

Previous Research

*“For what things we have to learn to do, these we learn by doing”
-Aristotle*

As a young scientist I have taken this philosophy to heart. I aspire to always be a better researcher. On this journey I have actively participated in several research activities. These experiences have taught me the importance of a peer-reviewed research plan, methods that tightly address one’s hypothesis, statistical skills, an extensive literature review, and good presentation techniques. Aside from building those skills, interactions with my research mentors have taught me about ethics and broader impacts, given me confidence in my abilities, and allowed me to taste the excitement of crafting a manuscript and shepherding it through the process of publication in a peer-reviewed journal. I’m hooked and determined to succeed.

Corridor Project research: Before starting my graduate program at the University of Florida, I worked for eight months in 2007 as a field technician on the “Corridor Project” at the U.S. Department of Energy’s Savannah River Site (SRS) in rural South Carolina. The project aims to bridge the gap between testing theory about habitat corridors and applying the results to adjacent land managed by the U.S. Forest Service. I learned about it through riveting talks at scientific meetings and papers in prominent journals, including *Science*, *Nature*, *PNAS*, and *Ecology*. I was drawn to it because of my passion for conservation biology and applied ecology. My duties entailed preparing sites, sowing tens of thousands of seeds, planting thousands of seedlings in forty 1-ha sites and watering them by hand during a record breaking, summer-long drought. The seedlings were species of “special concern” in restoring the sites to longleaf pine savanna, and the goal was testing effects of landscape corridors and habitat edges on restoration success. This experience quickly shaped my plans for graduate work because I was encouraged to pursue independent projects during my “spare” time. I started by learning to identify ants and surveying the common species in all of the sites. I then used GPS to map Red Imported Fire Ant (*Solenopsis invicta*) and Harvester Ant (*Pogonomyrmex badius*) colonies. Observing ants and becoming familiar with their natural history, reading literature, and chatting with colleagues gradually yielded several ideas for a dissertation project (see Proposed Research).

To broaden the impact of my activities at SRS, I volunteered for The Ruth Patrick Science Education Center’s Science and Technology Enrichment Program (STEP). With STEP I helped provide hands-on environmental activities, designed to encourage children to develop an interest in science. Students were bussed to SRS, where they spent the day in the field and a nearby classroom, doing inquiry-based lessons and temporarily becoming scientists. I was pleased to share my excitement for science and nature with these students – it was as much a part of that summer’s scientific activities as the plants I tended and the ants I surveyed.

NSF-REU: In the summer of 2006, I participated in an NSF Research Experience for Undergraduates (REU) program at Miami University in Oxford, Ohio. The theme was ecology of human-dominated landscapes. I collaborated with another REU student (Alison Hale) and two professors (Drs. Mary Henry and David Gorchov). Our overall goal was to understand the invasion dynamics of a problematic understory invasive species, Amur honeysuckle (*Lonicera maackii*). We took an integrative approach, linking large scale datasets from remote sensing with small scale, on-the-ground vegetation sampling. Alison and I actively participated in both parts. I was primarily responsible for the remote sensing component, while she focused on vegetation

analyses. I learned how to use Landsat TM and ETM+ satellite imagery to detect areas of high vs. low cover of *L. maackii*. As an understory shrub of deciduous forests, *L. maackii* is difficult to detect by satellite imagery because it is often hidden by tree canopies. We circumvented this problem by taking advantage of *L. maackii*'s relatively early leaf expansion and late leaf retention. We were able to determine the best time window to detect *L. maackii* through the canopy. In parallel, we collected data on *L. maackii* abundance in the field by direct observation (i.e., we "ground-truthed" the satellite imagery). The combined study was very successful – we developed and validated a technique for detecting this understory invasive species by Landsat in late autumn. I took leadership in writing a manuscript, which we submitted to the *International Journal of Remote Sensing* (Resasco *et al.* 2007). I also presented this project at an ecology seminar at the University of Oklahoma (OU), and at the joint meeting of the Ecological Society of America and the Society for Restoration Ecology in August 2007.

Undergraduate research at OU: As an undergraduate at OU, I conducted an independent research project under the tutelage of Dr. Jeff Kelly. The project focused on a possible diet shift in Ord's Kangaroo Rat (*Dipodomys ordii*), associated with C3 woody shrub invasion in grasslands historically dominated by C4 plants. In this case, we decided to conduct carbon isotope analyses on hair samples of museum specimens dating back to 1930 to determine whether a shift in isotopic signature from C4 to C3 was present. We quantified shrub invasion through aerial photographs from museum specimen trap-sites and dates. Also at OU, I volunteered in the Mammalogy collection at the Sam Noble Museum of Natural History from 2004 to 2005. To share my appreciation of nature and biodiversity I also volunteered at the Oklahoma BioBlitz! program from 2004 to 2006. BioBlitz! is an inventory of biological diversity hosted by the Oklahoma Biological Survey and aimed at K-12 students.

Mammal research in Mexico: I firmly believe that scientists should be effective communicators with the general public and across different cultures. Acting on this conviction, I participated in an international collaborative study of small mammal distribution and ecology in Colima, Mexico in the winter of 2004/2005. Being fluent in Spanish and familiar with the Latin American culture, I was able to foster a valuable scientific and cultural exchange with Mexican students and faculty. I hope to have this sort of exchange with international colleagues and collaborators throughout my career.

Peer-reviewed publication:

- Resasco, J, Hale, AM, Henry, MC, and DL Gorchoy (2007) Detecting an invasive shrub in forest understory using remote sensing. *International Journal of Remote Sensing*. 28, 3739–3745.

Presentations:

- Resasco, J, Hale, AM, Henry, MC, and DL Gorchoy, Detecting an invasive shrub in forest understory using remote sensing. ESA/SER Joint Meeting, San Jose, California. August 5-10 2007, Poster.
- Resasco, J, Hale, AM, Henry, MC, and DL Gorchoy, Detecting the understory invasive shrub, Amur honeysuckle (*Lonicera maackii*) using remote sensing. Ecomunch Seminar, University of Oklahoma. October 10, 2006, Oral presentation.