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Status of Melaleuca Control at Big Cypress National Preserve

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Abstract

Melaleuca quinquenervia (Cav.) S.T. Blake was introduced into the Big Cypress area in the mid-1940s (Meskimen 1962). Through wind dispersion and spread by off-road vehicles, melaleuca continued to grow unchecked. By 1979, in what is now the 728 000 ac Big Cypress National Preserve, melaleuca covered over 38 000 ac. In 1984, an exotic plant control program was initiated and focused on melaleuca. Traditionally, National Park Service (NPS) crews working seasonally were used exclusively to treat melaleuca. Since 1995, private contractors have been used to treat areas that contain moderate to dense monocultures of melaleuca. Outliers are treated by groups of 1-3 persons consisting of NPS employees and/or volunteers. The result has been an increase in treatment efficiency and cost effectiveness. To date, the combined efforts of NPS crews and private contractors have resulted in the treatment of over 10 million melaleuca stems at a cost of almost three million dollars. Funding currently exists to complete the initial treatment of all melaleuca in the preserve in the 1999 fiscal year.

Introduction

The integrity of Big Cypress National Preserve's native flora and fauna is threatened by a variety of exotic pest plants that have been introduced into southern Florida, primarily for horticulture. Several of these plants have demonstrated the ability to spread into natural areas, displacing native plant communities and disrupting natural processes such as fire and water flow. A few species have already replaced native plant communities in the preserve and have changed the landscape both visually and ecologically. These species are melaleuca (*Melaleuca quinquenervia*

(Cav.) S.T. Blake), Brazilian pepper (*Schinus terebinthifolius* Raddi), Australian pine (*Casuarina* spp.), cogon grass (*Imperata cylindrica* (L.) P. Beauv.), Cuban laurel fig (*Ficus microcarpa* L.f.), Java plum (*Syzygium cumini* (L.) Skeels), and air potato (*Dioscorea bulbifera* L.). The most troublesome of these is melaleuca.

Melaleuca, an Australian tree species, was introduced into southern Florida in the early 1900s as an ornamental and a possible source of lumber. An aggressive, invasive plant, it has since spread throughout the region, replacing native plant communities with dense monotypic forests that provide little value to wildlife (Schortemeyer et al. 1981). The spread of melaleuca constitutes one of the most serious threats to the greater Everglades ecosystem, a region that includes Big Cypress National Preserve and Everglades National Park (Thayer 1990).

In 1979, varying densities of melaleuca infested an estimated 38 000 ac of the preserve (Gunderson 1983). The preserve initiated an exotic plant control program in 1984, with primary emphasis on melaleuca. By 1992, systematic reconnaissance flights revealed 119 000 ac of infestations within the preserve. For the period 1984 to 1995, National Park Service (NPS) work crews spent nearly all of their time treating outlying populations of this species. The goal of this strategy was to limit the further spread of melaleuca into unimpacted areas of the preserve.

Management Strategy

Resources management at the preserve is permanently committed to exotic pest plant control. Public Law 93-440, which established the preserve, requires "the preservation, conservation and protection of the natural, scenic, hydrologic, floral and faunal, and recreational values of the Big Cypress Watershed." NPS management policies mandate the control of exotic species up to and including total eradication, whenever such species threaten the protection or interpretation of resources being preserved.

One of the keys to a successful exotic plant control program is the use of an integrated pest management (IPM) approach. This approach uses a combination of mechanical, physical, chemical, and biological control methods while minimizing impacts to non-target vegetation and soils. Other important elements of IPM include a systematic approach, long-term commitment, and consistent follow-up.

Resource managers in the preserve have adopted an incremental strategy for the control of melaleuca. In this strategy, the preserve is divided into 10 treatment units and melaleuca is identified and eliminated from one treatment unit at a time. Units that pose a potential threat to Everglades National Park and other important resource areas have received the highest priority. Once initially treated, units are monitored and retreated on a three-year cycle. This allows seedlings an opportunity to reach a height that will facilitate detection with a minimal chance of these

plants producing seed.

The goal of the control program is to bring melaleuca to a “maintenance” level. A maintenance level is considered achieved when all mature melaleuca have been cut and treated and seedlings resulting from previous treatments and seed banks have been controlled for a minimum of five years.

