

Silver King Fire

BURNED AREA REHABILITATION PLAN

July 29, 2020



Top panel: Burned *Melaleuca quinquenervia* in the Silver King fire footprint; Bottom panel: Delineation between burned and unburned cypress trees in the slough

UNIT: Big Cypress National Preserve (BICY)

LOCATION: Collier County, Florida

DATE: July 29, 2020

PREPARED BY: Courtney Angelo, BICY Botanist, Robert Sobczak, READ Assigned to Silver King Fire & BICY Hydrologist, and Billy Snyder, BICY Biologist

RECOMMENDED BY: Jill Waisley, Fire Planner

Recommended	Name		Position	
	Anthony Pernas		Chief of Resource Management	
	Signature		Date	
	<i>Anthony Pernas</i>		8/20/20	

Recommended	Name		Position	
	James Sullivan		Fire Management Officer	
	Signature		Date	
	<i>James R. Sullivan</i>		8/21/20	

Approved	Name		Position	
	Thomas Forsyth		Park Superintendent	
	Signature		Date	
	<i>Thomas P Forsyth</i>		Aug 21, 2020	

Introduction

This Burned Area Rehabilitation Plan has been prepared in accordance with the Department of the Interior and National Park Service policy. This plan provides rehabilitation recommendations for all lands burned within the Silver King Fire footprint and impact areas including: public lands administered by the National Park Service. The primary objectives of the Silver King Burned Area Rehabilitation Plan are:

- 1) To repair or improve lands unlikely to recover naturally from severe wildland fire damage by emulating historic or pre-fire ecosystem structure, function, diversity, and dynamics according to approved land management plans.
- 2) Restore or establish healthy, stable ecosystems, even if these ecosystems cannot fully emulate historic or pre-fire conditions as specified in approved land management plans.

Based on observations and scientific data, fire has been shown to exacerbate invasive plant infestations. *Melaleuca quinquenervia* (Melaleuca) is a fire-adapted species which spreads easily into burned and surrounding areas post-fire. Melaleuca fruit capsules which contain copious amounts of seeds are also stimulated to open and release seeds after fire adding more propagules to the system than pre-fire conditions. *Schinus terebinthifolia* (Brazilian pepper) is a primary succession species that favors disturbance such as fire scars and mechanical soil disturbance. *Lygodium microphyllum* (Old World climbing fern) is also present in the area. Given the invasive behavior of this species, it can quickly invade burned areas and smother native vegetation. Additionally, Big Cypress National Preserve has historic chronological data of invasive plant infestations since the early 1990's that were mapped using systematic aerial reconnaissance and Digital Aerial Sketch Mapping (DASM). This rehabilitation plan addresses how to deal with the populations of invasive non-native plants within the Silver King Fire footprint.

Fire Background

The Silver King Fire (609 acres) includes one wildland fire within Big Cypress National Preserve (BICY) (Fig. 1). It was reported on April 9, 2020 and occurred in the northeast corner of BICY, along the L-28 canal near the Big Cypress Sanctuary Community. The Silver King Fire was 100% contained after 21 days on April 30, 2020. A handline on the ground and drop buckets of water from the air on the fire helped secure a resource area of significant importance prior to containment. Fire growth was halted due to multiple rain events that occurred over days 16-21 thereafter ending the response. Additionally, it was the first wildland fire of the season to occur after the initial COVID-19 shutdown and the cause is listed as undetermined.

Hydrological conditions of the wildland fire footprint

The wildland fire footprint experienced an unusually dry period leading up to the event; while, the Preserve entered April in a state of deep and prolonged drought. The April 2020 drought conditions mirrored spring droughts of the 2009 Deep, 2011 Jarhead and 2018 Avian wildland fire seasons.

