

### **Summer 2012: A Cornucopia of Research**

This summer's internship was sponsored by Sewanee's Department of Forestry and Geology, though it encompassed many disciplines other than the study of geology and forestry. My work took place in and outside of Sewanee, and allowed me to collaborate with a researcher from the University of Alabama, Tuscaloosa, and a research scientist working for the USDA Forest Service, while providing data for the Tennessee Department of Environment and Conservation (TDEC), Metro Nashville Parks and Recreation, and the Sewanee Utility District (SUD). It built upon research conducted in previous years and was paired with some historical archaeology that expanded my senior field project that took place this past semester. In total, I had the privilege of working on four research projects during the course of my internship. These projects were: (1) the historical archaeology of rock features in and around the Cook Site in Sewanee, TN, (2) the dendroecology of the Hill Tract forest in Nashville, TN, (3) biomass calculations for an old-growth *Quercus* forest in Savage Gulf State Natural Area (SGSNA) in Grundy County, TN, and (4) a 315-year drought reconstruction for the Southern Cumberland Plateau, TN.

The historical archaeology project began this summer's internship. I assisted Dr. Sherwood and her intern, Mason Niquette, in partially excavating a total of three rock features, or piles of sandstone rock containing brick, metal, and other historical artifacts. Before excavations could begin, I joined Mason in traversing around 350 acres of the Domain's forest in search of additional rock mounds. Our ground surveys did not turn up any additional rock features outside the vicinity of the Cook Site, though we did enjoy an off-the-beaten trail hike through the woods, literally! Once surveying was completed, we had to georeference the rock features we were going to excavate by mapping their spatial extent using a total station, and later uploading the data points in GIS. Further mapping of the surrounding area's landscape ensued while excavations got underway.

The largest, and most threatened, rock feature was the first to be partially excavated. Two 1 meter by 1 meter plots were established to define the areas we were to dig. With a trowel in hand, we dug those two plots in 10 centimeter intervals, our dirt being screened for artifacts as we went. After

completing each interval, the profile was prepared for photo documentation, was sketched by hand, and mapped in using the total station, and notes were made of the artifacts found and about the profile. The same procedure was repeated for the other two rock features, though the third feature was excavated using only one 1 m by 1 m plot. Our excavations unearth many interesting artifacts, including pieces of ceramic ware, various types of nails, buttons, and prehistoric chert flakes to name a few. The artifacts were properly catalogued and are now being examined for identification and approximate dates.

The historical archaeology project gave me valuable skills to add to my research repertoire; it provided me with experience in archaeological survey methods, the use of survey equipment (e.g. total station), archeological excavation, and the cataloging and curation of artifacts. Furthermore, this study is one of the first historical archaeological projects conducted on the Domain, and may shed some light on the early history of the area, particularly the agrarian and mining communities that were located on the fringes of the university. The project also meant a great deal to me because it originated out of my senior field project, and it brings me great joy that it is not only being continued, but also expanded by Dr. Sherwood, Dr. Ken Smith, and Dr. Willis and Dr. Gerry Smith due to their interest in the site's archaeology, soil chemistry, and historical significance, respectively.

When I was not involved with the historical archaeology project during the first half of my internship, I assisted in a dendroecology study being conducted in the Hill Tract Forest in Nashville, TN. The study was a continuation of last summer's research that I was also fortunate to be a part of, and is being carried out jointly by Dr. Torreano and Dr. Hart of the University of Alabama, Tuscaloosa. The project was designed to aid the Tennessee Department of Environment and Conservation (TDEC) and Metro Nashville Parks and Recreation in the management of the forest for conservation and public enjoyment. My responsibilities in this study were largely field based and included accompanying Dr. Torreano, Dr. Hart, and Dr. Hart's grad students in arduous hikes through the forest to locate sampling plots using a GPS aided by a compass.

At each plot, we identified trees by species and measured their diameter at breast height (dbh). Trees meeting certain dbh specifications were cored for later tree-ring analysis. Regeneration surveys were also conducted and invasive species inventoried. After each field work session, I was put in charge of entering all the field notes into a computer spreadsheet and making copies of the originals. It was also my responsibility to prep some of the tree cores for dendrochronological analysis, which required the cores to be air-dried, glued to wooden mounts, and sanded with progressively finer abrasives to reveal the cellular structure of the wood. The tree cores are currently waiting to be dated and measured by Dr. Hart and his grad students, and the data from these cores will be used in a future scientific publication.

The dendroecology study supplied me with valuable work experience related to my major, Environmental Studies: Natural Resources, and gave me the chance to apply the knowledge and skills I've learned during my four years in Sewanee in a professional research venture. My field skills were of use while navigating through the forest and collecting forestry data such as dbh, and my many years of coursework aided me in the identification of tree species and the reading of the landscape. By working with Dr. Hart and his grad students from the University of Alabama, Tuscaloosa, I was also provided with networking opportunities and sound advice regarding graduate school. Furthermore, this project offered me an insider's perspective on how a research project is implemented. Having been involved with research starting the summer following my freshman year, I was familiar with the later stages of the research process (i.e. data analysis, publication of findings), but lacked experience in the early phases of a professional research project, such as data collection. Therefore, this internship allowed me take part in all steps of the research process, from conceptualization to publication, before entering graduate school--a rarity for an undergraduate!

The second half of this summer's internship built upon the later stages of the research process, data analysis and publication of findings. I was assigned two mini projects at the end of the summer: computing biomass for an old-growth *Quercus* forest in Savage Gulf State Natural Area (SGSNA) and reconstructing drought for the last 315 years for the Southern Cumberland Plateau, TN. Both projects

utilized data already available from earlier research in SGSNA overseen by Dr. Torreano, Dr. Hart, Dr. Clark, a US forester, Megan Buchanan, one of Dr. Hart's former grad students, and several minor contributors, myself included. I largely worked on these two projects independently, but I did consult Dr. Torreano, Dr. Hart, and Dr. Clark periodically for sound advice regarding the methodology for the biomass computations, and Dr. Torreano and Dr. Hart provided helpful feedback on my drought data. The drought reconstruction project expanded previous work that I compiled last year as an independent study, but required supplementing the data from the SGSNA study with government Palmer Drought Severity Index (PDSI) records and reconstructed PDSI from other scientific publications.

The biomass and drought reconstruction projects provided me with ample time to hone my Excel skills. Both tasks required weeks of extensive Excel work that involved organizing large data sets to effectively compute formulas--a valuable skill to have in most careers. In addition, the biomass study supplied valuable work experience with the USDA Forest Service through my collaboration with Dr. Clark, while the drought reconstruction project offered me the opportunity to provide data in a published report to the Sewanee Utility District (SUD), which may be used to guide future planning and water policy for Franklin and Marion Counties, TN. Together, these two projects gave me the chance to apply the knowledge and skills that I've acquired over the course of my college career into two meaningful data sets that could be useful to both the scientific and Sewanee communities.

Overall, my internship provided me with a rich skill set and very diverse work experience from my involvement with four research projects this summer. Some of these studies built upon research conducted in previous years, while others were new scientific pursuits. They all afforded great networking opportunities due to their involvement with local, state, and federal government entities, one being the Tennessee Department of Environment and Conservation (TDEC). The knowledge, experience, and skills acquired from this internship and those in past years coupled with my Natural Resources degree have qualified me for a range of environmental careers, including an environmental specialist career at TDEC, which I'm currently pursuing with the intention of entering graduate school at a later date.