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<u>Deer Browse on the Domain</u>
Internship Report

Since the reintroduction of white tail deer (*Odocoileus virginianus*) on the

Cumberland Plateau in 1940, deer populations on the Domain have been growing. With no

natural predators left in the area, the only restraint on deer population growth is limited food

resources. The deer cull, as of now, is not enough to reduce the population substantially.

This summer I worked with Dr. Evans and Ashley Block to better understand and gather

information on this high population of white-tailed deer on the domain for management

implications in the future. I conducted research on the heterogeneity of deer browse across

the plateau. Deer browse is the consumption of leaves, twigs, and buds of woody plants

identified by distinctive tear marks on the branch. Through the guidance of Dr. Evans and

Dr. Chris Van De Ven I was able to design and conduct a research project that looked at the

effect of white-tail deer on forest regeneration. We set out to look at parameters sensitive at

the community level: the density of seedlings and saplings, diversity and richness using the

Shannon- wiener index, and browse intensity.

My internship had three main parts: literature review, fieldwork and lab work. We

hypothesized that the deer browse across the domain would be heterogeneously in intensity

and spatial distribution. To design a research project I first looked at previous research done

in the area. I read recently published literature focusing specifically on what their methods

are and how they could be applied to the domain. I also created a vegetation index for deer

browse which was applicable for the plateau.

Conducting fieldwork gave me a chance to have firsthand experience in data

collection. I had 43 randomly stratified locations on Breakfield Road where I conducted my

research. I hiked to the locations, ran my 50m tape, and counted browse in the 10 quads for

each transect. I learned how to identify deer browse and all of the woody plant species of

the plateau. I also learned how to use a GPS devise in tandem with maps to find the

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locations of my transects and my way back to the road. My controls for this experiment were 20-year-old deer enclosures set up to look at chestnut oak. An enclosure is a fenced-in area excluding deer, allowing you to see what the ecosystem would be like without the presence of deer. These controls gave my data much more validity because of the invaluable comparison to the rest of my transects. The contrast of the understory in the enclosures and high browse areas was extreme. This gave me the opportunity to see some rare wildlife and parts of Sewanee I would have never found. I had encounters with wasps, turtles, chiggers, frogs, and even a rattlesnake. One of my favorite field experiences was collecting a huge edible mushroom commonly known as "chicken of the woods" and cooking it for my friends that night. The fieldwork took a total of 3 weeks.

The rest of my internship consisted of lab work. This included entering, averaging, and analyzing my raw data collected in the field. I used new methods with Adobe Photoshop to calculate percent ground cover which gave us the unique opportunity to view quads as deer food. I also created a topographic map showing the variation of browse in relation to my different indexes. These indexes included: browse index, tree diversity, tree richness, sapling diversity, sapling richness, number of saplings, percent recruitment, and average percent cover. We found that there was very strong correlation between the level of browse and the percent recruitment, number of saplings, average percent cover, and sapling richness and diversity. Browse is not yet being shown to linearly affect tree diversity.

I will continue this research as a half credit in the fall and will hopefully have a publishable paper at the end. More importantly, this research can be used for management of the domain. The domain uses science-based adaptive management, which means it changes to best fit the scientific findings. This research will help the administration better manage the high population of deer on the plateau now that the effects are known. Already cull methodology has been altered based on my findings to better manage the deer. With

lower deer populations the forest will begin to regenerate again and it will be more sustainable.

This internship gave me the opportunity to see what a field scientist's life is like and how data is collected and analyzed. I had a crash course in GIS, data collection, plant identification, positives and negatives of different research methodologies, and expanded my knowledge on how to write a scientific paper. Hopefully having experience in designing, conducting and analyzing research and writing a publishable paper will give me a competitive advantage going into graduate school or in entering the job field. This experience has taught me to be able to think on my feet in demanding situations and understand that research doesn't always turn out how you anticipate it to. This has opened my mind to different opportunities such as doing conservation work for the EPA or land management research. Applicable conservation work is what I really have a passion for, but field work is not necessarily what I want to do. Conducting field research gave me respect for the massive amount of research done by the scientific community. Doing field research is neither glamorous nor directly rewarding but it is essential for the expansion and growth of science. I have a new-found respect for scientists that have the dedication to commit themselves to fieldwork. Personally I think I would prefer to work in a more social environment where I was interacting with people daily. Overall this opportunity provided me with techniques and an ability to work independently that can only be gained through hands-on experience.