During spring 2020, the water table dropped below the root zone of large cypress trees for an approximate 10-12-week period from mid-March to late May, making stands of cypress more susceptible to mortality in the presence of fire. During the fire, all visited cypress domes were completely dry, along with Mistletoe Slough only containing a small pocket of water with the reminder of the area dry. The water table was measured to be located 3-4 feet below the center of cypress domes and 2-3 feet below the center of Mistletoe Slough. This resulted in a sustained and widespread deficiency in soil moisture within these systems.

In the wetland ecosystems of the Preserve, severe drought can have a profound impact. Under drought conditions, wildland fire is more likely to burn deeper into the surface soil layer and into ecosystems that are normally less likely to burn (e.g., domes, strands, and sloughs). This is essentially what occurred during the Silver King Fire. The wildland fire was able to penetrate cypress domes and Mistletoe slough and burned cypress trees and peat. It penetrated the perimeter of areas with natural resources of significant importance (i.e., T & E species).

It is possible that draining of the headwater areas of the Big Cypress National Preserve watershed has contributed to an overall drying of the landscape. Restoration efforts should focus on landscape level management that re-establishes natural hydrology.

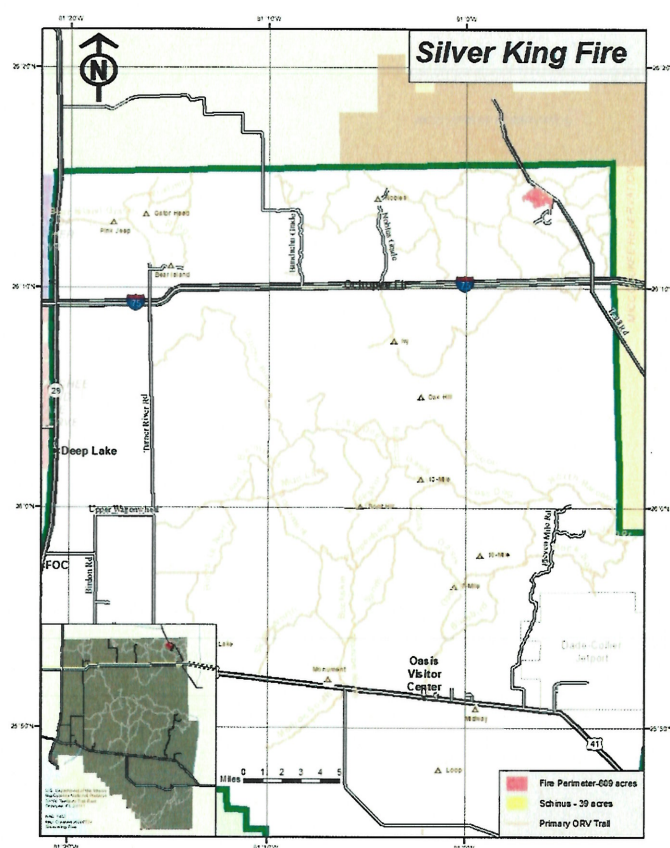


Figure 1. Map of the Silver King Fire footprint

Fire Damages and Threats to Human Safety and Natural and Cultural Resources

Please see the READ report for a more detailed description of natural resources in and around the fire footprint. The vegetation communities in the wildland fire footprint consist of upland areas that include pineland and mixed hammock. There is also an area of similar size of lower cypress stands (as described above).

The wildland fire burn severity was diverse, resulting in a mosaic pattern from limited high severity to unburned. The upland pineland and mixed hammock communities that were within the Silver King Fire footprint were impacted by the fire, along with fire management techniques such as clearing vegetation to make a handline. This area is home to three state-listed epiphytes and several endemic herbaceous species.

Within the cypress stands, there are areas where cypress trees were burned. Furthermore, peat burned and may result in cypress tree mortality due to heat exposure to drought-exposed roots; however, this effect was mostly isolated. The extent of this impact will not be observable until the following growing season.

