Graduate Student Profile:

Casey Johnston

HOMETOWN: Ruston, LA

SEEING THE FOREST THROUGH THE TREES

BEING ABLE TO IDENTIFY longleaf pine trees from other species is important because of the tree's very diverse ecosystem. About 900 plant species are associated with the longleaf pine ecosystem, as well as several endangered wildlife species—all of which can be cared for more easily if their exact stand locations are known.

Forestry graduate student, Casey Johnston, is working with Dr. David Evans using spatial technology to identify longleaf pine trees from other species in south Mississippi. Evans is a forestry professor in the Forest and Wildlife Research Center. The research, which is part of Johnston's master's degree program, uses remote sensing and spatial technologies to identify the lowest resolution of images needed to confidently differentiate between species.

A previous graduate student, Mary Frances Nieminen, found that longleaf pine could be identified from loblolly pine using geospatial software. However, the images use half-meter-sized pixels, which, according to Johnston, are expensive to obtain, have large storage requirements, and can be difficult to process. Johnston's project should make it more logistically feasible to identify longleaf pine across a large region.

"Longleaf pine has a lot of positive economical and environmental properties," Johnston said. "It has different structural properties than loblolly pine. It is slower to develop significant aboveground growth and is better adapted to withstand hurricane winds and forest fires frequently associated with its native coastal plains habitat. Longleaf pine also has the potential for efficient carbon sequestration, which assists in controlling climate change by providing long-term carbon dioxide storage."

To conduct the research, Johnston found aerially visible, mature, canopy-level examples of longleaf and loblolly pines within parts of south Mississippi. Their coordinates were obtained using a GPS and laser rangefinder. He then randomly halved the collected tree location points into control samples and test samples. Using the geospatial software, ERDAS Imagine, the samples were loaded on top of WorldView-2 satellite imagery. The 8-band imagery was subset into three spectral bands (Red-Edge, Near-Infrared 1, and Near-Infrared 2). The overall spectral value of each test sample canopy was collected across the imagery. These spectral signatures were used to classify the imagery.

An acceptable classification accuracy of the control samples at a half of a meter led to the next step of the project, pixel resampling. The classification was run with pixel sizes scaled to one, two, four, eight, and 16 meters. Discovering the lowest spatial resolution needed to acceptably classify longleaf pine from loblolly pine will conclude Johnston's project. Once the spatial resolution requirement question is answered, Johnston hopes that this information will be helpful in the future for locating longleaf pine on a larger area, perhaps within its entire range across the southeastern United States. ❖