Monitoring

Systematic reconnaissance flights are utilized to detect and quantify melaleuca populations. Approximately half of the preserve, or five treatment units, are surveyed by this method each year. Flights are conducted from December to March to coincide with the deciduous period of the cypress, facilitating the identification of melaleuca. Flight lines are flown using a Trimble global positioning system (GPS) for navigation information. Two observers on the aircraft spot for melaleuca targets within a half kilometer of the aircraft (“targets” are defined as isolated individual trees, areas of scattered trees, and dense stands). The type and position of the target is then entered into the GPS unit as a waypoint. Data collected from the flights are transferred to a personal computer database, post-processed using Trimble software, and manipulated using the ArcView’s geographic information system (GIS).

Control Methods

Seedlings (plants under 1 m in height) are hand pulled and stacked in a pile to prevent resprouting. Plants taller than 1 m are cut using a machete or chain saw and the cut stumps applied with herbicide (25% Arsenal or Rodeo) diluted in water. Treated areas are then burned approximately two months to one year after the initial treatment to reduce post-treatment seedling establishment (Myers and Belles 1995). Universal Transverse Mercator coordinates are obtained for all treatment sites using GPS receivers.

The U.S. Department of Agriculture has released the first insect in a proposed suite of biological controls. The melaleuca snout beetle (*Oxyops vitiosa*) feeds on the delicate new leaf growth at the end of melaleuca stems. In sufficient numbers, this beetle could greatly reduce melaleuca seed production. When this reduction occurs cannot be predicted because of varying geologic, hydrologic and climactic conditions that affect beetle establishment.

Partnerships

In 1994, Big Cypress National Preserve and Miami-Dade County entered into a

partnership in which the preserve developed and implemented a mitigation plan satisfying the permitting requirements for a joint Miami-Dade County/Florida Department of Corrections jail facility. The mitigation plan provided the preserve with \$1 581 000 for the treatment, retreatment, monitoring, and evaluation on 21 498 ac of the preserve. A private contractor completed the initial treatment of all the melaleuca in the project area in February 1997. This phase of the project resulted in the treatment of 3 999 535 melaleuca stems at a cost of \$973 000. The second (retreatment) phase of the project commenced in early 1998. Results of the melaleuca treatment program from 1984 to 1997, including funding levels, are summarized in Table 1.

Table 1. Summary of melaleuca treatment at Big Cypress National Preserve (1984-1997).

Year	Number of stems treated by			Funding (\$)
	NPS Crew	Private Contractor	Aerial application	
1984	49,120	0	0	50,000
1985	25,704	0	0	50,000
1986	20,502	0	0	0
1987	151,872	0	0	40,000
1988	27,750	303,281	0	87,000
1989	189,489	0	0	60,000
1990	161,131	0	0	100,000
1991	126,484	0	0	100,000
1992	373,455	80,902	0	170,000
1993	134,640	0	0	100,000
1994	244,234	0	2,474,400	183,000
1995	73,343	2,106,555	0	470,000
1996 (Monroe)	0	3,999,535	0	973,000
1996 (Loop Rd.)	0	966,750	0	200,000
1996 (Corn Dance)	0	347,455	0	220,000
1997	33,014	437,997	0	62,480
Totals	1,610,734	8,242,475	2,474,400	2,928,840

In the 1998 and 1999 fiscal years, a match of Miami-Dade County Wetland Trust Fund monies to the preserve's existing exotic plant control budget will provide for the initial treatment of all known melaleuca remaining in the preserve. A private contractor will perform the work under the supervision of NPS staff. The private contractor is currently under a "time and materials" contract with the preserve to control exotic vegetation within the boundaries of both the preserve and Everglades National Park. This contract allows the NPS to issue individual task orders for five years (base year, plus four option years) as funds become available.

Discussion

The preserve's exotic plant control program has reduced the aerial extent of melaleuca from 119 000 ac to approximately 48 000 ac, through the cutting and treatment of over 10 million trees. Private contractors are now used exclusively for the treatment of moderate to dense melaleuca infestations. NPS employees and volunteers continue to target sparse melaleuca populations. This approach has reduced the cost of melaleuca treatment from 66 to 24 cents per stem.

The removal of melaleuca from the preserve's sensitive wetlands will permit the reestablishment of native plant communities and increase plant and animal diversity. Federally-listed species found in the area which will benefit from melaleuca removal include the red-cockaded woodpecker, wood stork, and Florida panther.

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