

# South Florida Ecosystem Restoration Task Force

## Invasive Exotic Species Strategic Action Framework

### *Long-term Management Case Study: Melaleuca*

**Melaleuca** is a fast-growing evergreen tree native to eastern Australia. The plant is a prolific seed producer, is fire-adapted, and is able to thrive in both flooded and well drained soils. First introduced to Florida in the early 1900s as an ornamental tree and soil stabilizer, melaleuca quickly spread throughout south Florida and is considered one of Florida's worst invasive species. Melaleuca successfully invades a variety of habitats in Florida including pine flatwoods, mesic prairies, sawgrass marshes, cypress swamps, roadsides, ditch banks, lake margins, and pastures (Laroche 1999). Once established, melaleuca can significantly alter plant species composition, community structure, alter important ecological processes such as fire behavior and litter production, and reduce the carrying capacity for some wildlife species (Mazzotti et al. 1981, Serbesoff-King 2003, Rayamajhi et al. 2009).

### Case Presentation

The introduction of melaleuca to the United States did not initially include its co-evolved predators and pathogens. This release from natural enemies, in combination with its numerous adaptations to south Florida's environment, significantly increased melaleuca's invasive potential. In a short time, the plant spread beyond the areas where it was intentionally planted. By 1970, melaleuca was established throughout the Everglades and by 1993 infested an estimated 488,000 acres in south Florida (TAME 2007). Large tracts of the Everglades *River of Grass* were quickly changing from sawgrass marsh and open water sloughs to dense melaleuca stands with little to no native plants in the understory. Other detrimental changes to ecosystem characteristics and processes such as community structure (O'Hare and Dalrymple 1997) and fire intensity and behavior (Flowers 1991) were also discovered as the melaleuca expansion continued. Without active management of melaleuca, the Everglades and other unique Florida ecosystems would be severely altered or lost completely, regardless of ongoing efforts to restore historic surface water flows to the region.

Mounting evidence that melaleuca was causing substantial impacts to Florida's natural areas, led state and federal agencies to take action in the late 1980s against the spread of melaleuca and attempt recovery of impacted ecosystems. At that time, natural resource managers faced significant obstacles to melaleuca management. In particular, there were very few established control tools, there was no dedicated funding for control or research, melaleuca could still be legally cultivated and sold in Florida, and the public was largely unaware of the plant's harm to Flori-

### A Model Plan

Melaleuca is a highly invasive tree native to Australia. First introduced to Florida in the early 1900s as an ornamental tree and soil stabilizer, melaleuca quickly spread throughout the South Florida Ecosystem.

Florida's eventual response to this long-neglected invasive species problem is an exceptional example of cooperative implementation of a comprehensive, long-term strategy. The Florida Melaleuca Management Plan and the initiatives it inspired can serve as a model framework for other invasive exotic species plans. See page 3 for specific recommendations.



Photo: Vic Ramey, UF/IFAS.



An Everglades marsh overtaken by melaleuca.

Photo: SFWMD.

da's natural areas. Early in 1990, the Florida Exotic Pest Plant Council (FLEPPC) and the South Florida Water Management District jointly convened a task force of federal, state, local land managers, scientists, and others to develop a plan for managing melaleuca. The resulting Florida Melaleuca Management Plan (Laroche 1999) became a guiding document for a regional, comprehensive strategy.

## Management Actions and Outcome

Implementation of melaleuca management began in the late 1980s and accelerated shortly after the completion of the first edition of the Florida Melaleuca Management Plan in 1990. To address the numerous challenges outlined above, the plan set forth clear management objectives and proposed specific recommendations based on an integrated control strategy. These included:

- Maintain cooperation and collaboration among agencies
- Adopt a regional quarantine strategy, which systematically controls melaleuca from new incipient populations toward the older and more established populations
- Maintain consistent funding to promote efficiency in long-term planning
- Fund research on effective and safe herbicides in natural areas
- Fund biological control research

