Prairie Dogs and Black Footed Ferrets

New Mexico
Supercomputing Challenge
Final Report
April 3, 2013

Team 113
Taos High School

Team members
Drake Bjorkman
Kobe Bellas
Payton Hanna
Francisco Vigil

Teacher
Tracy Galligan

Project Mentor
John Paul Gonzales

Executive Summary

The situation we are investigating is the relationship between the black-footed ferret and the Gunnison prairie dog and how their actions have an impact on the other species and their environment as a whole. We built a computer program to simulate this relationship and illustrate how they need each other to survive and thrive to their fullest extent. We thought that if we could provide significant data, we could give it to the Town of Taos and maybe even start helping both populations return to their natural symbiotic state.

Problem

The purpose of this project is to discover if the prairie dog population in northern New Mexico is increasing or decreasing due to reproduction and predators. In northern New Mexico, prairie dogs are not considered important to many people but by researching them, we found that they are directly responsible for the survival of the black-footed ferret. This is important because the black-footed ferret is dependent on the prairie dog for food; making up 90% of its diet and the black footed ferret eats a prairie dog every three days. When they do this they move into the burrows of the dead prairie dogs. There is a symbiotic relationship between the two, because the ferret gets food and provides population control to the prairie dogs. Overall, we are trying to show under what circumstances the prairie dog population would diminish to the point that would no longer be able to sustain life for the black-footed ferret.

Our Solution

The simulation we are running is a predator/prey model using prairie dogs, black footed ferrets, food, and plague. We used the software programs StarLogo TNG™, to build the computer model. We plan on making a predator/prey simulation program to represent the population of prairie dogs over time or until the predator/prey population diminishes.
We have observed and studied the between relationship the black-footed ferret and the prairie dogs of New Mexico and their interaction with each other and how it affects the other species. We have created a very basic computer model describing this relationship.

Verification and Validation

We have no verification or validation as we never collected data that could be supported by any logic, math, science or any other field of academia.

Results

The results we drew from this project were somewhat vague. Minor flaws in our simulation prevented us from getting much significant data or data relative to the situation. However, we did make conclusions based on the research we conducted and information we were given. The ferrets rely on Gunnison prairie dogs for 90% of their food. The ferrets will eat a

prairie dog and then move into its den, supplying them with a home safe from the elements and other predators, such as coyotes or foxes. In these regards, the ferrets need the prairie dogs to stay a healthy population or else they will die off. In return, if the ferrets disappear, the prairie dogs will overpopulate their given area and diminish their source of food to the point where they will not have anymore and they will die. Both species are necessary to each other's survival and well-being, despite the fact that there are so many more variables in this situation than the ones just listed.

Conclusion

We have concluded through trial and research that black-footed ferrets are essential to each other's survival and everything must be done to ensure the survival of both species. However, we are a group of high school students no one will actually listen to us if they don't run away first.

Achievements

Drake's Achievement: I learned a little about coding in StarLogo and I learned a lot of stuff about prairie dogs and black footed ferrets. I hope that I informed some people about the situation however probably nothing will change. One thing I am proud of is how much work I put into this project. I realize that won't convince any judges with it but I can still be proud. I am also proud of Payton because he gave up a chance to see his--for lack of a better word--girlfriend in the name of supercomputing.

Payton's Achievement: I got a chance to experience a project I've never done before, and I learned a tad about working StarLogo. I exposed some new people to the situation of Gunnison prairie dogs and black-footed ferrets, and hopefully we made some impact on our judges in Española and exposed them to this problem. We can't really do anything about it without significant data.

Kobe's Achievement: I have learned how to program in starlogo and how to create a predator prey model. I also got to work on a project that I have not done before and I have also learned how to incorporate data into a simulation even if the model was not greatly successful. This has also taught me how to work in a group and try to accomplish a project. I have been able to work in a group and teach judges and friends about the symbiotic relationship between the Gunnison Prairie Dog and the Black-footed Ferret.

Acknowledgements

We would like to thank John Paul Gonzales for improving our coding skills and thanks to Steve Tapia for his information on the ecosystem we were studying.

Bibliography

Tapia, Steve Wildlife biologist

"Black-footed Ferret." *Wikipedia*. Wikimedia Foundation, 04 Mar. 2013. Web. 03 Apr. 2013.

"Gunnison's Prairie Dog." *Wikipedia*. Wikimedia Foundation, 04 Feb. 2013. Web. 03 Apr. 2013.