CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
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Project Number
J2407

Project Title
Eriogonum caespitosum Density as a Model Predictor for Lycaena Species Population Models in the White Mountains

Abstract

Objectives/Goals
This math project is a continuation of a previous project to determine the use of a model as a predictor in field studies. In phase II of my study I looked at the correlation of the flowering population of one plant species to the population of one family of butterflies. This small study worked well, and was expanded into a larger study, phase III, at multiple sites and multiple species of butterflies within the same family, based upon 5 years of data. As data becomes available after the field counts held on July 4 of this year, I will examine the validity of my predications and apply to algorithms being constructed for multiple sites and multiple species.

Methods/Materials
Utilizing real field data from the White Mountain Research Station in Bishop, California, I correlated 5 years of data from one of several study sites. I used population data for flowering matted buckwheat Eriogonum caespitosum against the population density for the Copper and Blue Butterfly family Lycaenidae. Data was tabled and graphed for each respective year available, 2005 through 2009. I set a 95% confidence level with a t-Test to establish a predictability parameter. Phase III of the project will look at multiple species at multiple study sites. Predictions for 2010 will be made.

Results
I found that the Copper and Blue Butterfly Lycaenidae populations did correlate to the population of flowering buckwheat, Eriogonum caespitosum, within a 95% confidence level over a five year period at multiple study sites, regardless of severe population swings from year to year. The relationship appears virtually linear for these species. I am now preparing a phase III study examining multiple sites and multiple species to determine if the same mathematical correlation can be used as a predictor for other butterfly families and dominant plants.

Conclusions/Discussion
There appeared to be a direct correlation between the density of flowering buckwheat Eriogonum caespitosum and the family of Copper and Blue butterflies Lycaenidae. This was indicated regardless of low or high swings in population density for any given year, within a 95% confidence level in the model. I am now preparing a phase III study examining multiple sites and multiple species to determine if the same mathematical correlation can be used as a predictor for other butterfly families. A simple algorithm should be used for future predictions.

Summary Statement
This applied mathematics project examines the correlations between wild buckwheat populations and butterfly populations as a yearly model predictor.

Help Received
Dr. Morse helped obtain data for me.