



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Chloe Brandon	Project Number J0107
Project Title Bio-Inspired Wind Power: Can a Whale Help Us Design Better Wind Turbines?	
Abstract Objectives/Goals The objective of this task was to determine if the power output of a three blade horizontal axis wind turbine could be improved by incorporating simple whale tubercles into the leading edge of the blades. Tubercles are bumps found on the fins of whales, and have been shown to reduce drag as the whale moves through water. Methods/Materials Balsa wood turbine blades were attached with bamboo skewers to a compact disk. This assembly was then attached to a DC motor and placed in front of a box fan. The power output from the DC motor was determined using a multi-meter, as the turbine rotated from the wind generated by the fan. Results Measurements of power output were performed on modified turbines and control turbines at different fan speed settings. At all speeds, the tubercle modified blade design resulted in improved power output. The increase was greatest at the highest fan speed setting. Conclusions/Discussion The project demonstrated that the power output of a horizontal axis wind turbine can be improved using a simple tubercle design added to the leading edge of the blades. This was verified using a model three blade turbine constructed from balsa wood.	
Summary Statement I demonstrated that the power output of a simple wind turbine can be improved if whale tubercles are incorporated into the leading edges of the blades.	
Help Received I came up with the idea for this project after investigating ways to improve wind turbine performance. I designed and assembled the wind turbines and blades. My father taught me how to use a multi-meter to measure voltage and from the motor, and convert it to power.	