Introduction

For eight weeks this summer I worked for the Landscape Analysis Lab and Sewanee Herbarium at the University of the South in Sewanee, TN. I worked on the *Flora of the Domain Project* with a partner, Nathan Bourne, under the guidance of Dr. Jonathan Evans (Professor of Biology, Herbarium Director), Nicholas Hollingshead (Landscape Analysis Lab manager and GIS instructor), and Mary Priestley (one of the Herbarium curators), and with the help of other Landscape Analysis Lab summer interns. The main focus of my internship was on the ecological aspect of plant distribution and ecology: the documentation of habitat types found on the Domain and the specific species found in each habitat type.

The Flora of the Domain Project

The Flora Project has been an ongoing effort to document every plant species found on the Domain (the University of the South's 13,000 acre campus) and to have each species represented by a dried specimen (or photograph in the case of rare species) in the Sewanee Herbarium. The ultimate goal has been to publish the *Flora of the Domian* in a scientific journal such as *Castana*. The *Flora of the Domain Project* began in 1995 with plant collections on the Domain by George Ramseur and the first Plant Systematics class. Since then, the Sewanee Herbarium Collection has grown drastically. Collection efforts by professors, students, and Herbarium staff have allowed for the documentation of more than 1,000 plant species on the 13,000 acre campus. The Sewanee Herbarium staff developed a preliminary checklist of the vascular plants (flowering plants, ferns, fern allies, and conifers) of the Domain in 2002. Since 2002, Herbarium staff and students have been searching for new species, and have found many.

A typical published flora of an area includes several parts: a description of the place's geography, geology, climate, and habitats along with an annotated list of plants organized by

group (Gymnosperms (conifers), Pteridophytes (ferns and allies), and angiosperms (flowering plants)). Flowering plants are broken down into two smaller groups: the monocots and the dicots. Species are listed alphabetically using scientific names by family, genus, and species. Next to each species' name is a list of abbreviated habitats where the plant is commonly found.

Goals and Methods

This summer the main goals were to look for and document new species on the Domain, create a list of habitats in which each species we have record of is frequently found on the Domain , and work on composing the actual document *The Flora of the University of the South Domain*. Throughout the summer, Nathan and I gathered floristic ecological data for different habitats found on the Domain. We performed ecological floristic inventories in each "typical" Domain habitat: Oak/Hickory Forest (plateau top), Chestnut Oak (plateau bluff), Sandstone outcrop, Native Virginia Pine forest, Plateau streams and streambanks, rockhouses and cliff faces, Upland swamps, Plateau human disturbed habitat, Cove human disturbed habitat, North-Facing Cove Forest, South-Facing Cove Forest, Cove streams and streambanks, Cove Floodplain, Limestone Ridge, Limestone outcrop, Beech forests. Inventories consisted of locating a good place for a plot (a place not recently disturbed by people due to activities such as logging and clearing and that is a good example of the habitat type). Sean McKenzie helped us find old growth forests using some of his data from the *Sewanee Forest History Project*. After locating a promising area, we would walk around the area and pick the spot most representative of the habitat type. For example, if we were looking for a place to study Mixed Oak/Hickory forest, we would find a place away from streams and edges (such as roads and trails) so as not to contaminate our "Oak/Hickory" sampling with water-loving stream species or disturbance plant species. After locating a representative piece of the habitat type we were sampling, we would lay

