The first time I heard the word "Ecology" I was one of a small group of middle schoolers congregated around Becca Rowe, a wildlife biologist from the local Utah Museum of Natural History, and presenter at that day's Expanding Your Horizons conference. As a participant in the conference, aimed at exposing middle school girls to career options in math and science, I had not expected to be so profoundly affected; after all I already knew I wanted to pursue a career in science. From an early age there were a few things I held as fact about myself: I loved animals, I was good at math and science, and those things meant that I would be a veterinarian. I was so committed to that path that early on I could be found most afternoons volunteering at the local vet's office, observing operations, learning about common illnesses, and which medications would help. But at that conference I discovered that loving animals and being good at math and science could mean so much more. Instead of examining the health of the world's creatures one pet at a time, I could find answers to questions that would address the health not only of animals, but of the plants and streams and soils to which I was equally committed. I learned that math was not just the equations on a page I enjoyed solving, but could be the framework through which I answered those questions. I went forwarded from that day with a renewed vigor in my pursuit of math, while holding tightly to the word ecology and its representation of the part I could play in healing the natural world.

I wanted more, and more meant turning to the first connection I could make to this strange new world of ecology: the Utah Museum of Natural History. Quickly my weekends became dedicated to fulfilling a variety of roles at the museum. As the resident entomologist's assistant I introduced kids and parents alike to the wonders of tarantulas and hissing cockroaches through scientific explanation and live specimens. I was a "Frog Wrangler", where I used coffee filters and dirty water to teach museum-goers about amphibians' semi-permeable skin and resulting sensitivity to pollutants in water. My time at the museum impressed upon me the importance of scientific communication, especially in the early stages of a child's education. Every day at the museum I was witness to the unique wonder and discovery of kids considering their relationship to the natural world for the first time. In addition to allowing me to pass on my passion, my time at the museum gave important societal context for the field of ecology as I looked forward to the day that I could pursue it further.

With this clarity of purpose, I started my undergraduate tenure at Utah State University as a double major in Ecology and Statistics. The next four years became a journey to find the most intellectually fulfilling and societally meaningful way to unite those two forces. Early research experiences included my work with Dr. Dan MacNulty looking at potential signaling between elk and wolf in predatory situations. We found that while an elk's gait type is correlated with the probability of an elk being killed, age was still the most important factor in explaining the success of a hunt. My work on this project coincided with a linear regression course, giving me invaluable ecological context for the concepts I was learning in class. I internalized the way nuanced decisions such as variable and model selection can be grounded in ecological theory while still maintaining statistical rigor. This proved to be invaluable as I went on to collaborate with statisticians at University of Goettingen in Germany to develop a nonparametric mixed effects model to predict forest biomass from LiDAR data. As the dataset of interest involved many variables with known and unknown functional relationships to forest biomass, my ecological background informed decisions about which variables should be modeled as linear, non-linear, or non-parametric relationships, improving the ability of the model to predict biomass.

I also sought experiences that would provide opportunities at each step of the research process, from data collection to communication of results. One such example was my project with Dr. Lise Aubry looking at the effect of phenological shifts due to climate change on Uinta ground squirrels (UGS). I assisted in fieldwork and executed the analysis to obtain abundance estimates using a Capture-Mark-Recapture robust design model. These estimates were compared to historical abundances obtained from NSF-supported research of the same population in the 1960's and 70's. After two years of contemporary data collection, preliminary results showed that contemporary UGS populations have higher body mass and survival than historically, suggesting that they might be benefiting from the longer above-ground season brought on by climate change. I secured a grant totaling $2000 to make this project possible. Results of this project were communicated in written form as a final paper in a graduate-level population ecology course and in oral form at multiple conferences, including Utah's Research on Capitol Hill where I discussed my work with legislatures and policy makers.

While each of these experiences clarified my understanding of the research process, it was my semester at the University of Helsinki that truly set me on the path to a career studying quantitative ecology at large spatial scales. As a student there I became involved in the Conservation Biology Informatics group, taking courses on the theory and application of systematic conservation planning. In this group I discovered the first line of ecological inquiry that truly incorporated all the aspects of ecology that first captured my attention. Not only did systematic conservation planning offer an approach to conservation action that could be applied to many taxa simultaneously, these questions were being addressed in the framework of advanced mathematical and statistical techniques. The group's conservation prioritization software Zonation provided evidence that these methods could be immediately useful to managers and not simply an academic exercise.