- Develop integrated weed management techniques to ensure cost effective and environmentally sound management.
- Encourage regulatory actions to prohibit the sale and distribution of melaleuca
- Implement outreach initiatives to inform the public and lawmakers of melaleuca's negative impact on Florida's environment
- Encourage initiatives to remove melaleuca on private lands

A great deal has been achieved towards realizing these objectives and recommendations since the first edition of the plan was drafted. By 1993, melaleuca was included on the U.S.D Department of Agriculture (USDA) Federal Noxious Weed List and was designated a prohibited plant in the State of Florida. Melaleuca was the first non-agricultural weed ever listed as a noxious weed by the USDA. Also in 1993, the Florida Legislature allocated an annual budget of \$1 million to the Florida Department of Environmental Protection (FDEP) specifically for melaleuca control. The allocation of consistent and adequate funding has been a vital component of implementing the plan, because it allows land managers to establish and rely on a long-term, adaptive management strategy.

Efforts to develop control tools were fortunately successful. Obtaining approved herbicides for melaleuca in natural areas and initiating research to refine herbicide application techniques greatly enhanced the overall success of the melaleuca program. Careful selection and use of herbicides has resulted in the cost-effective removal of hundreds of thousands of acres of melaleuca. Sustained funding for the development of biological control agents resulted in the approval of four insects for release in the U.S. Three of these insects are now established in Florida and are exerting significant pressure on melaleuca (Tipping et al. 2009). While biological control is not expected to eradicate melaleuca, reductions in melaleuca growth rates and reproductive potential are reducing the rate of reinfestation and thus reducing herbicide control costs.

Large sections of the Greater Everglades have reached or are nearing maintenance-control levels where melaleuca once dominated (Rodgers et al. 2014). However, some portions of the South Florida Ecosystem still contain sizable melaleuca infestations. Limited resource allocation for melaleuca control in some management areas has slowed progress. In these cases, resource managers cite insufficient or unpredictable timing of funding as a major impediment to their success.

While agencies continue to make progress toward achieving maintenance control of melaleuca on public conservation lands in south Florida, many private lands still retain large infestations. In addition to direct impacts to natural resources on those private holdings, those melaleuca infestations provide a continuous seed source for new infestations on adjacent public lands. Unfortunately, there are only a handful of programs to assist private land owners with removal of melaleuca and other invasive plants within the state. Outreach initiatives such as the TAME Melaleuca Project have contributed to increased public awareness of the environmental and economic impacts of melaleuca. In addition to increasing awareness among the general public, TAME and similar outreach programs are actively transferring knowledge to private land owners and small governments seeking to manage melaleuca.

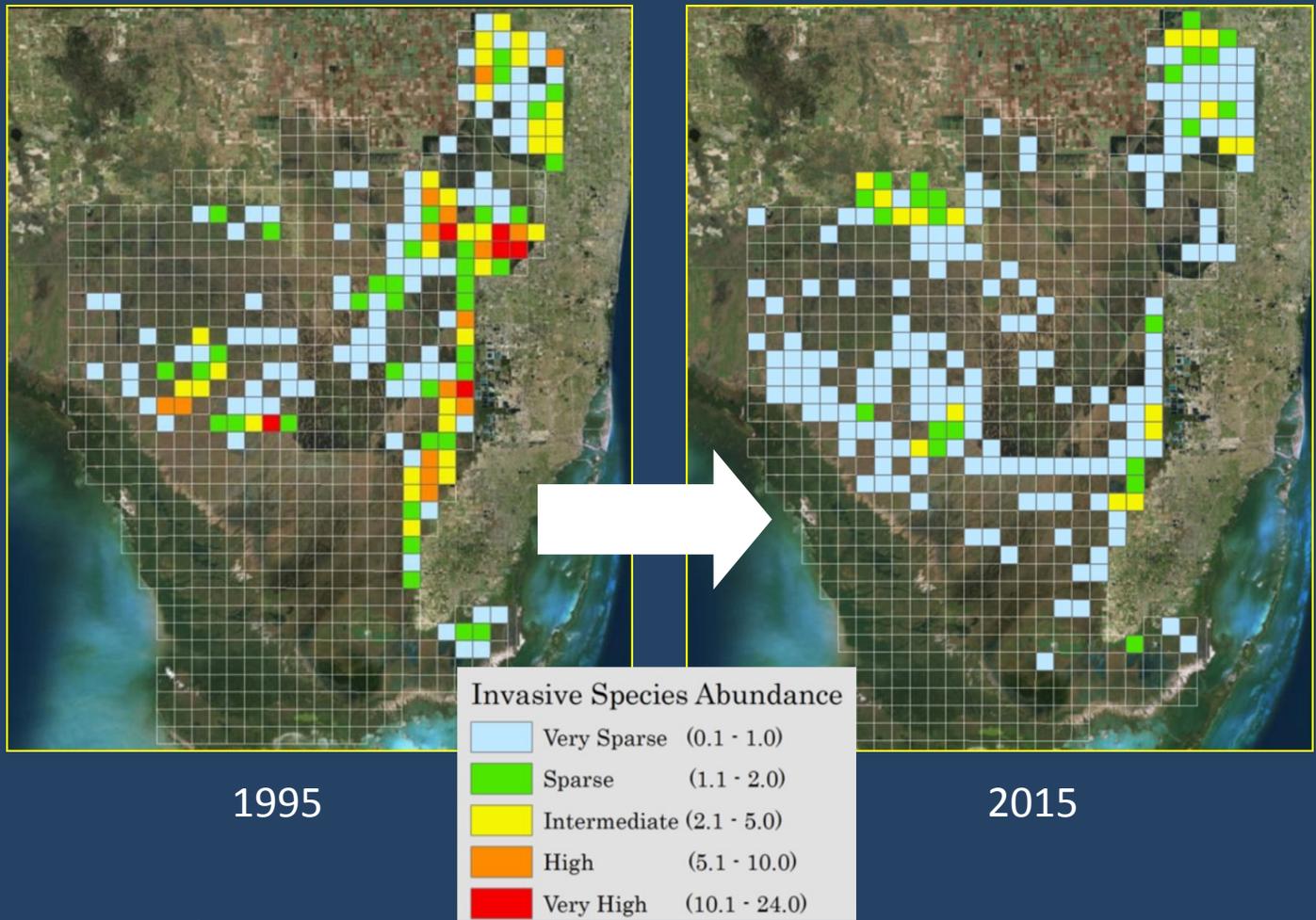
## Lessons Learned

South Florida's century-long melaleuca story is an instructive example of the environmental and economic consequences of allowing aggressive invaders to proliferate for decades without management action. Hundreds of thousands of acres of native habitat have been altered or lost, and the effort to reverse this course is costly. The south Florida melaleuca effort (including biological, mechanical, chemical, and physical control efforts) has cost over \$43 million thus far. To place this in perspective, however, FDEP estimates that failing to act against melaleuca would ultimately cost the region \$161 million annually in lost revenues (Laroche 1999). The high cost of managing this aggressive invader calls attention to two important points. First, aggressive action against newly detected invaders could save significant public resources and substantially reduce impacts to natural resources in the long term. Second, eradication of many long established, aggressive invaders like melaleuca is unlikely. A lasting commitment to maintenance control is the most cost effective and environmentally responsible approach to managing these species. Allowing once controlled invaders to re-establish in natural areas is not only poor stewardship of the resource; it is an inefficient use of public resources.

## Key Recommendations

- Develop a region-wide strategy and maintain a commitment to interagency cooperation and information exchange
- Follow an integrated management approach—utilize multiple control tools and strategies (including regulatory initiatives)
- Ensure consistent and sufficient financial resources—reliable funding greatly improves program efficiency through longer term strategic planning
- Fund outreach and education—increasing public awareness improves prevention initiatives and strengthens support of agency programs

# Melaleuca 1995-2015



1995

2015

Source: LeRoy Rodgers, SFWMD.

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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