The drought-stressed cypress trees and the perimeter of Mistletoe Slough were impacted by this fire. Seasonal wildland fires in the Preserve are common, and as such are well-adapted to the associated changes that accompany seasonal burning. Although, cypress domes and stands typically are thought to be less fire-adapted than other plant communities in the Preserve. In this diverse area, the Silver King fire penetrated the cypress and slough complex which provides habitat for at least nine state-listed species (i.e., 8 endangered epiphytes and 1 threatened epiphyte).

Invasive Plants

The region of the Preserve where the Silver King fire occurred is known to have dense populations of Brazilian pepper, along with scattered populations of Melaleuca, and Old World climbing fern. The last comprehensive aerial mapping event of invasive plants in this area occurred in 2012-13. Based on the results of the mapping event from 2012-13, 39.3 acres of Brazilian pepper were detected in the fire footprint. Within the Silver King Fire READ report one dense stand of Melaleuca is identified. Ground observations by the Preserve botanist indicate presence of Old World climbing fern. Using the aerial survey (2012-13) with an allowance for growth since the survey was performed of 10%, Brazilian pepper acreage estimates are placed at 43.2 acres. Dense Melaleuca is placed at one acre and Old World climbing fern is also estimated at one acre.

As a result of the high levels of disturbance created by the wildland fire and suppression efforts there is a high probability of these known infestations expanding within the fire footprint in the coming years. The burned area assessment completed by the BICY team *does not* recommend additional DASM to detect new invasive plant locations within the fire footprint; although, a comprehensive ground survey is recommended one-year post-fire.

The most significant invasive species in the fire perimeter are Brazilian pepper (*Schinus terebinthifolia*), Old World climbing fern (*Lygodium microphyllum*), and Melaleuca (*Melaleuca quinquenervia*). This

funding request has been made by Billy Snyder, BICY Biologist, and Courtney Angelo, BICY Botanist, and therefore will be brought forward for analysis.

Melaleuca (*Melaleuca quiquenervia*) is a fast-growing tree that is native to Australia. *Melaleuca* seeds are dispersed by wind and water, but many seed capsules are stored on mature trees and are explosively released after fire. In pineland uplands within the Buzzard wildland fire footprint, roughly 25-50% (5-10,000 acres) have some level of *Melaleuca* infestation as a result of the 2018 fire. Within the Buzzard fire footprint, infestations of *Melaleuca* where dense monocultures exist with no mature trees, suggest seedlings germinated from a dormant seedbank that may have persisted unknowingly till recently. While the pre-fire estimate of *Melaleuca* is one acre, the area of the population is likely to increase due to its post-fire behavior described herein.

Brazilian pepper (*Schinus terebinthifolia*) is an invasive species from Brazil and Argentina. Open wetlands and cypress communities generally have very low infestation levels of Brazilian pepper restricted to high spots and cypress tree bases. Infestation levels in uplands (i.e., pinelands and hammocks) vary greatly. History of human use, fire frequency and disturbance probably dictate infestation levels in these communities. The heaviest Brazilian pepper infestations occur along roadsides and canal banks, in abandoned agricultural land and around old home sites. Brazilian pepper is a primary succession species and will quickly colonize areas of disturbance. It is anticipated that fire lines created will develop quickly into monocultures of Brazilian pepper.

Old World climbing fern (*Lygodium microphyllum*) is a fire-adapted invasive plant species from southeast Asia. Old World climbing fern is the highest priority invasive plant species found in the Preserve due to its rapid growth and difficulty of control. Known locations of Old World climbing fern identified through DASM have been treated annually for the last several years. One-acre pre-fire infestation level of Old World Climbing fern will likely increase due to movement into the fire footprint from dissociated populations and this increase should be visible within one-year post-fire. Thus, funding for a one-year post-fire comprehensive survey to determine the extent of the species' expansion should be provided in addition to treatment funding.

