Pine Rocklands Fire Managers Symposium

1998

Proceedings

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Summary

With support from The Nature Conservancy and Dade County Environmentally Endangered Lands Program, the first Pine Rockland Fire Manager’s Symposium was held on December 8 - 9, 1998. The meeting was attended by 75 people representing 25 organizations and agencies. Representatives from federal, state and regional government, non-profit organizations, universities, and private citizens were present.

Pine rocklands are a globally endangered plant community, containing a diverse herbaceous flora and an overstory dominated by slash pines. In south Florida, this community is found within Everglades National Park, and extends northeast toward downtown Miami. Higher elevations of the Lower Keys and the Bahamas also support pine rocklands.

This once-extensive community has been severely reduced and fragmented by development. On mainland south Florida approximately 90% of pine rocklands have been lost. Pine rocklands of the Keys and the Bahamas have also been affected by development, though not as extensively as in the Miami area. Fragmentation has altered critical ecosystem processes in these forests, including the fire regime.

Fire is an integral ecological process of pine rocklands. However, development and fire suppression have limited the spread of fires across the landscape. Without fire, a continuous subcanopy of broad-leaved trees develops, hindering pine germination, and shading out herbaceous plants. Many of these herbaceous plants are local endemic taxa. The rarest of these endemics are in danger of imminent extinction. Fire also stimulates reproductive activity in many of these rare endemic taxa. Prescribed fire is an effective means of controlling succession to a hardwood forest, and preserving biodiversity.

The main focus of the meeting was to provide updates on the status of fire management programs, provide information and updates on research activities, share strategies for public education, and develop cooperative connections to better plan and improve on fire management of pine rocklands in southern Florida.

Several problems and needs were addressed at the symposium. One of the most prominent ideas being the need for enhanced public education and awareness. We also found that we may need more trained fire personnel working on the fire lines to make our programs more effective. Funding continues to be an issue, and we identified some ways to unify our needs to solicit funds. We were very happy to welcome representatives from the Bahamas and to learn of the growing fire management program in this region.

Following is the symposium proceedings. A contact list for fire managers in southern Florida and the Bahamas is presented at the end of this document.
PINE ROCKLAND FIRE MANAGER'S SYMPOSIUM

Schedule
December 8, 1997

9:45 - 10:00 Welcome/Overview: status of pine rocklands
L. Flynn

10:00 - 10:40 Conceptual overview of designing fire regimes for natural remnants, including problems with exotics
R. Myers

Planning and Program Overviews

10:40 - 11:00 Everglades National Park - fire management overview
J. Segar

11:00 - 11:20 Dade County - fire management overview
J. Maquire

11:20 - 11:50 Developing a fire management program in the Bahamas
K. Oliver

11:50 - 12:10 Lower Keys Pine Rocklands
B. Stiegllitz

12:10 - 1:30 LUNCH

Scientific Research

1:30 - 1:50 Post-fire monitoring at Nature Conservancy preserve
D. Gordon

1:50 - 2:10 Effects of late Holocene climate change and human disturbance on the fire ecology and vegetation history of Andros Island
E. Kjellmark

2:10 - 2:30 Keys endemics and fire effects research of lower FL Keys
M. Ross

2:30 - 2:50 Pine Rockland phenology and pollination
S. Kepur

2:50 - 3:10 Post-hurricane fire effects
J. Snyder

3:10 - 3:30 Overview of Everglades National Park Fire Research
J. Decoster

3:30 - 3:50 BREAK

3:50 - 4:10 Fire effects and pine mortality
H. Slater

4:10 - 4:30 Rare butterfly species and fire management
M. Salvato
December 9, 1997

**Fire Effects on Exotics and Important Elements**

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<td>9:40 - 10:00</td>
<td>Endemic plants and fire management</td>
<td>D. Garvue</td>
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<tr>
<td>10:00 - 10:20</td>
<td>Regulatory issues and endangered plants</td>
<td>J. Tuten</td>
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<td>10:20 - 10:40</td>
<td>Fire management and Key Deer</td>
<td>M. Folk</td>
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<td>10:40 - 11:00</td>
<td>Fire and exotics species management</td>
<td>S. Wells</td>
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**People and Fire Issues**

