

South Florida Ecosystem Restoration Task Force

Invasive Exotic Species Strategic Action Framework

Long-term Management Case Study: Ambrosia Beetles & Laurel Wilt Disease

Laurel wilt disease threatens to cause the extinction of native redbay trees (*Persea borbonia*) and swamp bays (*Persea palustris*) in the Everglades, as well as seriously impact commercial avocado (*Persea americana*) groves in south Florida. This has implications for the structural integrity of tree islands in the Everglades. Additionally, bay trees are one of the most important cultural resources to the Miccosukee Tribe of Indians of Florida and the Seminole Tribe of Florida.

The disease is caused by a fungus (*Raffaelea lauricola*) transmitted by an exotic insect, the redbay ambrosia beetle (*Xyleborus glabratus*). The beetle bores into healthy trees creating tunnels in the wood and introducing the fungus. The tree's reaction to the fungus blocks water, which results in wilting of leaves and quickly leads to the death of the tree. The beetle was introduced in Port Wentworth, Georgia in 2002, spread rapidly down into Florida, and was first detected in Miami-Dade County in March 2010. Laurel wilt disease was discovered in swamp bays in February 2011 and by late 2013 dead swamp bays were observed throughout the southern Everglades.

Swamp bay is a shrub or small tree that is a major component of many Everglades tree islands and is found in swamp forests, hammocks, and pinelands throughout the region. Swamp bay fruits are consumed by bears, deer, and many songbirds and the foliage is the larval food plant for the palamedes swallowtail butterfly. While the mammalian and avian frugivores are generalists, the only host plants for the swallowtail larvae are swamp bay and redbay, both of which are very susceptible to laurel wilt.

In areas with redbay ambrosia beetles, populations of redbay and swamp bay have experienced almost 100% mortality of mature trees within a few years of the first appearance of laurel wilt symptoms. Given the rate of spread, it is expected that within a few years most, if not all, mature swamp bays within the Everglades ecosystem may be killed. Although the mature trees are likely to be killed, swamp bay often reacts to injury by basal sprouting, which should lead to

young trees that initially won't attract the redbay ambrosia beetle. It is possible that the basal sprouting of swamp bays will create shoots from its roots that will allow the species to survive for an extended period, much like the American chestnut continues to survive as small resprouts.

Can the Issue be Resolved by Management?

Management of redbay ambrosia beetles and laurel wilt in the Everglades will not be easy, and may not be possible. Only one beetle is necessary to introduce the fungi that will cause the death of a tree. Insect

Ambrosia Beetle

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Photo: Courtesy of Sun Sentinel.

control, such as preventative insecticides, might be effective in an agricultural setting, but is not feasible in the Everglades. Given the current abundance of dead and dying bay trees already in the Everglades, it can be assumed that a large numbers of beetles are already finding their way to uninfected trees. Given enough time, the chances are that a beetle will find all the existing bay trees. Therefore, it seems that no practical way can prevent the spread of redbay ambrosia beetle or any feasible way to treat plants in the natural areas against the fungal pathogen.

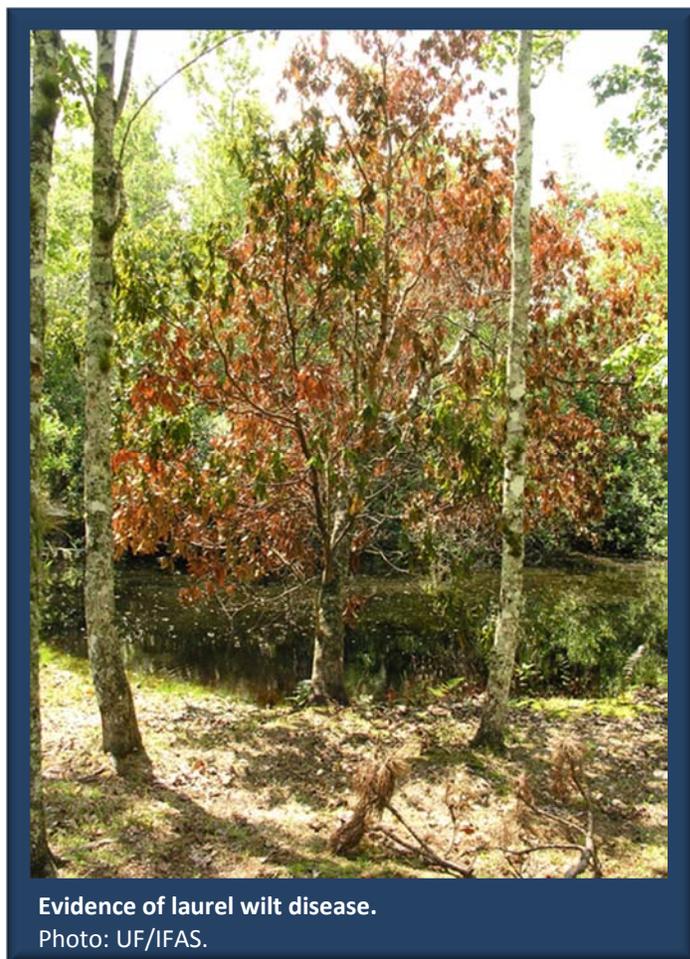
What Would be the Facilitating Factors Needed for Success?

Success in the sense of slowing or reversing the effects of this invasive exotic species are not likely, however, efforts can be focused on developing a recovery strategy. The first important step in a recovery strategy would be to find individual trees that are resistant to the redbay ambrosia beetle. This effort is underway for the redbay and needs to be extended to swamp bay. Two hypotheses are: 1) the tree may not be producing the appropriate chemical signal to attract the redbay ambrosia beetle; or 2) the tree is resistant to the fungal pathogen.

A recovery strategy would include efforts to document the spread of laurel wilt by aerial surveys and reporting from individuals in the field. It is recommended that a network of permanent plots be established throughout the Everglades to follow the progression of laurel wilt and search for resistant individuals that can potentially be cultivated.

Key Recommendations/Issues

Efforts to locate and propagate individual swamp bay trees that show resistance to the redbay ambrosia beetle and/or the laurel wilt fungus are recommended. Resident populations of swamp bay in the field will almost certainly disappear and the best chance to reestablish the species in the wild should be addressed through a comprehensive recovery plan. It is



important to develop a comprehensive recovery plan that involves propagating resistant organisms and reestablishing them into the wild.

The Everglades has begun to experience bay tree mortality that will impact tree islands and Tribal cultural uses. This needs to be documented and research initiated to understand the impacts to the natural system including individual tree response, the species in general, and overall ecosystem restoration.

The redbay ambrosia beetle has spread rapidly over the past decade and has led to the mortality of approximately five hundred million trees. Better communication across state, county, and agency boundaries during the initial invasion may have provided more awareness of this important invasive exotic species.

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This document is part of a series of case studies developed for the Invasive Exotic Species (IES) Strategic Action Framework. This particular case study highlights issues within the Long-term Management Phase of the IES Invasion Curve. 6/1/15