

Domain Plant Communities: Creating an Ecologically Informed Flora

1025 species—that is the new total for the Flora of the Domain, and represents the most plant species found on any college campus in the nation. After 15 years of collecting, identifying, and cataloging, 2010 is the year that the Sewanee Herbarium has decided will be the final year for the Flora project, and through the Environmental Studies internship I received this summer I was able to work alongside Dr. Evans, the Herbarium staff, and fellow intern Katie Qualls to help the Herbarium reach its goal of the completion of the Flora. Over the course of the summer we set a number of lofty goals for ourselves, hoping to make a lot of progress in a number of areas. While we did not accomplish all of these goals—we knew the list was very ambitious—we made headway towards each of them, and at the very least set the stage for future work to be done in these areas. This internship afforded me the opportunity to explore my passion for botany, to become better acquainted with the processes that go into performing scientific research with a goal of publication in mind, and provided a foundation for continuation in the study of plant taxonomy and a possible honors thesis using the data we collected.

While the primary goal of our research was working toward the completion of the flora, which is essentially a catalog of plant species with a given area, our other goals covered a broad spectrum, relating to the research of a number of other interns and providing data for future projects. Under the overarching goal of the flora project, Katie's and my project over the summer focused on an ecological assessment of the plant communities of the Domain. While the Flora of the Domain project is focused on diversity and cataloging the species and is not strictly ecological, the ecological data we gathered will help to structure our appendix to the flora—the part of the paper that contains the list of species—in a way that is both ecologically informed and ecologically informative. The incorporation of this ecological data will help to ensure that the

Flora of the Domain is not an end in and of itself, but rather will be used in the future by any student want to do a study in plant ecology, especially if that study focuses on plant communities. Through our research, we defined 25 distinct plant communities on the Domain.

In addition to being immediately relevant to the Flora of the Domain, data regarding plant community structure on the Domain will be important in conserving biodiversity on the Domain and across the Cumberland Plateau. An important step to knowing how to conserve biodiversity is knowing what diversity is present and how it is distributed across the landscape. The Flora of the Domain in and the ecological information contained therewithin address both of these necessities. As a part of my internship, I built upon work that I did in my Advanced Conservation Biology Class last semester in which I was responsible for editing our classes 100 page document on the conservation of biodiversity on the Domain. In its original form this document took a fairly theoretical approach to conservation on the Domain, but with the addition of detailed analyses of community structure, the direct implications of these management strategies are more apparent. This document is still a work in progress, and is meant to be a continuously edited document, becoming more comprehensive over time as more students contribute to it.

We also drafted a couple of more long-term goals for the project that extended beyond the scope of our work this summer. We want to eventually use the data we have concerning community structures and the distribution of these communities for more in depth spatial analysis in the form of a vegetative map of the Domain. With the use of GIS and the resources of the Landscape Analysis Lab, this map could be created in a systematic detailed way that would provide important ecological data regarding the entirety of the Domain—something that does not presently exist in this level of detail. This vegetative map will be an ongoing project, as it

requires knowledge of GIS exceeding both Katie and my present capacities. Our data will also interface with current GIS projects in other ways. Our sampling of forest communities on the Domain will be useful for the Sewanee Forest History Project, a project that has been going for more than two years that aims to use the last seventy years of Domain land use documents to help understand the historical progress of land management on the University Domain. Having current community assessments will augment this historical information by helping us to understand how current community composition is a product of past land use. Both of these GIS applications of our research will represent our work visually in a format that will be easily accessible for other research efforts.

I worked harder from day to day this summer than I have ever worked; every day was filled with working towards our goals of our project. For most of the summer my days began at 7:30 AM, at which time we would begin to prepare our data sheets and equipment to go out in the field. We would then spend all morning, occasionally going into the afternoon, in the field, establishing study plots and executing our assessments. We traveled all over the Domain, spreading our study sites around both habitat types and geographic locations, seeking comprehensiveness in both cases. In the field we used two methodologies. One was a comprehensive look at all of the species within a circle plot of a 30m diameter qualified by the presence of each species within predetermined strata categories. We counted number of individuals of every tree species in each strata to achieve detailed population information. We then set up 8 1mX1m square plots in which we cataloged every species with individuals less than 0.5m tall and estimated percent ground cover. We established at least one of these comprehensive plots for the ten interior forest habitats we designated. Our second methodology was less comprehensive, striving for breadth and speed rather than depth of detail. These

descriptive plots were meant to accompany our detailed list by providing comparable information and to allow us to compare multiple sites of the same community type. An assessment of a comprehensive plot could take up to four hours, whereas a descriptive plot usually took about an hour. We also established descriptive plots in habitats that were either disturbed or laid out in a way that would not allow for a circular plot to be established. Regardless of layout, we made our descriptive plots comparable in size to our comprehensive plots.

One of our major responsibilities this summer was to create our own methodology. Working with Dr. Evans, we were able to understand the processes commonly used in ecological studies, and with our goals in mind we developed our unique methodologies. While a major portion of our methods were focused on conducting our research in the field, they also had to go beyond that. One of the major challenges of doing any sort of taxonomic or ecological study with plants is the difficulty of definitive identification. In an ideal world, during your study every plant would be in full bloom, allowing for the most straightforward identification in the field, and you would be able to recognize each plant. Unfortunately, this was not the case; there were an overwhelming number of plants that we could not identify in the field, and so we had to create a protocol for the collection and later identification of these plants. We took collections in the field, meticulously marking each specimen connecting it to the data sheets we created. We took our collections from the field back to the Herbarium each day, where we would spend hours identifying the morning's collections. That process often took all afternoon, as oftentimes identifying a single grass or sedge can take up to an hour. At the end of the summer, we took the data we collected and created a database with it that will be used to help create the appendix to the Flora of the Domain.

From this internship experience I was able to grow in my knowledge and understanding of ecological principles, both in terms of ecology on the Domain and ecological principles in general. In addition to this, the most important intellectual advancements brought about by my work this summer was an advance in my plant identification abilities. I spent a semester studying plant taxonomy, but that experience pales in comparison to this summer. Being out in the field every day, forced to key out plants of all varieties, regardless of how obscure or difficult they were. At the beginning of the summer I would have collected a rush, a sedge, or an obscure grass and just given up; but by the end of the summer I could identify many grasses and rushes by sight, or could usually at least quickly key them out. However, sedges still elude me. I became familiar with the process of how one goes about putting together a flora; I witnessed all the challenges and difficult decisions that I had no idea existed.

While this internship will not directly feed into my career goals, it has helped to cement in me what I believe will become a lifelong passion. This summer I found myself enraptured by all things botanical; plants became my entire day five or six days a week. To many people the act of distinguishing one grass from another or wondering if you are looking at a hophornbeam or an ironwood would seem tedious and boring, but I was enthralled by the discipline, by the meticulous attention to detail required by the discipline, and by the almost incomprehensible of diversity even just on the Domain. I believe this internship will prove to be an experience that will stay with me for the rest of my life, and plant taxonomy will be a constant passion in my life.