Big Cypress National Preserve Management Requirements

The primary concern for burned area rehabilitation and long-term recovery of the Silver King site is preventing invasion by non-native, invasive plants. Sections that experienced a high severity burn and were mechanically disturbed will be vulnerable to invasion from nearby seed sources. Fires in similar vegetation types in the near vicinity have been invaded quickly and required extensive control. BICY has actively managed exotic plants since the 1980s and many of the sites are under a cyclic maintenance program, however new invasions are a constant threat.

Several guidance documents dictate the need for the preserve to take actions to address these current threats to its resources. Government Performance and Results Act (GPRA) planning language identifies natural areas and resident biota as entities identified for protection and restoration:

- Goal 1a1A (Disturbed Areas Restored) identifies goals for rehabilitation and restoration of areas within the Preserve.

- Goal Ia1B outlines requirements to reduce areas dominated by exotic plants. Activities supporting these goals clearly promote restoration of natural biological systems and have been met consistently for several years.
- Goal Ia2B identifies biota of management concern and indicates that their populations will be managed to a desired condition.

The South Florida and Caribbean Parks Exotic Plant Management Plan and Environmental Impact Statement (August 2010), Big Cypress National Preserve planning section, identifies Old World climbing fern, Brazilian pepper and Melaleuca as highly invasive and a priority for management by elimination. The Resource Management Plan for Big Cypress National Preserve (1998) references vegetation management, also generally as exotic plant control, and species listed for protection. There is at least one reference to developing a Vegetation Management Plan in the plan outline; this is primarily focused on exotic plants (p. 28).

A requirement to manage biological systems in nearly their natural conditions is found in some of the legislative framework that created the Preserve: "...assure the preservation, conservation, and protection of the natural, scenic, hydrologic, floral and faunal, and recreational values of the Big Cypress Watershed in the State of Florida and to provide for the enhancement and public enjoyment thereof..." (An Act to establish the Big Cypress National Preserve in the State of Florida and for other purposes. [88 Stat. 1225] [P. L. 93-440] October 11, 1974; Sec. 1 (a)). As community identifiers, and as the common components in most biological communities, the plant biota can be considered as the basis for management considerations in each area. Therefore, plans for management based on plant communities and their constituent plants should be considered as fundamental for decisions (management) that are focused on natural areas.

Proposed treatments in the Silver King fire footprint fit the preceding guidance well, and with rehabilitation would have a much more successful long-term prognosis than if left to be addressed under the preserve's normal control program.

FIRE LOCATION AND BACKGROUND INFORMATION

Fire Name	Silver King Fire
Fire Number	Wx 20-017
Agency Unit	BICY
Region	SER
State	Florida
County(s)	Collier
Ignition Date/Cause	Unknown case, 4/9/2020

Zone	Southwest Florida Caribbean
Date Fully Contained	4/30/2020
Jurisdiction	NPS
Total Acres	609 acres total mapped
Date Contained	4/30/2020

NATURE OF PLAN

Type of Action (check one box below)

☒	Initial Submission
☐	Amendment to the Initial Submission

REHABILITATION ASSESSMENT

Rehabilitation Objectives

- Prevent the establishment of non-native invasive plants
- Detect and treat at least 95% of non-native invasive plant occurrences within the Silver King Fire footprint
- Use integrated pest management (IPM) to prevent the establishment of non-native invasive plants within the Silver King Fire footprint
- Use standard effectiveness monitoring protocols to ensure success of non-native invasive plant removal treatments
- For the Silver King project, a ground survey of treatment sites would be performed post-treatment to determine effectiveness of project treatment. If a 95% kill rate is not achieved for any area of the project after three months following project completion, one additional thorough treatment of the project area will be the responsibility of the Contractor at no cost to the Government.