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<td>11:00 - 11:20</td>
<td>Fire in an urban interface: case studies</td>
<td>J. Murrian</td>
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<td>11:20 - 11:40</td>
<td>Division of Forestry - Fire operations and response</td>
<td>D. Utley</td>
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<td>11:40 - 11:50</td>
<td>Public outreach</td>
<td>J. Klein</td>
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<td>11:50 - 12:10</td>
<td>Private landowner stewardship and prescribed burning</td>
<td>B. Glancy</td>
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**Planning**

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<td>G.I.S., a tool for planning</td>
<td>J. Wishy</td>
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<td>1:50 - 2:10</td>
<td>Site-characterization of Lower Keys Pine Rocklands</td>
<td>L. Flynn</td>
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<td>2:10 - 2:30</td>
<td>G.I.S. Planning and Dade County fire management</td>
<td>B. Olsen</td>
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<td>2:30 - 2:50</td>
<td>Air quality issues</td>
<td>J. Wheeler</td>
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<td>2:50 - 3:10</td>
<td>BREAK</td>
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<td>3:10 - 4:30</td>
<td>Wrap-up: Open discussion</td>
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<td>Identify unmet needs</td>
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FIRE MANAGEMENT IN THE SLASH PINE SAVANNAS OF EVERGLADES NATIONAL PARK

Presented by:

John Segar
Prescribed Fire Specialist
Everglades National Park
P. O. Box 279
Homestead, FL 33030

Everglades National Park manages over 1.5 million acres of wildlands in the southern tip of Florida, including approximately 20,000 acres of slash pine savanna and associated finger glades. These lands are managed as "wilderness preserving essential primitive conditions including the natural abundance, diversity, behavior, and ecological integrity of the unique flora and fauna". Management guidance states that the park will be "restored and protected in ways that allow natural processes, functions, cycles, and biota to be reestablished and maintained in perpetuity".

Approximately half of the park is made up of fire adapted or dependent vegetation communities. Lightning fires are common in both the transition (May-July) and summer (July-September) seasons, but transition season fires are generally larger and burn significantly more acreage than summer season lightning starts. Arson fires are common in the dry season (October-May) and may become very large, but few lightning starts occur in the dry season.

The park has been using prescribed fire to manage slash pine savannas since 1938 when it started the first prescribed fire program in the National Park Service, and it continues to be the primary resource management tool. Prescribed fire operations have changed considerably over the years as the park's knowledge and understanding of fire ecology has expanded. Current prescribed fire operations are geared toward reducing hazardous fuel loads, and decreasing the woody understory that has accumulated over the years of fire exclusion followed by winter and late summer burning, and restoring a diverse grass dominated understory which historical accounts document existing before development of the everglades.

In addition to the above objectives, the park has identified a number of resource management and operational constraints to burning the slash pine savannas. Resource management constraints include: keeping pine scorch and mortality within acceptable levels; minimizing damage to embedded hardwood hammocks; protecting endangered species (panther and endemic vegetation); and reducing exotic species (primarily Brazilian pepper). Operational constraints include: availability of burn windows, burn crew/equipment availability and cost, and smoke management.

The park has been successful in restoring diverse and grass dominated understories in several areas by shifting burning from the wet season (July-October) to the transition season (May-June) and increasing the use of headfires and flanking fires. This has resulted in a significant increase in understory grass composition and species diversity. These changes have also increased the operational difficulty of burning due to increased intensity and weather variability.

