CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

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Project Number

J1118

Project Title

Ecology or Economy: How to Have It Both Ways! Managing the Impact of Infrastructure Projects on Endangered Species

Abstract

Objectives/Goals

As the global population grows, it has become common for infrastructure projects (e.g. dams, solar farms) to adversely impact the habitat quality and overall viability of wildlife in general, and endangered species in particular. The goal of my project is to identify and validate a computer simulation based approach to assess and manage the impact of an infrastructure project on the population viability of an endangered species. I have used the Panoche Valley Solar Farm project in California and its impact on the giant kangaroo rat (Dipodomys ingens, GKR) population as the case study example. Hypotheses: 1. The solar farm as proposed will adversely impact GKR population viability, and drive it to extinction within the next 100 years; 2. It is possible to identify a modified scope and footprint for the solar farm that does not significantly threaten GKR population viability.

Methods/Materials

The control group is the GKR population in Panoche Valley, current population and projected growth, if the solar farm is not built. The experimental scenarios are: (a) the solar farm project as currently proposed, (b) a few variants of the solar farm in the same location, but with modifications to the footprint. Based on detailed research, I selected the Vortex Population Viability Analysis Software as the computer simulation system for this project. A customized stochastic model was built using Vortex to capture the specifics of the Panoche habitat and the GKR population. This model was run iteratively to estimate the projected GKR population over 100 years under each scenario using numerous simulation runs.

Results

Simulation results show that the Panoche Solar Farm as proposed will likely have a significant adverse impact on the GKR population, with an estimated >40% likelihood of GKR extinction over 100 years. I was also able to identify an alternative footprint for the solar farm with the potential to significantly mitigate the impact and reduce the likelihood of GKR extinction to <15%.

Conclusions/Discussion

My research project validates computer based simulation as an effective approach to the assessment and management of the impact of infrastructure projects on the viability of endangered wildlife species. In the real world Panoche Solar Farm case study, I was able to identify an alternative proposal that represents a good balance across ecological conservation and economic development.

Summary Statement

A study that validates the use of computer based simulation as an effective approach to managing the impact of infrastructure projects on the habitat quality and population viability of endangered wildlife using a real world case study.

Help Received

Mr. Sommer provided valuable guidance for this project. Dr. Lacy helped resolve issues related to the Vortex software. Mr. Spangler answered questions related to model parameters.