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Wind Turbines And Bat Barotrauma

Wind is a renewable resource that has been harnessed by wind turbines to generate an environment friendly source of energy. However, their status as a “green” source of energy has been challenged due to the hazards they pose to migratory bats. Thousands of bats die each year at wind farms, and these deaths have recently been attributed to lung damage caused by the rapid drop in air pressure induced by wind turbines. The purpose of my project is to propose a rotor design that reduces this drop. I adapted the raked wing tip of a Boeing 767-400 to the rotor tip of the Vestas V80 wind turbine in order to reduce wing tip vortices, since vortices generate extremely low pressure currents downwind of the blade. I tested this design against an unmodified V80 rotor tip for losses in both static and dynamic pressure. I achieved my goal of reducing vortex induced static pressure loss downwind from the wind turbines. I also demonstrated that vortex loss is a significant factor in lethal pressure drops. The raked rotor tip produced vortices that were 57.3% weaker than those produced by the control blade. When I extrapolate my measurements to what a full scale rotor would produce, I estimate my raked wing tip will reduce the total pressure drop from 5.3 kPa to 3.1 kPa, which is sufficient to fall below the lethal threshold of 4.4 kPa for bats.