Everglades National Park continues to monitor and research fire effects in order to continue to refine fire management practices. Major fire management in slash pine savanna issues in need of further investigation include: the effect of the shift to transition season burning in dry years; and fire return intervals needed to maintain slash pine savannas where a grass understory has been restored. The fire management program will continue to adapt as information on these and other issues is made available.
DEVELOPING A FIRE MANAGEMENT PROGRAM IN THE BAHAMAS

Presented by
Katherine A. Oliver
Assistant Director
Bahamas National Trust of the Nature Centre
P.O. Box F-43441
Freeport, Bahamas

Four islands in the northern Bahamas contain pine rocklands - Abaco, Andros, Grand Bahama, and New Providence - comprising more than 500,000 acres. Bahamian pine rockland, a fire sub-climax community, is characterized by pitted, broken oolitic limestone, thin soils, an overstory of *Pinus caribaea*, and an understory of *Turbinax*, *Sabal* and/or mixed hardwoods. The pine forest is important habitat for resident and migratory land birds, supporting densities six times greater than similar habitats in the southeast U.S., and it is habitat for the endangered Bahama Parrot and Kirtland's Warbler. Impacted by logging, development, and large winter burns from accidental fires and hunter-induced fires, pineland in the Bahamas are not actively managed by owners which include the Government, private companies and individuals, and The Bahamas National Trust (BNT). Three of the twelve national parks managed by the BNT contain pinelands and, in cooperation with Everglades National Park, preliminary fire management plans have been developed for the Nature Centre, Lucasan National Park and Abaco National Park. The objective was to develop a fire program consistent with land management goals which included protection of biodiversity, pineland vegetation, and endangered species and habitats; protection of buildings, improvements, and captive animals on site; and public education. In the short to medium term, the Trust plans to upgrade equipment and wells and begin collecting weather data; consult with other agencies, train staff (including a designated Fire Management Officer), and hold seminars involving locals and skilled fire managers; mechanically reduce fuel loads around buildings, exhibits, etc.; and begin utilizing low intensity summer prescribed burns.

SITE CHARACTERIZATION AND FIRE MANAGEMENT PLANNING FOR LOWER KEYS PINE ROCKLANDS

Presented by
Laura Flynn
The Nature Conservancy of the Florida Keys
P.O. Box 4958
Key West, FL 33041

Due to development pressures over the last several decades, fire has been suppressed in Lower Keys pine rocklands. Without an active burn program, pine rocklands succeed to a dense hardwood hammock. Under these late-successional conditions, many narrowly endemic herbaceous plants are put at risk of extinction, and habitat for endangered fauna, including the Key deer, becomes unsuitable. To begin to develop a consistent fire management program, and restore fire to this community we examined site characteristics of more than 1,000 acres of pine rocklands in the Lower Keys. We collected information about pine demography, shrub cover, fuel load, foliage density, litter depth, and location of rare endemic herbs. An updatable GIS-linked relational database was created. This database stores and summarizes the data for use in mapping site characteristics and monitoring changes to vegetation as fires occur. This database is designed to contribute to each step in the development and implementation of a fire management plan, including: setting objectives; prescribing burns; and evaluating results of burns. Using available fire history records, we also examined patterns between known fire history and site characteristics. Few definitive correlations were apparent due to the inadequacies of current fire history records for tracking all factors that affect vegetation characteristics, including fire intensity and pre-burn conditions. The GIS-linked database includes forms to track these parameters in the future.
OVERVIEW OF FIRE MANAGEMENT IN LOWER KEYS PINE ROCKLANDS
U.S. FISH AND WILDLIFE SERVICE

Presented by

Berry Stiegliitz
Project Leader
USFWS Florida Keys National Wildlife Refuge
P.O. Box 430310
Big Pine Key, FL 33043-0510

The primary owners of pine rocklands in the Florida Keys are National Wildlife Refuges, but only National Key Deer Refuge has rocklands. State of Florida's CARL program - Key Deer Project (managed by FWS), South Florida Water Management District (managed by FWS), Monroe County Land Authority (managed by FWS), and The Nature Conservancy.

The focus of management:
1. Key deer, which is pseudo-indicator of overall environmental health.
2. Suite of plant and animal species also rocklands-dependent.

