



CALIFORNIA STATE SCIENCE FAIR

2013 PROJECT SUMMARY

Name(s) Emma R. Freedman	Project Number J1109
Project Title How Endangered? Modeling the Effects of Logging and Poaching on Orangutan Viability	
Objectives/Goals The Bornean orangutan, classified on the IUCN Red list as endangered since 1986, is threatened by illegal poaching and habitat loss due to logging. Borneo, one of the only two remaining places where the orangutans live in the wild, was almost completely covered by rainforest in 1950, and is now only 50% covered. The remaining pockets of rainforest are diminishing, leaving groups of orangutans isolated. Though some areas are protected, illegal poaching, logging, and forest degradation occur. These human actions pose as threats to the orangutans. On the current path, the remaining orangutan populations are threatened with extinction. We need to know how logging and poaching affect the populations so we can take more effective action on saving this species.	Abstract
Methods/Materials In this study, using a student version of MATLAB, I have modeled orangutan populations using a density dependent logistic simulation to test the effects of various levels of logging and poaching on the sustainability of orangutan populations in 120 scenarios. Models were also run projecting the sustainability of #real# populations when affected by 1% logging and 1% poaching.	
Results In scenarios affected by neither logging nor poaching, all populations besides those with a relatively low initial population size restricted to low quality habitat are sustainable. Reduced levels of poaching can be tolerated by most of the populations, but currently, estimated poaching rates are unsustainable. No populations affected by any of the tested logging rates are sustainable if these rates are allowed to continue indefinitely. All #real# population scenarios affected by the lowest mentioned logging and poaching rates are unsustainable. The data suggests that one, large, high quality reserve is better for orangutan survival than many small, or low quality habitats.	
Conclusions/Discussion This work shows that both poaching and logging adversely affect the sustainability of orangutan populations, but logging is more devastating. Overall, both logging and poaching must both be reduced to save this species, and reforestation interventions must be made in areas with low quality habitat. Because of the orangutans' life history and population biology, there is a strong time lag between disaster for the orangutans, and a noticeable decrease in the population. Therefore, precautionary efforts must be made to protect this species from extinction.	
Summary Statement I am interested in saving the orangutans so I modeled the effects of logging and poaching on orangutan viability to find out which action poses the greatest threat.	
Help Received Dr. David Bernick was my mentor; Lauren Lui, UCSC graduate student, tutored me in MATLAB; Patty Freedman helped me with background research; John Rosasco, M.A. gave me an introduction to calculus; Dr. Tim Tinker gave me an introduction to evolutionary biology.	