

South Florida Ecosystem Restoration Task Force

Invasive Exotic Species Strategic Action Framework

Long-term Management Case Study: Shoebutton Ardisia

Shoebutton ardisia (*Ardisia elliptica*) is an evergreen shrub/small tree native to Asia. Originally imported as an ornamental plant in the early 1900s, it has become a prolific invasive species that is very expensive to control. Shoebutton Ardisia is now commonly found in short hydroperiod wetlands, hammocks, and tree islands in Miami-Dade, Broward, West Palm, St. Lucie and Brevard Counties (UF/IFAS). In the 1980s, shoebutton Ardisia was found in to be invasive within Everglades National Park. Since then, the extent and range of shoebutton Ardisia has expanded as it displaces both native and invasive exotic plant species. Because it impacts community structure and ecological function of native habitats, shoebutton Ardisia is a Category 1 invasive on the Florida Exotic Pest Plan Council's Invasive Plant List. The desired outcome in managing this invasive exotic species is to find and implement a cost-effective control.

Case Presentation

Shoebutton Ardisia is a summer-flowering, fall-fruiting species that is closely related to the native marlberry (*Ardisia escallonioides*), an uncommon shrub found in south Florida hammocks. The native marlberry is not abundant because there is a native seed predator which renders up to 90% of its seed non-viable. There is no known seed predator in south Florida for *A. elliptica*. Shoebutton Ardisia seeds are known to be dispersed by birds and raccoons.

First spotted outside Everglades National Park during vegetation mapping in 1990, shoebutton Ardisia expanded to several hundred acres by 1996. Today, there are approximately 4,000 acres of shoebutton Ardisia within and adjacent to the Miami-Dade County South Dade Wetlands Preserve, an important wetland system in the southern part of the county. Land in this area is targeted for acquisition and management by the county's Environmentally Endangered Lands (EEL) Program because of its strategic location between two national parks (Everglades and Biscayne national parks) and within the watersheds of Florida Bay, Biscayne Bay, Card Sound, and Barnes Sound.

Managing at the Wrong End of the Invasion Curve

An evergreen shrub/small tree that is native to Asia has invaded short hydroperiod wetlands, hammocks, and tree islands in south Florida. It impacts both the community structure and ecological function of native habitats. Miami-Dade County's Environmentally Endangered Lands (EEL) Program is working to identify cost-effective controls to manage this invasive species.



Hand treatment of shoebutton Ardisia by Miami-Dade County EEL crew.
Photo: Miami-Dade County EEL Program.



Shoebutton *Ardisia* is also known to extend up the coast within Miami-Dade County, especially in coastal wetlands that are already impacted by Brazilian pepper or in areas that have been farmed in the past. Shoebutton *Ardisia* spreads rapidly in nutrient enriched soils such as those that have been altered by farming, and also tolerates longer hydroperiods than Brazilian pepper.

Beginning in 2002, the EEL Program implemented a concerted effort to treat shoebutton *Ardisia* within the South Dade Wetlands Preserve, and that work continues today. The control effort is limited because not all of the land with the preserve has been acquired, and invasive exotic species present on private lands (including *A. elliptica*) are not being treated, so the private parcels act as a seed source. Control of shoebutton *Ardisia* is further complicated because field identification is difficult as the invasive strongly resembles the native marlberry and dahoon holly (*Ilex cassine*). Field crews must undergo training and gain practical experience so they can properly identify species to treat.

Management Actions

In controlled studies, Garlon 3A® (triclopyr, amine salt form) was over 90% effective at reducing cover of shoebutton *Ardisia* with one application. The effectiveness rate of Garlon 3A is diminished in the field when plants in dense stands are inadvertently missed during treatment. Resprouting plants and massive seed germination with increased light after initial treatment requires repeated follow-up treatments. Arsenal® (imazapyr) has been used as an alternative supplement to Garlon 3A®, but Arsenal® is not appropriate for all habitats and can result in high non-target damage to some plants like buttonwood (*Conocarpus erectus*) and white mangrove (*Laguncularia racemosa*). Detection of shoebutton *Ardisia* by aerial review is not effective, so finding infestations can be difficult in remote areas and requires ground verification.