Fire managers face various problems, including:
A. Classic urban interface issues.
1. Endangerment of private property, especially structures.
2. Air quality and smoke management.
3. Loss of cost-effectiveness by managing fire on extremely small parcels.

B. Common resource management problems/issues.
1. Why fire? The public is largely ignorant of the need for fire.
2. Insufficient resources to do the job as well as it needs to be done.

C. Common South Florida problems/issues.
1. Exotic plants.
2. Arson.

D. Keys-specific problems/issues.
1. High level of endemism.
2. Species near limits of respective ranges.
3. Toxic plant life, which when burned compounds smoke management concerns.
4. Older population, which compounds smoke management concerns.
5. Lack of specific knowledge about burning pine rocklands.
6. Public attitudes.
   a. Distrust of government.
   b. Ownership without stewardship.
7. High population turnover necessitates frequent re-education.

Solutions to the above issues include:
A. Excellent rockland management partners.
   1. TNC.
   2. DOF.
   3. Big Pine Key Volunteer Fire Department.
   4. Other FWS offices/personnel.

B. Pine rocklands fire study (Ross et al).

C. Additional resources derived from South Florida Ecosystem Restoration efforts.
   1. Funds.
   2. GIS.
POST FIRE MONITORING AT A NATURE CONSERVANCY PRESERVE ON BIG PINE KEY

Presented by

Doria R. Gordon
The Nature Conservancy
University of Florida
P.O. Box 118526
Gainesville, FL 32611-8526

South Florida pine rockland is reported to have a natural fire frequency of every 3-15 years, and is replaced by closed hardwood forest following 15-25 years of fire exclusion. Few data document the short-term vegetative responses when fire is restored to pine rocklands, with the majority of research conducted on mainland Florida. We compared pine rockland responses to fire in two burned sites with one adjacent unburned site in the Florida Keys. All sites were originally unburned for roughly 20 years. We measured the density or frequency of five rare plant species; number of Pinus elliottii var. densa by dbh class, litter depth, and percent cover of bare ground, litter, and vegetation. Three years post-fire, most of the rare species appeared not to suffer negatively from the fire and may be increasing post-fire. Significant increases were seen in Chamaecrista lineata var. keyensis, with similar trends in Stylosanthes calcicola, Chamaesyce dentata, Serpyllum and Dichromena floridensis compared to unburned populations. Linum arenicola is at low densities across the burn units, and remained unchanged or decreased following fire. Pine mortality increased significantly following fire, with 91% mortality in one of the burned sites and no dependence on dbh. Mortality of individuals >1.4-m height was significantly dependent on mean pre-burn litter depth. Post-fire pine densities ranged from 265-665 / ha, compared with estimates of 500 / ha in fire managed mainland pine rockland. Litter depth was decreased by 70 to 80% by the two burns, and had not returned to pre-burn depths after three years. Many of the mid- and understory species respouted rapidly following fire, resulting in only a short-term decrease in vegetation cover. Bare ground significantly increased from below 20% to 40% cover following fire, returning to between 20 and 30% on average after three years. Litter cover followed the opposite trend, decreasing by 50% following the fire and remaining at that level on average. Re-introduction of fire appears to be restoring the open community structure characteristic of pine rocklands.

DADE COUNTY - FIRE MANAGEMENT OVERVIEW

Presented by
Joe Maquire
Miami-Dade County Parks and Recreation
Natural Areas Management
22200 SW 137 Avenue
Miami, FL 33170

Dade County fire managers have recently completed a strategic fire management plan. The plan, discussed by Joe Maquire is presented following the abstracts.
EFFECTS OF LATE HOLOCENE CLIMATE CHANGE AND HUMAN DISTURBANCE ON THE FIRE ECOLOGY AND VEGETATION HISTORY OF ANDROS ISLAND, BAHAMAS

Presented by

Eric Kjellmark
Florida Southern College
Biology Department
111 Hollingsworth Dr.
Lakeland, FL 33801

Paleoecological methods were used to investigate the role of anthropogenic fire in the development and maintenance of the pinewoods of Andros Island, Bahamas. Fossil pollen and charcoal from a transect of three sediment cores was used to reconstruct the vegetation and fire history of Andros Island over the last 2,900 years. Cores sites were located 1 km, 5 km, and 17 km from the east coast. The timing of events in the lower third of two cores is uncertain due to inconsistencies in the radiocarbon chronology, but the results suggest that Andros experienced unusually dry climate from before 2,900 yr. BP to 1,500 yr. BP, which may correlate with a widespread Caribbean dry period from 3,200 to 1,500 yr. BP. This dry period had a variable effect on the vegetation depending on its proximity to the water table. After 1,500 yr. BP, wetter climate supported tropical hardwoods around the two core sites closer to the coast and pinewoods around the third site. Around 750 to 800 radiocarbon yr. BP, charcoal concentrations and pine pollen peak in the two cores closest to the coast. The core from 5 km inland shows a large increase in pollen from pinewoods vegetation and a 10 X higher charcoal concentration than that from the 1 km inland core. The third core shows little change in charcoal or pine pollen. Around 400 to 500 yr. BP, charcoal concentrations are lower in the two cores closer to the coast, but higher again near the tops of the cores. Although climatic shifts could have caused the charcoal and vegetation changes around the two core sites closer to the coast, they may reflect human arrival on Andros 1,000 to 800 yr. BP, followed by the removal of humans ca. 1530 AD, then recolonization ca. 200 years later. The third, inland core site suggests that pinewoods have been present on Andros Island for at least 2,400 years, well before the arrival of humans. The pinewoods around this site appear to have been maintained by lightning fires burning in from nearby sawgrass flats to the west. The patterns in the 3 cores suggest that pinewoods were present, but less widespread on Andros before human arrival and that the colonization of the island by humans brought about an increase in fire frequency and an expansion of pinewoods vegetation at the expense of tropical hardwoods vegetation.
INTEGRATING ECOLOGICAL CRITERIA INTO FIRE MANAGEMENT IN SOUTH FLORIDA ROCKLANDS

Presented by

Mike Ross
Florida International University
OE Bldg. Room 148
University Park Campus
Miami, FL 33199

In the Florida Keys and in south Florida as a whole, human activities have obscured most evidence of the pre-development fire regime. Like the central Alberta Jack pine forests, our pine forests are sometimes intermingled with wetland habitats. In other cases, they are embedded in an urban matrix. Our pine forests are likely to include different-aged pine cohorts in close proximity to one another. Furthermore, the pine forests of south Florida are species-rich in terms of plants, with many endemics. In this discussion, I'll review what we do and don't know about the natural fire regime of south Florida pine forests, then I'll discuss our ongoing fire ecology project in the Keys. Next, I'll make a case for identifying and pursuing explicit ecological goals in the more sophisticated fire management system we'll need in the future.

We know enough about the south Florida environment to say with some confidence that most fires burned in early summer when lightning was most frequent, but largest acreages probably burned in late spring of dry years, prior to summer rains. Although all pine rockland herbs are dependent on fire, for either direct or indirect reasons or to control competing hardwoods, some exhibit this dependency more strongly than others. Fire that is essential in one part of the life cycle may have negative effects, at least temporarily, in others. Our fire management systems should attempt to accommodate these variations as much as possible.

In order to shed more light on some of these relationships in the Florida Keys, I and other researchers from FIU (with support from the DOI Interagency Fire Initiative) have begun a 4-year field study on Big Pine Key. The Key Deer Refuge has a history of active fire management going back several decades. Fires were generally carried out mid-summer. Among these fires were many even, effective burns, several in which significant canopy mortality occurred. There was a noted lack of success in restoring stands with heavy undergrowth. In light of these mixed results, the Refuge decided to suspend the fire program until a comprehensive research program could be done.

