Are Growth Rates of Pine Trees Affected by Depth to Groundwater?

McBride, Alynza (School: South Sumter High School)

This project assessed whether longleaf pine tree (Pinus palustris) ring widths varied with groundwater depth. If tree ring growth is related to groundwater depth, then pine trees in deeper groundwater environments will grow at a slower rate than those in shallower environments, because tree ring width correlates with water availability. If pine trees become too saturated, they grow smaller rings; therefore, it is anticipated an optimal water-level depth that maximizes ring widths will be observed. Tree cores were collected at eight sites near groundwater monitoring wells where groundwater depths varied. The independent variable was depth to groundwater. The dependent variable was tree ring width. The constant variables were height and side of the trees where cores were collected. The control group was duplicate cores collected from one tree at each site to determine if ring growth was consistent within individual trees. Tree cores were collected using an incremental tree borer; stored and dried in paper straws; mounted on wooden bases; and sanded to increase ring visibility. The cores were scanned, and rings were measured using photo analysis software. Average tree-ring widths were compared to average depths to groundwater to assess the correlation. The hypothesis was partially supported, because a strong correlation between average ring width and groundwater depth was observed, resulting in a coefficient of determination (R2) of 0.83. Signs of stress from inundation were not observed, likely since groundwater level fluctuation was not large enough to result in visible impacts at the eight sites sampled.

Awards Won: