CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
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Project Number
S1306

Project Title
The Utilization of Empirical Math Modeling in a Predator-Prey Relationship

Abstract

Objectives/Goals
In Phase 1 of this project, utilizing real-time research data I was able to confirm that classic predator-prey mathematical models fail to include dynamics that influence population size. Based on this information I concluded a model cannot be created to accurately represent the predator-prey relationship in the presence of unpredictable environmental variables. In Phase 2 of this project I conducted a comparative study between migratory variables and a static (less dynamic) environment with these models using real-time data.

Methods/Materials
In this study it is my goal to determine that in an isolated population, the polynomial fit lines do not exhibit the behavior observed in the data, in relation to the classic predator-prey model. First, a classic predator-prey model was constructed for comparison purposes. Then data from Ngorongoro Crater (a relatively static non-migratory ecosystem) was converted into spread sheets. Using these spreadsheets graphs were made for each predator and prey. In addition, polynomial fit lines were constructed on the graphs. Then the classic and Serengeti models (a highly migratory ecosystem) were compared to the various Ngorongoro graphs to check for compliance.

Results
To analyze the predator-prey models a polynomial fit line was constructed on the graphs to show the most accurate depiction of the data. They were also used to assist in the comparing of the models made with the Ngorongoro Crater data (a non-migratory environment), Serengeti data (a migratory environment), and the classic mathematical predator-prey model.

Conclusions/Discussion
Utilizing data from the Ngorongoro Crater, I was able to confirm that polynomial fit lines do not exhibit predictable behavior observed in the data with migratory variables in predator-prey relationships essentially eliminated in comparative populations and ecosystems.

Summary Statement
This project is a mathematical analysis of predator-prey models and their interaction with uncontrollable dynamics.

Help Received