The design of the study that we initiated consists of six blocks on Big Pine Key, each receiving three treatments: a winter fire, an early summer fire, and no fire. Two blocks will be treated in each of the next three years, beginning later this winter. Much of the emphasis of this study will be on important forest structural changes. We will document treatment effects on biomass, understory structure, and population structure of the major tree species. We will also examine flowering and fruiting responses associated with the treatments, the interaction of fire and deer on the vegetation via enclosures, and possibly the effects of treatment on the population dynamics of selected endemic herbs. We hope to involve scientists interested in other pine forest components to work their research into our design. Mostly we hope to provide some guidance and tools to the Key Deer Refuge in developing their fire program.
PLANTS IN PINE ROCKLAND FRAGMENTS - THE ROLE OF POLLINATORS

Presented by

Suzanne Kopur
Department of Biological Sciences
OE 232
Florida International University
University Park
Miami, FL 33199

Outside Everglades National Park less than 2% of the pine rockland habitat remains. Plant species restricted to the northern part of the original extent of the pine rockland persist only in fragments, and some are categorized as endangered species. Many of the fragments are seriously degraded, long unburned and heavily infested with exotic pest plants. While individual plants may persist by virtue of being perennials, new individuals must be recruited from seed if the populations are to remain viable; seed production usually requires pollination. Proper management of pine rockland fragments (control of exotics, and periodic fires) greatly increase flowering of the understory plants, and pollinator abundance as a result. Observations on pollinator activity and rejuvenated pine rocklands were presented.

PINE ROCKLAND VEGETATION RESEARCH IN EVERGLADES NATIONAL PARK

Presented by

James K. DeCoster and William J. Platt
Louisiana State University

We have set up a long-term study of the rock pinelands and glades in Long Pine Key, Everglades, National Park, in order to study the composition and dynamics of the vegetation. In particular we are studying the effects of hurricanes and fire disturbance on the South Florida slash pine, the composition of the groundcover vegetation, and the effects of fire on the groundcover vegetation. Tree and vegetation plots were placed in fire management blocks in which different fire regimes are prescribed. Half of these blocks are burned in years following wet winters, and half in dry years. Within each of these groups, half are burned in the early season (May and June), and half are burned in the late growing season (mid-July through September). Eight pine plots, 4 ha each, were established to assess Hurricane Andrew impact. Four plots have been burned since the hurricane. Preliminary analysis shows that while tree mortality results from both the hurricane and fire, there is not a strong interaction between the two. We have set up 0.1 ha vegetation plots along elevational transects across the glades and pine rocklands. Our sampling design allows us to examine species richness at scales ranging from .01 m² to 0.1 ha, determine species relative abundances within each plot and reassemble the plots to determine changes in species relative abundances due to the different fire regimes. Preliminary analysis of this data shows that the pinelands are very diverse systems at all spatial scales. High species richness at coarse spatial scales is likely attributable to habitat heterogeneity. The mechanisms for allowing for high richness at fine spatial scales are unknown. Dominance diversity curves show that the vegetation is not dominated by a single species, but rather, there is co-dominance of a relatively large number of species. Burns in the past growing season will allow us to reassemble the plots to assess how the different fire regimes will affect the relative species abundance. We hypothesize that early season burns will favor grass species over shrub species. This is a long-term study, and it may take years of repeated burns before there is significant change in the species composition is evident.
While natural disturbances have influenced the biota of the Everglades region for centuries, anthropogenic disturbances are a much more recent phenomena. This de novo combination of natural and anthropogenic disturbances constitutes a new environmental stress affecting ecosystems. In this study, we explore these interactions as they apply to reserve management using savannas dominated by slash Florida slash pine (*Pinus elliottii* var. *densa*) as our model system. We also explore the interactions and relationships between Hurricane Andrew (the natural disturbance) and pre-hurricane fire regimes (potential anthropogenic disturbance) and their interactive effects on south Florida slash pine stands. We sampled 15 sites within Everglades National Park (ENP) and southern Metropolitan Dade County (MDC) within the eyewall path of Hurricane Andrew, which crossed the tip of southern Florida on August 24, 1992. We assessed two types of mortality in each plot. Direct mortality included trees killed during the hurricane. Extended mortality resulted from deaths over the subsequent 24-50 months of trees still alive immediately after the hurricane (i.e., those not included as direct mortality). Results of our study indicate strong interactive effects on the pinelands, resulting from the combination of anthropogenic fire regimes and natural disturbances such as hurricanes.

