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2. Graduate Student Applicant: Submit Statement of Interest and Commitment (.pdf or .doc files only). Here is your opportunity to explain why you should be chosen to participate in the Advanced Study Institute. You can explain your background, interests, motivations, and plans for the future. You also should elaborate on your commitment to continue with a research project in your home institution.

I first became interested in disease ecology when I accepted an M.S. graduate position at New Mexico State University (NMSU) studying bird communities and West Nile virus. As an ecologist, I am interested in the interactions between organisms and their environments, and therefore, focused my research on examining ecological patterns associated with diseases. To understand how a disease is maintained in nature, this requires collecting field data to help determine species involvement, habitat characteristics, environmental factors, and species interactions that might affect the presence of a disease. These pieces of information are the foundation upon which disease models can build upon to examine concepts such as growth rate and outbreaks. As part of my graduate experience in disease ecology, I would like to expand my expertise in modeling disease patterns so that I can be proficient in both the ecological and mathematical aspects of diseases for my future career as a professor in this field.

I am enthusiastic about attending the AIMS/DIMACS workshop in South Africa. I know this workshop will greatly enhance my background in disease ecology by providing integral experience in mathematical modeling of diseases. By working with other graduate students alongside experienced disease modelers, I will gain an immense knowledge on how disease growth should be modeled. The experience I hope to obtain from this workshop will be carried with me throughout my career and will allow me to become a more knowledgeable disease ecologist.

My interest lies with diseases that are vectored by arthropods. Africa has a large number of arthropod borne diseases that utilize humans as the primary or secondary hosts, such as malaria, dengue, trypanosomiasis, west nile, rift valley fever, and many others. I would like to focus on modeling vector borne diseases, but would also gain experience in non-vectored diseases to obtain a more comprehensive background in disease modeling. It is through modeling that ecologists and epidemiologists can work together to provide the public information on how to reduce infection risks. Although my experiences in disease modeling are limited, my background in ecology will be an asset by providing insights about ecological parameters that may be important to achieving an understanding of disease outbreaks.

My fascination with vector borne diseases was a result of my experiences at NMSU. I had the opportunity to conduct ecological research on a newly emergent disease (West Nile virus) that was rapidly expanding across the United States. Although my undergraduate background was in ecology and not diseases, I decided to take this challenge and gain new foundations in my graduate career. I had three primary research questions regarding WNV in the avian communities of the arid lands of southern New Mexico: 1) What is the variation in seroprevalence that may be associated among four key habitats of southern NM (riparian, agriculture, urban, and desert) on the avian populations?; 2) What is the role of avian natural history traits in the transmission of WNV?; and 3) Do communities with higher avian diversity have lower disease risk compared to communities with lower avian diversity as suggested by the host dilution hypothesis? I found that urban and agricultural habitats had the highest seroprevalence and that age was an important natural history characteristic, with adult birds having had higher seroprevalence than birds of the year. The role of sex was equivocal as males had higher seroprevalence one year whereas the females had higher seroprevalence the second year of the study. The host dilution hypothesis was supported, showing that as the diversity for the avian communities began to decrease, seroprevalence across the communities began to increase.

The experiences I gained from my research on WNV contributed significantly to my decision to continue studies on vector borne zoonotic diseases. This led me to Rutgers University where I am working towards a Ph.D. studying Lyme disease ecology. I will be integrating ecology with epidemiology in an effort to work with epidemiologists in the future towards human health protection. Because of this, I have attended two DIMACS workshops on computational and mathematical epidemiology. These included the models of co-evolution of hosts and pathogens, and immuno-epidemiology. In addition, I am currently enrolled in the computational ecology class at Rutgers University, which focuses on modeling ecological patterns using the program Mathematica. This will provide me with experiences in modeling and allow me to combine modeling of ecological patterns with those of disease risk, transmission, and maintenance.

My short term career goals include finishing the Ph.D. program in Ecology and Evolution at Rutgers University within five years. During this time, I will be examining Lyme disease ecology, looking specifically at genotype differences in *Borrelia burgdorferi*, the bacterium

responsible for Lyme disease. This research will be co-advised by Dr. Rick Ostfeld and Dr. Peter Morin. Additionally, I will be using microcosms, or small study systems in which manipulation of the community and environment can be controlled, to examine general questions regarding disease transmission and maintenance. I would like to model transmission and maintenance in these microcosms, utilizing the modeling experiences I hope to gain from the computational ecology class as well as the AIMS/DIMACS workshop in Africa.

Microcosms have been used in many ecological studies that examine ecosystem functions and communities. They are simple systems that can be controlled within the lab and offer insights into how species interact in a community. Because of the difficulty in evaluating individual species in communities at the macrosystem level, microcosms are a great way to test ecological questions at a tractable scale. By using microcosms, I can manipulate the communities and pathogen that can invade the system to examine the outcome of transmission and maintenance. This will provide a basis to understanding what parameters are important in modeling the system, and this in turn, will provide information on determining the parameters for real life diseases. Importantly, microcosms are also ideal for developing and testing mathematical models.

My long term goal is to become a professor and continue research on disease ecology while providing undergraduate and graduate students an opportunity to become involved in ecological questions and models. I would also like to teach so that I can encourage fresh minds to study disease ecology because of the importance of diseases to wildlife, humans, and ecosystem services. As new diseases emerge and old ones reemerge, there is a continual challenge for new researchers to get involved, and I want to encourage these new researchers. I know that with the past research experiences at NMSU and my future research experiences at Rutgers University, in addition to the experiences that this workshop has to offer, I will become a much stronger disease ecologist.