out a 30m diameter circle plot at that place with 30 meter tapes, mark the center of the circle with a piece of PVC, take a GPS point at the center of the plot so it could be located again later if needed, take a panorama of the plot, and numerically describe each plant species found in the plot. We were interested not only in the compositional aspect of the plots, but also in vertical and horizontal structure of the habitat. At each plot, we recorded the exposed bedrock and colluvium type, slope, aspect, percent canopy cover, wetness of soil, depth of soil in 4 places, the number and DBH of all canopy trees, and the number of all subcanopy (under the canopy but taller than 2 meters) and tall sapling (between 0.5 and 2 meters tall) plants of each species found in the plot. We sampled eight smaller 1meter by 1 meter subplots within each 30 meter circle plot in order to sample plants that were smaller than 0.5 meters tall. In these subplots we recorded the percent foliage cover of each species in each subplot. After collecting data we calculated the dominant, codominant, and subdominant canopy tree species (based on basal area calculations using measured DBH's), vine species, forb species, and graminoid species. Dr. Evans came with us on almost every trip to help identify plants. If we found plants inside the plot that were not readily identifiable we would photograph the plant or take a sample back with us to the Sewanee Herbarium and identify it. At the completion of each field plot we usually had many plants to identify. Nathan and I spent much of our time identifying “unknowns” in the Herbarium using dichotomous keys and the Sewanee Herbarium Collection as resources. In addition to our circle plots, we used the existing data in the Herbarium Database to assign habitat types to all herbarium records based on the location the specimen was collected from.

Though a great majority of my summer was spent gathering data in the field and identifying species in the lab, on several occasions I had the privilege of going “plant hunting” (searching for new plant species on the Domain) with Mary. This usually consisted of going on

fun off-trail hikes and looking out for plants we didn't recognize. Between these "plant hunting" hikes and our circle plots, Nathan, Dr.Evans, Mary, and I found about twenty new species on the Domain this summer. Added onto our existing plant list, this raised the number of vascular plant species found on the Domain to well over 1,000.

Though the data we collected this summer was mainly meant to be used in the *Flora of the Domain* paper, we collected and recorded data in a way that it could be used easily for other projects as well. We input the data we gathered into the Sewanee Herbarium database so that records could be kept electronically. The data we gathered may be used to inform the University as to which habitats are most important to conserve. Floral diversity usually coincides with insect, mammal, and reptile diversity. Thus, our findings may be important to the Domain Biodiversity Management Plan. The data we collected can also be used to create a vegetative map of the Domain. Near the end of my internship I started creating such a map with the help of Sean McKenzie and Nick Hollingshead. I look forward to working on it more during my fall months at Sewanee. In addition, data from our inventory plots can be used in future classes and student projects. Dr. Evan's *Plant Ecology* class will be using our plot data in the fall to study ecology of some of the habitats found on the Domain. Our data may also be used in a number of independent studies, as plots can be re-visited and re-observed and changes over time can be recorded. We hope to use the panoramas we took at each plot location to create an informational (and beautiful) website about the Sewanee Domain.

What I Learned from my Internship

This internship would've been near impossible without previous knowledge of the plant species of the Domain and how to use resources to identify unknown species. During my fall semester as a sophomore at Sewanee I took *Plant Systematics*, a class offered by Dr. Evans, in

which I learned these skills. This summer I used essentially the same skills, but improved radically. I learned countless new scientific names of plants and can now identify all common plant species on sight, became more familiar with how and when to use the Herbarium collection and the Herbarium database, and more apt at using dichotomous keys and understanding technical terms used to describe plants.

As a career, I want to be a botanist, of sorts. I plan on double majoring at Sewanee in Geology and Environmental Studies: Ecology and Biodiversity. When I graduate, I want to use my knowledge of geology (therefore soils and soil processes, as underlying rock and geologic history have a lot to do with surface soils) and ecology (specifically of plants) to work on soil conservation projects in countries that depend on destructive farming practices for income. Through educating people and helping them conserve and maintain healthy soils to grow plants, these countries can benefit economically and ecologically.

My internship this summer helped me become more familiar with plants in general and the intricate workings of why certain plants grown in certain places (soil moisture availability, light availability, type of soil (ex: sandy vs clayey), etc). In addition I had the opportunity to see and study several habitats that I'd never heard of before, much less been to such as the Maple/Gum Swamp and lowland cove Beech Forest. I learned how to use very accurate GPS equipment, a skill I'm sure will be important to me in the future. I also learned from Nick Hollingshead and Sean McKenzie how to use GIS (specifically the program *Manifold*) to compile and organize geospatial information and begin work on a vegetative map of the Domain.