CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)
Georgia C. Butler

Project Number
J2303

Project Title
A Magnetic Surfboard: Will Sharks Be Lured or Perturbed?

Abstract

Objectives/Goals
The objective of this study is to create a 2ft high-density surfboard that repels leopard sharks using rare earth neodymium magnets.

Methods/Materials
14 Neodymium magnets of varying strength, 2ft high density foam surfboard, 7 leopard sharks, squid bait and holding clip.
Built surfboard with groove for magnet placement and adjustment, placed surfboard in tank with sharks and recorded number of approaches and repels within chosen distance ranges for 3x 10 min trials for different magnet strengths and postions in presence and absence of food.

Results
The number of approaches and scared reactions (repels) were counted for multiple trials at each magnet position, including the number of repels within different distance ranges and bait conditions. The average number of approaches and repels over the 10-minute trials was compared. The approaches decreased with magnet strength while the repels increased. The average repels at the median distance in each range was also compared and found to decrease rapidly with the distance from the surfboard. In general, the repel reactions were more abrupt in the 0-8 cm distance range and were also much more common when very close to a strong magnet. In some cases the bait was taken early so the number of approaches was lower for that trial.

Conclusions/Discussion
When no magnets were present it is clear that the sharks had limited scared reactions without food and none with food. Even at weaker magnetic fields the sharks were still repelled at shorter distances. As the magnet strength increased the repel events increased and the approaches decreased. The number of repel events even increased out at the further distances with the strongest magnets. It is also shown that the number of repels is lower farther away from the surfboard and higher close to the surfboard. The experiments indicate that the objective was accomplished and from these results it is possible that magnets may help reduce shark attacks on surfboards.

Summary Statement
I created a model foam surfboard that repelled leopard sharks using rare earth neodynium magnets.

Help Received
I designed and performed all the experiments in the shark tank, changed the bait and magnet positions myself. My school science teacher Nicole Shimshock and a mentor John Cafill reviewed my results and provided suggestions. My father helped with MS Excel, power saw and tools. Marine Science Institute