Anna Thonis
Stony Brook University – Department of Ecology and Evolution
Statement of Purpose

A dual undergraduate major in Environmental Science and Sustainability Studies, paired with a Master's in Biology (in progress), has given me a unique perspective on evolutionary and ecological processes. With a background in the earth sciences, I studied the interconnectedness between biology and the Earth's biogeochemical processes. Additionally, my extensive Sustainability Studies thesis delved into the thought processes behind why individuals feel differently about the environment, wildlife, and conservation. As I currently pursue my M.S. in Biology, I am learning about the core biological processes that underlie many of the Earth's complex systems. Pursuing a Ph.D., I aspire to become a more skillful and dynamic learner, teacher, advocate, and researcher in the field of ecology. An advanced degree has the potential to accelerate my research-oriented career path, in hopes of securing a job in Academia, or potentially for a federal research organization. Although time is of the essence, taking the time to hone my critical thinking skills will only position me as a stronger scientist and researcher, while also providing me with the tools I need to make substantial contributions to the field in the future.

Regarding past research experience, during the summer of 2015, I worked as a Forest Intern for the non-profit organization Frontier. I was stationed in Nosy Be, Madagascar, where I conducted independent research on the brumation behavior of the plated ground lizard, *Zonosaurus rufipes*. Through the use of bucket traps to capture *Z. rufipes*, as well as analyzing annual survey data on the species, I determined the species' abundance for the area for mid-July (the time of the annual temperature drop for N. Madagascar) and compared this to its annual abundance data. The data showed a strong correlation between *Z. rufipes* entering brumation (similar to mammalian hibernation) and the annual temperature drop in northern Madagascar. Additionally, I conducted three field surveys per day, quantifying population and abundancy differences between degraded, secondary, and primary forests. Our primary survey taxa included various species of bird, butterfly, snake, lizard, and lemur. My research experience in Madagascar provided me with a strong foundation for continued research and field work in a remote country, as well as a background in population dynamics, specifically between forest types.

In the fall of 2015 I began conducting research with Rensselaer Biology Professor, Dr. Brad Lister, on the potential distribution changes of Puerto Rico's *Anolis* lizards. The goal of the study was to determine the potential change in distribution of each of the ten species of Puerto Rican anole due to climate change. To do this, we used distribution data from the Puerto Rico GAP Analysis, paired with WorldClim bioclimatic variables, for use in MaxEnt niche modeling software. As a part of our results, we found that eight of the ten *Anolis* species studied are likely to experience a decline in their most suitable habitat area by 2050, and nine of the ten species by 2070 (under Global Climate Model HadGEM2-AO, RCP8.5). By looking at these predicted habitat changes, as well as the preferred habitat of Puerto Rican anoles, we aim to increase knowledge on potential distributional changes of *Anolis*. This research experience has prepared me for future research projects involving ecological modeling and has provided me with many of the tools that I hope to use for my future graduate research project. Furthermore, I attained valuable experience writing and prepping a work for publication in an academic journal, as I was fortunate enough to first author this paper. The paper was submitted on December 1, 2017.

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Lastly, during the summer of 2016 I participated in a National Science Foundation Research Experience for Undergraduates program (NSF REU). My research project focused on defining the thermal profile of the pygmy treeshrew, *Tupaia minor*. The project involved the setting of ~100 locally-made cage traps for capturing *T. minor* throughout the jungles of Kuching, Sarawak, Malaysia. The experiment measured each specimen's metabolism at various, set temperatures in order determine the species thermal tolerance limits. My study species, *T. minor*, evidenced a surprisingly wide thermoneutral zone (<10°C) compared to other small tropical mammals of similar body mass, indicating that the species may be able to adjust effectively to rising ambient temperatures. This research paper is near completion and currently being prepped for submittal.

After speaking with Dr. H. Resit Akçakaya, I believe that my research interests align strongly with Stony Brook's Ecology and Evolution Ph.D. program. I am interested in studying the impact of climate change on biodiversity through the use of species distribution and metapopulation modeling. A greater understanding of the potential impacts on species due to increasing ambient temperature has the power to improve conservation plans for protecting various species, as well as allow for the more accurate predicting of extinctions. Although I do not know of its feasibility at this time, Dr. Akçakaya and I discussed the potential for incorporating a species' physiological constraints, such as thermal tolerances, into species distribution modeling. The incorporation of a species' physiology has the potential to generate more accurate species distribution models, when working to determine which species may be at risk of extinction in the coming years (Kearney and Porter, 2004; Araujo and Luoto, 2007; Logan et al., 2013). Additionally, the work Dr. Akçakaya is involved in with the International Union for the Conservation of Nature (IUCN) excites and intrigues me. I feel strongly that my experience with distributional modeling, population dynamics, and thermal physiology, alongside my eagerness to learn and work towards a greater understanding of the vulnerability of species to extinction, makes me as a strong fit with the Department of Ecology and Evolution at Stony Brook University.

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