TIMUCUAN SCIENCE AND HISTORY SYMPOSIUM

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Status of Redbay and Swampbay within Timucuan Ecological and Historic Preserve Following 20 years of Laurel Wilt Disease

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Introduction

- Laurel Wilt Disease (LWD) is a vascular disease that impacts species within the family Lauraceae, including redbay (*Persea borbonia*) and swampbay (*Persea palustris*) caused by *Raffaelea lauricola*, a phytopathogenic fungal symbiont carried by the redbay ambrosia beetle (*Xyleborus glabratus*) (Figure 1).
- LWD causes symptomatic wilt (Figure 2), disrupts water transport (Figure 3), and leads to tree death (Mayfield and Thomas 2006).

Figure 1. Redbay ambrosia beetle, *Xyleborus glabratus*. (Thomas 2006).

Figure 2. Trees affected by Laurel Wilt Disease – browning seen in foliage of the infected individuals (Mayfield 2006).

Figure 3. Vascular strain caused by LWD, likely causing tree mortality (Mayfield 2006).

- Widespread mortality of redbay was first observed in Georgia and South Carolina in 2004; this decline was brought on by the exotic, invasive Laurel Wilt Disease (LWD); LWD was unintentionally introduced to the United States via contaminated wooden packing material through Port Wentworth, Georgia in 2002 (Fraedrich et al. 2007).
- LWD was detected on redbay and swampbay at Timucuan Ecological and Historic Preserve (TIMU) in 2005, and in less than two years it killed over 92% of individuals in the park over 7.6 centimeters (cm) in diameter (Fraedrich et al. 2008).
- Today, Laurel Wilt Disease is found in 11 southeastern states and is killing hundreds of millions of trees in the Lauraceae family (Olatinwo et al. 2021).

Methods

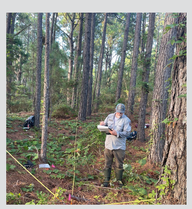

Figure 4. Recording species diversity data – survey tape dividing the plot into quadrants to be sampled. NPS photo / SECN staff.

- The National Park Service's Southeast Coast Network (SECN) monitors terrestrial vegetation on 15 national park units within the Southeastern U.S. to assess ecosystem health and vital signs brought on by stressors and threats.
- Data collected on long-term monitoring plots include species presence and abundance (Figure 4), tree diameters and health assessment (Figure 5), seedling/sapling counts, and a host of other abiotic components (Boyle et al. 2019).
- A total of 23 plots were established within TIMU in 2019 and resampled in 2023; plots are located across 3 park subunits (Thomas Creek, Cedar Point, and Theodore Roosevelt) and 3 park habitat types (Upland Forests, Open Woodlands, and Wetland Forests) (Figure 6).

Figure 5. Measuring tree diameter at breast height (DBH) of trees and assigning health codes at TIMU. NPS photo / SECN staff.

Results

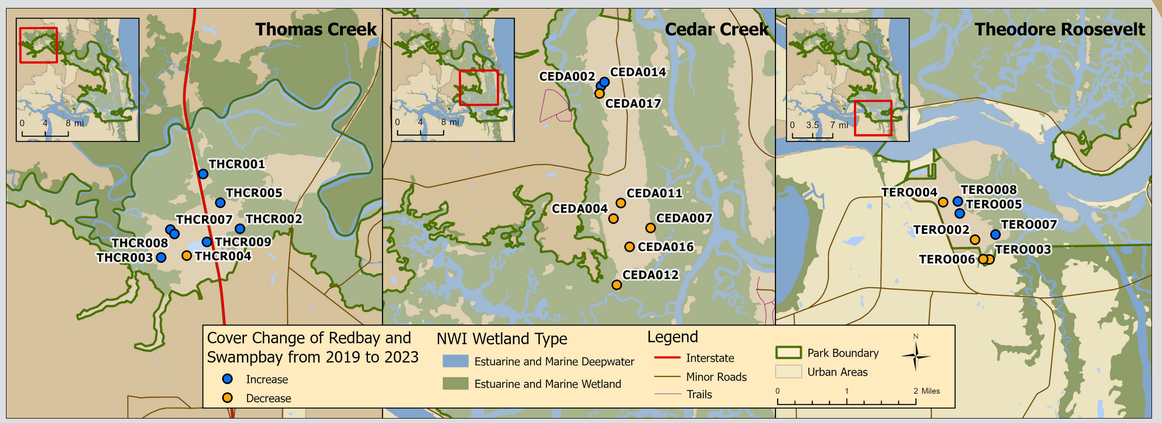

Figure 6. Southeast Coast Network vegetation plot locations within TIMU and cover change in redbay and swampbay density from 2019 to 2023. Created by Mallorie Davis / SECN.

Figure 7. Basal area change in diagnostic tree species from 2019 to 2023 by broad habitat type. Created by Mallorie Davis / SECN.

Figure 8. Rate of change of redbay and swampbay seedlings by height class and saplings by diameter class within Broad Habitat Types at TIMU between 2019 and 2023. Created by Mallorie Davis / SECN.

Observations

- No living swampbay trees (> 10 cm DBH) were detected in 2019 or 2023.
- There was a 20% decline in swampbay and redbay seedling recruitment; but a 22% increase in sapling recruitment suggests a possible rebound in future trees.
- Basal area (BA) of living redbay trees between 2019 and 2023 increased from 0.26 to 0.38 stems per hectare; however, only two tree-sized specimens were present in 2019, one of which was categorized as standing dead in 2023. Standing dead trees are not calculated in overall BA.
- No new swampbay or redbay trees were found in 2023 from revisited plots established in 2019.
- Overall cover of redbay and swampbay species per plot increased from 1-2% cover in 2019 to 10-25% cover in 2023.

Conclusion

- Overall, redbay and swampbay are in decline at TIMU due to Laurel Wilt Disease. There is hope with recruitment evident in the sapling strata; however, with reduced seedling recruitment, redbay and swampbay trees could continue to see a rapid decline in health, density, and cover.
- The Southeast Coast Inventory and Monitoring Network will continue to track and monitor long-term changes in vegetation including tree health. TIMU is currently scheduled to be resampled in 2027.

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Photo from Albert (Bud) Mayfield (2006), USDA Forest Service, Bugwood.org.

Photo from Michael C. Thomas (2006), Florida Department of Agriculture and Consumer Services, Bugwood.org.