

## **Abstract**

As a result of wind turbine sound emissions from the blades, regulations are placed on wind turbines that limit the potential energy that could be acquired from wind farms, and wind turbines at large. The sound regulations placed on wind turbines result in a decreased amount of power generation. The following study investigated the performance of three different biological airfoils and analyzed the total amount of energy and sound produced by each blade. The movement of wind turbines through the air is the main contributor to the sound originating from wind turbines. To test each biological airfoil, a 3D model of each wing/fin was found and was attached to the central hub/rotor using TinkerCAD and printed with a hole in the center for the axle. A fan was used to generate the wind under 3 different wind speeds. Radians per second were recorded for each wind speed using a photogate (Go Direct), and sound measurements in decibels (dB) were recorded with the online sound meter on Youlean using a phone. The sound data was insignificant due to the noise from the fan and mechanical components of the wind turbine. The rigidity, surface area, and mass of each blade affected the blade's speed, and power output. Further experiments can be conducted on different biological airfoils and more accurate penguin, pterodactyl, and bat wings.

*Keywords:* Biological airfoils, noise regulation, wind turbine blades, wind energy