TEAM ORGANIZATION, MEMBERS, AND RESOURCE ADVISORS

Burned Area Emergency Response Team Members: *(List of technical specialists used to develop the plan)*

Position	Team Member (Agency)
Hydrologist	Bob Sobczak (NPS)
Wildlife Biologist	Deborah Jansen (NPS)
Botanist	Courtney Angelo (NPS)
Exotic Plant Specialist	William Snyder (NPS)
Fire Planner	Jill Waisley (NPS)

SUMMARY OF ACTIVITIES AND COSTS

The summary of activities and cost table below identifies rehabilitation costs:

REHABILITATION ACTIVITIES COST SUMMARY TABLE – Silver King Fire

Spec #	Title	Unit	Unit Cost	# of Units	Work Agent	Cost FY 21
1	Invasive Plant Control	Burn Site			SC	\$37,870
1	Post-fire 1-year survey	Burn Site			SC	\$2500
1	Herbicide for invasive plant control	Burn Site			SC	\$1000
TOTAL COST						\$41,370
Work Agent: CA=Coop Agreement, FA=Force Account, G=Grantee, P=Permitee, SC=Service Contract, TSP=Timber Sales Purchaser, V=Volunteer						

INDIVIDUAL SPECIFICATION

TREATMENT/ACTIVITY NAME	Invasive Plant Control	PART E SPECIFICATION #	1
NFPORS TREATMENT CATEGORY*	Invasive Species	FISCAL YEAR(S) (list each year):	2021/2022/2023
NFPORS TREATMENT TYPE *	Chemical Treatment	WUI? Y / N	Y
IMPACTED COMMUNITIES AT RISK	Natural Areas	IMPACTED T&E SPECIES	9 state-listed T&E species, several endemic species

* See NFPORS Restoration & Rehabilitation module

Number and Describe Each Task: A. General Description: Detect, control, and monitor non-native invasive species in burned areas and prevent the expansion of known populations into newly disturbed sites. Control will follow procedures well established and ongoing for the BICY Invasive Plant Management program, emphasizing integrated pest management (IPM) techniques (herbicides, biological, mechanical, and cultural control methods) as appropriate to prevent the spread and establishment of noxious weeds within the fire area. The work will be conducted by private contractors currently under an ID/IQ contract administered by the Southeast region of the National Park Service. The Contractor will furnish all labor, equipment, personal protective equipment (PPE), herbicides, dyes and adjuvants for the control of invasive plants. B. Location/(Suitable) Sites: See Invasive plant distribution map, results of 2012/2013 DASM (Appendix A). We used data collected from the 2012/2013 DASM and ground surveys to determine coverages of invasive plants in the fire footprint. The next DASM flights for BICY will be carried out in late 2020 or early 2021. A 1-year post-fire vegetation survey is requested to determine ground-truthing of invasive plant distributions. C. Design/Construction Specifications: Contractor work performance will consist of furnishing all labor, equipment, and supplies (including herbicide and adjuvants), and performing all operations for controlling invasive plants listed under Project Goals in the areas described in Project Description or delineated in Project Map(s). Every effort shall be made by the contractor to avoid damage to native vegetation or wildlife. The contractor is responsible for the control and/or removal of all invasive plants including mature trees/shrubs, saplings, and seedlings. D. Purpose of Treatment Specifications: Control spread of non-native invasive species into susceptible burned areas that will change the native plant composition. Treatments will support development of native biological communities and more natural fire recovery by these communities. E. Treatment Effectiveness Monitoring Proposed: For the Silver King project, a ground survey of treatment sites shall be performed post-treatment to determine effectiveness of project treatment. If a 95% kill rate is not achieved for any area of the project after three months following project completion, one additional thorough treatment of the project area will be the responsibility of the Contractor at no cost to the Government. Invasive plant treatments provided by BAR funding have been effective for multiple species, including the three listed for this project, in previous years (2008-present) within BICY. For a list of success BAR projects and species information see Appendix B. This area of invasive plant treatment will be part of a larger ongoing invasive management program at BICY. Monitoring of invasive plants occurs continuously, but is primarily done with DASM at 5-7 year intervals. In DASM, locations and amounts of invasive plants are mapped to provide staff and contractors information to plan and manage operations. In addition, to DASM, NPS biologists practice EDRR methodology and evaluate areas within the Preserve for novel invasive species infestations during any type of field work.

CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST / ITEM
Herbicide treatment (low to medium density Brazilian pepper) 43.2 acres	\$35,370
Herbicide treatment (low to medium density Melaleuca) 1 acre	\$1,000
Herbicide treatment (low to medium density Lygodium) 1 acre	\$1,500
Herbicide for treatment	\$1,000
Post-fire 1-year survey	\$2,500
TOTAL CONTRACT COST	\$41,370.00

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNIT S	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY21	4/4/2021	6/4/2021	SC	Acres		43.2 acres	\$41,370.00
FY22	4/4/2022	6/4/2022	SC	Acres		Dependent on FY 21 survey*	\$41,370.00*
FY23	4/4/2023	6/4/2023	SC	Acres		-----*	\$41,370.00*
TOTAL							\$124,110.00*

***BAR Funding Year 2 and 3:**

BAR funding needs for year 2 and 3 as described above should be based on the actual invasive plant populations based on the 1-year invasive plant survey. That dollar number as could be similar to year one's request or could be higher. For planning purposes, \$41,370 should be used as a placeholder until after the year 1 survey is complete and a modified request is submitted.

SOURCE OF COST ESTIMATE

1.	Estimate obtained from 2-3 independent contractual sources.	
2.	Documented cost figures from similar project work obtained from local agency sources.	
3.	Estimate supported by cost guides from independent sources or other federal agencies	C
4.	Estimates based upon government wage rates and material cost.	
5.	No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, E = Equipment M = Materials/Supplies, T = Travel, C = Contract, F = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within the Accomplishment Report.
Figure 1 Map of the Silver King footprint
Appendix A Distribution of Invasive Plants within the Silver King Fire footprint (results of 2012/2013 DASM)
Appendix B Lists previous BAR awards to BICY, including target species of the award

TOTAL COST BY JURISDICTION

JURISDICTION	UNITS TREATED	COST
Big Cypress National Preserve FY 21, FY 22, FY 23	1	\$124,110.00
	TOTAL COST	\$124,110.00

BURNED AREA ASSESSMENT REPORTS

Objectives

To determine extent of area likely to be invaded by invasive plants.

Issues

Invasive non-native plants are located within and adjacent to the burned area.

Observations

Background information: The burned area is dominated by several plant communities including pine flatwoods, cypress strands, cypress domes, hardwood hammocks, and slough.