On average, initial control of shoebutton *Ardisia* has cost up to \$11,000 per acre for selective hand treatment by a crew of 6 individuals walking an area look-



Brontosaurus treatment of shoebutton *Ardisia* in Miami-Dade County. Photo: Miami-Dade County EEL Program.

ing for and treating seedlings, saplings, and trees. After initial treatment opens up the canopy, the shoebutton *Ardisia* seed bank responds to increased light levels and second year treatments can cost up to \$9,000 per acre to address all the new seedlings. By the third year, most of the seed bank is exhausted and the cost decreases to less than \$6,000 per acre, with subsequent annual maintenance treatments averaging between \$1,000 to \$1,500 per acre. In native dominated wetlands, treatments must occur every three to four years because shoebutton *Ardisia* is co-located with listed and rare species that will be displaced if the habitat is not maintained free of invasive exotic species. The EEL Program has treated over 350 acres through selective hand treatment and follow-up maintenance activities.

With selective hand treatment by crews, the control costs for shoebutton *Ardisia* were too high to be sustainable over 4,000 acres. To reduce costs in areas that are dominated by invasive vegetation, treatment efforts are now being used to manipulate the habitat to make it less suitable for *A. elliptica*. In dense stands of *A. elliptica*, the current strategy is use a gyrotrack or brontosaurus mulcher to mulch both native and exotic woody material, with follow up mowing and aerial spraying. The land is allowed to convert to prairie, which then can be maintained through the application of prescribed fire. The EEL Program has successfully converted 26 acres to prairie, with another

22 acres in process. This treatment method has averaged about \$3,000 per acre for mulching, and not more than \$300 acre for mowing or aerial spraying. In three years, there has been significant recruitment of native grasses. While not yet applied, prescribed fire is expected to cost less than \$100 per acre. As a side note, it is important to use proper phytosanitation/equipment decontamination practices when bringing in heavy equipment. Some exotic grasses can be brought in unintentionally, especially on mowers. Additionally, mulching is preferable to land clearing and grubbing because soil disturbance may also result in new infestations of nuisance species like cattails.

A primary management goal of the EEL Program is to reduce the amount of exotics-dominated forested wetlands to provide for a diverse ecological community, including habitat for listed ferns, bromeliads, and orchids. A critical component of this management goal is to reduce coverage of shoebutton *Ardisia* to make control cost-effective and feasible in the long-term. This is especially important because there is no biocontrol currently being developed and development of a biocontrol would be complicated by the presence of an

uncommon native in the same genus. In total, the EEL Program has spent almost \$5 million to control shoebutton *Ardisia* and other associated invasive exotic species in the South Dade Wetlands since 2000.

Key Recommendations

More research on the demographics and life cycle of shoebutton *Ardisia* is needed. Specific information on the relationship to soil nutrient characteristics, response to prescribed fire, seed banks, and vectors can all inform management decisions and help to reduce management costs. Most importantly, consistent and sustained funding is needed to help bring this species under permanent control. Funding comes in cycles, but the invasion doesn't stop or slow without active management. Lacking sustained and sufficient funding, land managers are forced to prioritize their management strategies, which often means choosing whether to maintain what has already been restored or respond to new or expanding threats.

Literature Cited

Shoebuttan *ardisia* (*Ardisia elliptica*). University of Florida/IFAS. <http://plants.ifas.ufl.edu/node/43>.



Grass prairie recruitment after brontosaurus treatment of *A elliptica* in Miami-Dade County. Photo: Miami-Dade County.

South Dade Wetlands Shoebutton Ardisia - 2013 Estimated Distribution