Upon returning to my home university I had the singular goal of identifying and acquiring the additional skills I would need to pursue a career in large-scale conservation ecology. In addition to enrolling in advance computational classes in topics such as the Python programming language and multivariate statistics, I became a member of the Weecology research group, co-led by Dr. Ethan White. As a member of a group on the cutting edge of broad-scale, data driven ecology, I worked to develop and execute a research project informed by my experience in Helsinki, and prompted by unaddressed discrepancies in the conservation prioritization literature. I saw that while most of the work being done in Helsinki was based on survey data, the kind of global prioritizations I was interested in were almost exclusively done based on geographic range map data. This raised the important question of whether or not the two data types were comparable. I sought to address this question by creating biodiversity maps with hotspot prioritizations based on both data types, and analyzing the sensitivity of prioritizations. I found startling discrepancies between the maps built on range and survey data, with as little as 15% overlap in hotspot prioritizations. The results of this project are the basis for my undergraduate honors thesis and a manuscript currently in progress. The discrepancies found raise essential awareness of the importance of data quality and type, and provide the motivation for my proposed project, which will develop methods to facilitate use of information rich survey data.

My pursuit of computational approaches to global-scale conservation questions continues as I begin my PhD at University of California, Berkeley. I am uniquely prepared to pursue these questions, with the theoretical grounding and quantitative skills to recognize and address rising challenges in conservation. My strong research background brings an awareness of what it means

to design and execute a project from conception to communication of results. Berkeley is an incomparable institution in which to be asking these questions, and to prepare me for an academic career at the forefront of conservation tool development. As an assistant professor of Ecoinformatics, my advisor Carl Boettiger brings a wealth of knowledge about novel quantitative approaches to ecological questions. His position as a co-founder of the ROpenSci project, seeking to make products of science transparent and accessible, ensures I will have the tools to make the results my academic efforts available to the conservation community. The Berkeley Institute for Data Science (BIDS), of which I am a member, provides a community for researchers asking data-driven questions across disciplines. Participation in this community presents an unparalleled opportunity to pair methods novel to the field of ecology with conservation questions. I am also a fellow in the NSF Research Traineeship (NRT), Ecology and Society: Data Science for the 21st Century. This NRT is focused on equipping graduate students asking environmental questions with tools to leverage the data of the future. My position in the NRT supports my further exploration and development of a wide range of computational skills. While at Berkeley, I also continue my commitment to facilitating the growth of quantitative approaches in the next generation of scientists and conservationists. I am a member of the BIDS working group for Education and Training, where I work with faculty and fellow PhD students to address quantitative skill development across disciplines. I also continue my relationship with the organization that first brought me to the field of ecology, the Expanding Your Horizons network. Through my position on the organizing committee for the Berkeley area workshop, I work to bring female scientists together with middle school girls. Workshops are designed to present potential careers in math and science in an engaging interactive way, introducing many to those possibilities for the first time.

I am committed to a career developing novel quantitative approaches to global conservation questions. A National Science Foundation Graduate Fellowship would ensure my research direction continues to be driven by intellectual curiosity, with freedom for further exploration of the relationship between math and ecology that has motivated my career thus far. It would provide an incredible launching pad for my career in academia and my role developing and using quantitative approaches to address the pressing conservation questions of the coming decades.

Summary of Intellectual Merit: I have the unique background of being trained as both an Ecologist and Statistician. My experience pairing the two expertise to answer questions ranging from predator-prey interactions to forest biomass modeling demonstrates my ability to apply my skills to any ecological topic. This is only strengthened by the support for data-driven science found in the BIDS and NRT communities. My strong statistical background, history of working with large ecological datasets, and experience in all aspects of the research process, ensure that I am fully prepared to tackle the challenges of the proposed work.

Summary of Broader Impacts: Scientific outreach and education have played an integral role in shaping my journey of scientific discovery and eventual career. A large part of my identity as a scientist now and in the future is therefore investing in the continuation of such programs. I show this through my involvement in the BIDS education initiative and the Expanding Your Horizons Network. I am also uniquely prepared to make my research societally meaningful. As conservation is an inherently global challenge, my experience collaborating internationally demonstrates my ability to take novel conservation applications beyond my immediate academic scope. I have the technical background and resources to make products of my research, such as the software developed, available to the conservationist and managers that can best use them.