clear night sky. For most people, that brief glimpse is the extent of their relationship with the little brown bat, *Myotis lucifugus*, whose range extends across almost all of North America. However, the impact these little mammals can have on people, as well as their environment, should not be understated. Bats help control insect populations, pollinate vegetation, and serve as inspiration for humanity, from folkloric art to biomimicry technology. And yet, the little brown bat's status as an endangered species is not often discussed, and their negative stereotypes persist in society. Personally, I have always been fascinated by bats, as I spent many nights in my childhood bat-watching in southern Alberta and south central British Columbia, which are populated in large part by little brown bats. I've done many school research projects on bats, and yet there is still so much more to discover about them. I want to go further with my efforts; I want to draw attention to the issues little brown bats face and highlight what is being done, and what we must continue to do, to help this species.

Likely the single largest risk that little brown bats face is a fungal infection known as White Nose Syndrome, which is caused by *Pseudogymnoascus destructans* (Bittel, 2018). This disease has spread across North American bat populations rapidly, with little brown bats being in the top three most affected species. This fungus stages an epidermal attack that can increase metabolic rate and can awaken bats from hibernation, which drains their energy stores. Bats are also particularly susceptible as their immune system is weakest during hibernation, and the fungus frequents damp and dark areas that often coincides with the little brown bat's preferred environment. As well, bats tend to cluster closer together at colder temperatures, which allows

the fungus easier transmission in more vulnerable circumstances (Environment Canada, 2015). With the disease decimating millions of bats, killing up to 94% of the local population in some areas (Environment Canada, 2015), the effect of this epidemic has been horrific on the little brown bat. Several factors can be influenced by humans, such as the transmission of this infection between colonies. Although humans cannot be infected by White Nose Syndrome (Bat Conservation International, 2024), they can carry spores into bat habitats and hibernacula. Additionally, the spread of White Nose Syndrome makes little brown bats more susceptible to other risks such as habitat degradation, as the population depends on the survivability of fewer individuals (Environment Canada, 2015). This fungal infection is one of the main causes of the little brown bat's endangered status, but there are contributing factors that amplify the negative effects of this epidemic.

Further risks threatening little brown bats include habitat loss and degradation that has occurred in many areas across Canada. Although little brown bats tend to forage in more open spaces (Environment Canada, 2015), they can be found in forested areas on occasion and can use them for roosting, which makes deforestation a threat towards their environment. Humans can also degrade natural environments through urbanization and growing infrastructure. These structures can be appealing to bats as roosting sites, but they are often treated as an infestation and forcibly removed (NWF, N/D). This displacement negatively impacts the bat's ability to travel, and also diminishes safe roosting spaces. As well, habitat disruption can occur with human presence, such as light pollution and particularly, wind turbines. Though wind turbines can be an excellent source of renewable energy, they can also present considerable threat to bats (Bat Conservation International, 2024), especially when combined with certain issues like White Nose Syndrome, which increases the amount of winter flying and the erraticity of flight

(Environment Canada, 2015). Furthermore, little brown bats can have long-distance movements, which puts them at greater risk for harm via wind turbines (Bat Conservation International, 2024). Although issues with wind turbines and other human interferences have always been present, more research is required to understand the “sensory and cognitive ecology” (Buehler, 2019) of how bats navigate environmental obstacles. This includes echolocation, but also expands to their flight techniques, as they have the unique status of being the only mammal capable of flight. Clearly, more information is needed in order to take action and find solutions for coexisting, because modern human development is significantly threatening the little brown bat.

As little brown bats are insectivorous, they depend on a large supply of insects to prey upon; this necessity can be threatened by the human use of pesticides. With bats eating up to 3000 insects per night (Celley, N/D), they play an essential role in limiting insect populations, but this equilibrium can be thrown off by use of aggressive chemicals in agriculture. The widespread use of pesticides can destroy insect species, which has a ripple effect across trophic levels. Predators which feed primarily on insects (though their diets can be varied), like the little brown bat, suffer the greatest impact. As well, the use of pesticides can influence the hormones of bats, which are at notable risk. This is both because bats have a high metabolism, as well as a slow reproductive rate which can be negatively impacted by pesticide use and accumulation (Schanzer, 2022). Disruptions to metabolic or reproductive hormones would then have an especially disastrous effect on bat populations. Therefore, it is clear that these risks, along with the others outlined, necessitate action to conserve the little brown bat.

A particular challenge in supporting the recovery and preservation of little brown bats is their reputation in society. Humans have been creating negative stereotypes about bats throughout history, as evidenced by the infamous vampire. Yet despite continuous efforts to dispel misinformation, there is still a great deal of societal stigma faced by bats. Even for those who don't feel outright revulsion or fear, the lack of conventional 'cuteness' present in these animals makes them less of a target for awareness and public conservation. As well, there is a lack of research and understanding centering around bats as a whole, which makes it hard to create targeted, beneficial legislation. This can be seen in how ill-covered bats are by certain risk assessment and conservation plans (Schanzer, 2022). However, as more recognition is drawn to the issues faced by little brown bats and similar species, scientific and government groups are beginning to take action to protect these valuable species.

One of the most vital aspects of bat conservation is preserving the sanctity of natural environments, particularly hibernacula. These areas are where bats tend to be most susceptible to infections such as White Nosed Syndrome, as they are at their most vulnerable during this time. Efforts to protect bats during hibernation include decontamination protocol when entering caves and other hibernation sites, as well as monitoring populations (Jasper National Park, 2023). In addition, scientific advancements are being made to find cures for White Nose Syndrome. For instance, the use of polyethylene glycol (or PEG) has shown promising results, able to trick the *Psuedogymnoascus destructans* into expecting a dry environment and halting spore production (Bittel, 2018). A different kind of fungus has been used to inhibit further growth of the harmful infection, and there has even been testing with a 'lickable' vaccine (Bittel, 2018); however, these advancements must be widely implemented to be effective. This means that funding is required to create and sustain conservation programs, and legislation must be put into place to ensure that

little brown bats remain protected. Luckily, it is not only lawmakers and top scientists that can improve this issue. Because there are several different threats currently facing the little brown bat, there are several actionable steps that can be taken on a smaller scale that can help conserve little brown bat populations.

Personally, I intend to continue my own efforts to educate myself and others on bats, their ecological role, and the risks they face. As well, I intend to try and create 'bat boxes' and utilize do-not-disturb stickers (Jasper National Park, 2023) to create safe havens for bats when I know they are in the area. Preventing the use of pesticides wherever I can, such as my home or discussing it with my neighbors or school organization, would also be beneficial. Donating to organizations like Bat Conservation International, or even more generally, the National Wildlife Federation, would contribute to funding that benefits conservation of little brown bats and their natural environment. I believe that the vitality of bats is far more expansive than is often discussed; many species serve as indispensable pollinators, as well as naturally controlling insect populations. The impact bats have made on humanity should also not be understated. Bats have become ubiquitous in pop culture and in folklore, as well as inspiring the development of technology that mimics their unique traits such as mammalian flight and echolocation. Despite the recognition they receive in these regards, there is much work to be done to conserve the little brown bat, and I intend to be at the forefront of actionable conservation. Helping this fascinating species would allow future generations to catch a glimpse of movement in the night sky, and know the rich and vibrant role the little brown bat plays in our world.

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