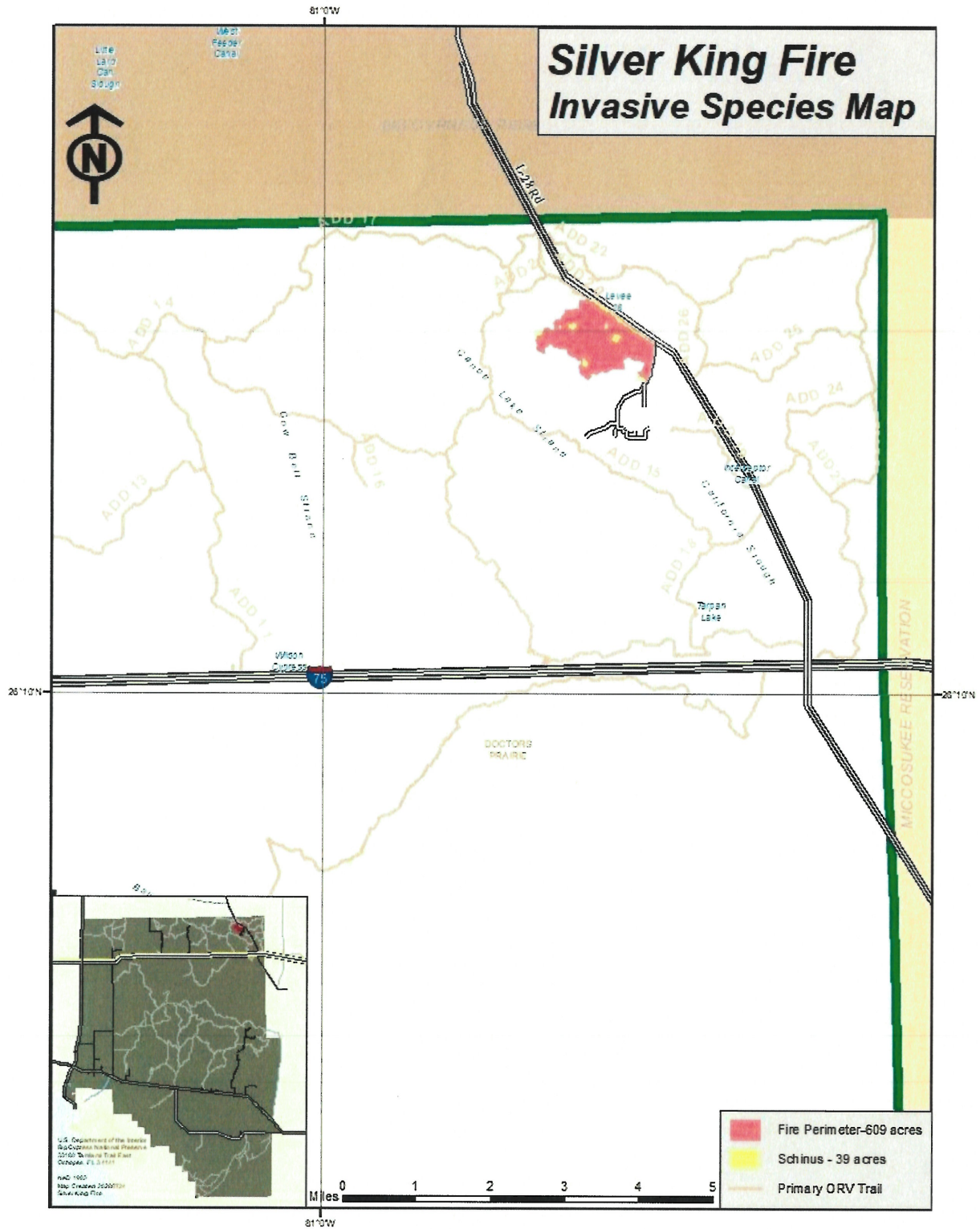
Reconnaissance Method: The initial reconnaissance was conducted on foot, along with DASM data from 2012/2013. Documented invasive plants found within the fire perimeter include Brazilian pepper, Old World climbing fern, and Melaleuca.

Findings: Several areas burned with sufficient severity to warrant continued monitoring and control of invasive plants. Funds are requested for FY21, FY22, FY23 to treat invasive plants.

Recommendations

Management (specification related):

Funds for rehabilitation during years 1-3 are requested to completely treat all invasive plants within the fire footprint.



Appendix A: Fire footprint with invasive species distributions.

Appendix B: Table of BAR awards to Big Cypress National Preserve, along with target species

YEAR	BAR Award	Target species
2008	Midrest Stricklckland BAR	Multiple species
2010	Deep Fire BAR	Schinus
2011	Deep Fire South BAR	Schinus
2012	Jarhead BAR	Multiple Species
2012	Jarhead Phase 2 BAR	Multiple Species
2014	Huckabee BAR	Multiple Species
2016	Huckabee BAR	Multiple Species
2016	Orange Blossom BAR	Schinus
2017	Birdon BAR	Multiple Species
2017	Mud Lake BAR	Multiple Species
2018	Cowbell BAR	Aerial Lygodium
2018	Parlaiment BAR	Aerial Melaleuca
2019	Cowbell BAR	Aerial Lygodium
2019	Avian BAR	Melaleuca
2020	Cowbell BAR	Aerial Lygodium