Tree Rings as a Potential Monitoring Tool for Saltwater Intrusion: Year 2

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This project assessed whether pine tree ring growth could be used to track rates of saltwater intrusion by analyzing pine tree growth ring response to surface water specific conductance levels, an indicator of saltwater intrusion. Since pine trees are non-halophytic, growth ring widths are predicted to decline with saltwater exposure. Therefore, if stress patterns and ring growth declines are related to surface water specific conductance spikes, then tree rings could be used as an inexpensive saltwater intrusion monitoring tool. Pine tree cores were collected at thirteen sites near Suwannee, Chassahowitzka, and Crystal Rivers, where saltwater intrusion has occurred. The independent variable was surface water specific conductance levels. The dependent variable was tree ring width. The control group consisted of duplicate cores collected from one tree at each site to verify methods and consistency. Tree cores were collected using an increment tree borer, stored and dried in paper straws, mounted on wooden bases, and sanded to increase ring visibility. Cores were scanned and rings were measured using photo-analysis freeware. Three-year tree ring width percent growth change was calculated and compared against specific conductance data for nearby surface water specific conductance gages. The hypothesis was supported because tree ring growth declined when surface water specific conductance spiked, demonstrating that trees are useful for saltwater intrusion monitoring. Growth declines were observed at sites impacted by saltwater intrusion near the Suwannee, Crystal, and Chassahowitzka Rivers. In contrast, growth declines were not observed at unimpacted inland sites and sites with statistically significant rainfall correlation.

Awards Won: