A Spatial Assessment of a Population of Chestnut Oaks

(*Quercus prinus*) on the Cumberland Plateau

I worked in Sewanee’s Department of Biology to continue a long-standing research project on the Cumberland Plateau. My advisor, Dr. Jonathan Evans, established the experimental plot above Thumping Dick Cove in 1997 and has been collecting data ever since. Each *Q. prinus* individual over 0.5 meters tall in the one-hectare plot was tagged, and changes were tracked yearly. We finished the final data collection concerning demography last fall, and my responsibilities this summer were related to collecting environmental data for the plot and analyzing data that had been previously collected. Data was analyzed using Geographic Information Systems (GIS). I also worked on a separate side project regarding a unique interaction between wild hogs (*Sus scrofa*) and yellow nut grass (*Cyperus esculentus*) on St. Catherine’s Island. We set out with the goal of publishing a scientific paper on the topic, so a thorough literature search and the creation of a manuscript was necessary over the course of the summer. This internship allowed me the opportunity to gain experience in fieldwork and data collection, the process of creating a scientific manuscript, and data visualization through GIS; this research has been integral in my decision to pursue graduate school.

In order to systematically work through these tasks, I began the summer by creating a list of objectives. My first objective was to synthesize information for the hog-sedge mutualism paper using material that Ethan Evans and I had compiled, as well as the previous reports written by students involved in the Island Ecology course. The gathering and analysis of data for this paper provided a lesson in proper data collection and storage; data had been collected in 1997, 2002, and 2008, and there were no remaining raw datasheets from any of these periods. I worked off of the raw data that was presented in tables from the reports of previous students. I found
writing the paper to be a challenge, but the end result was extremely gratifying. Dr. Evans advised that I begin with an outline and write what I thought might make good general paragraphs, and we would edit them together. I found this approach to be very helpful, and the manuscript quickly took form after several revision sessions. Dr. Cecala provided essential help analyzing the data with the program R, and we completed the final analyses shortly after I finished my internship. I look forward to submitting the manuscript to a peer-reviewed journal in the immediate future. This experience allowed me to work alongside the professors that I admired and contributed to my desire to further my knowledge so that I can perform research and give assistance at a similar level.

Early in the summer, I began familiarizing myself with the GIS software under the guidance of Dr. Van de Ven. I developed fieldwork and GIS skills while continuing the *Q. prinus* research. Major goals to be accomplished in the field included measuring soil depth, soil moisture (after a rain event and at a later point before any additional rain), leaf litter, and light levels for over 230 individual points. To accomplish these goals, I learned how to use equipment such as a moisture meter, fisheye lens, and the canopy light measuring program HemiView. I was able to practice datasheet organization to streamline the data collection process. I amassed all of the data I set out to collect with the exception of the light levels; upon analyzing the photos I had taken with the fisheye lens, I determined that they had been taken under non-ideal conditions during different weeks and were incomparable. I attribute this to the large number of data points I was trying to collect and previous unfamiliarity with the equipment. As a result, I plan to review the literature in order to determine the number of photos that need to be taken in order to assess the canopy light levels accurately and will take the photos in the fall before leaf-off. This setback was significant in highlighting the trial and error process in research, as it is an
example of the unforeseen problems in data collection.

In the Landscape Analysis Lab (LAL), I worked on interpolating data that had already been collected, such as elevation. I created layers for data points and compared these layers with one another to see if there was any correlation between soil depth, elevation, moisture, and leaf litter. I found a positive correlation between soil depth and the second set of moisture measurements, which was to be expected if we assume that deeper soil retains more moisture. I also began adding descriptive data to the 1000+ points that Dr. Van de Ven, Dr. Evans, and I had mapped the previous semester. I was able to visually display a record of total tree deaths, temporal tree height increase or decrease, non-\textit{Q. prinus} canopy trees, and acorn distribution for mast years by specific tree or data point. All of this served as my introduction to GIS and acted as a very useful tool for visualizing interesting patterns that will now be analyzed quantitatively.

I have learned that I enjoy collecting data from the field, but I find analyzing the data even more fascinating. There have been setbacks and complications, but I have found that these are a necessary part of the learning experience; after experiencing such issues, I can adapt my data collection process so that the same mistakes will not occur a second time. One additional aspect of the internship that I enjoyed was sharing my research and the experimental plot with others; I was able to bring the Sewanee Environmental Institute (SEI) students to the plot and give them a taste of my experience as an undergraduate researcher at Sewanee through organized activities. This internship helped me realize my interest in species demography and ecological communities, particularly interspecific interactions. The breadth of experiences I gained has confirmed that I want to attend graduate school, as it has allowed me to participate in fieldwork, analysis, and manuscript-writing.