Both direct and extended mortality of pines were significantly higher in sites burned during the dry season than in sites burned during the wet season or unburned sites. Our analyses indicate that of the major environmental variables fire season is the dominant factor accounting for these effects. These results indicate that anthropogenic alterations of fire regimes resulted in trees damaged by the hurricane becoming more susceptible to death from post-hurricane stresses, possibly indicating that fire manipulation far outside normal regimes shifts environmental conditions away from those that occurred during the evolution of the species. The consequences of management of fire outside the natural season may mean the loss of significant portions of south Florida's slash pine savannas and has serious implications for management of natural reserves elsewhere.
The Florida leafwing (Anaea tragodya floridalis) and the Bartram’s hairstreak (Strymon acis barramii) are butterflies endemic to south Florida. Both species share the same sole host plant, woolly croton (Croton linearis), and thus maintain similar historic ranges. Although not a rare plant, C. linearis is restricted to pineland forests. Such pineland areas have become increasingly rare. The largest remaining populations of C. linearis are located within Everglades National Park at Long Pine Key and on Big Pine Key. This loss of density coupled with constant chemical spraying for mosquito control has resulted in an enormous decline in numbers for both of these butterfly species in the past few decades.

In July 1997 a one-year census was begun within the National Key Deer Refuge and at Long Pine Key to determine the current status of the Florida leafwing and the Bartram’s hairstreak as well as that of the host. The ultimate goal of the project is to determine whether a captive propagation for either of these species is required. To determine this, transects have been established throughout both preserves with a special emphasis on observing any differences in butterfly density within areas to which mosquito adulticides are applied. These various sites are of adequate dimensions to gauge the present status of both larval and adult densities.

Anaea tragodya floridalis is one of Florida’s two leafwing species, a group that is mostly tropical in distribution. Its characters are typical of the genus with bright orange above and a dead leaf appearance on the underside. Being in the family Nymphalidae, the Florida leafwing is a strong flyer. Both males and females are extremely territorial. The genus Strymon to which the Bartram’s hairstreak belongs is more cosmopolitan in distribution. Bartram’s hairstreaks, however, are weak fliers and are restricted to staying close to their host. With a large clumped density of C. linearis, Big Pine Key appears to be this hairstreak’s last sole stronghold.

Solutions that might increase leafwing and Bartram’s numbers include prescribed burning to enhance population of host plant and limiting mosquito control activities.
ENDEMIC PLANTS AND FIRE MANAGEMENT

Presented by

Dena Carvve
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Many populations of south Florida endemic plant species are perilously low and are vulnerable due to lack of management and catastrophic events like hurricanes. Some endemic plants have been reduced to so few populations and low numbers that the collection of propagules and establishment of ex situ collections has become imperative. Maintaining garden collections is a formidable challenge. Conserving endemic species requires the conservation and management of natural habitat, and the monitoring and management of individuals and populations of endemic species in the wild. Fairchild Tropical Garden is working to develop a method for implementing a long-term, systematic endemic species monitoring program in south Florida and a way to link species-level monitoring and management with community and regional level resource management. Cooperative partnerships must be established to ensure that the conservation of endemics is consistent across jurisdictional and political boundaries. Fire is required for the maintenance of the pine rockland ecosystem. A program of prescribed burning in Dade County's pine rocklands needs to be implemented. Detailed studies of the impact of fire on endemic plants are needed. A concerted effort must be made to develop a mechanism to inform (in a timely manner) interested parties of controlled burns that take place in a natural areas. The use of a standardized survey and monitoring protocol (FNAL's Field Report Form - Stations of Rare Plants and Special Plants Survey Form) is promoted.

PRIVATE LANDOWNER STEWARDSHIP AND PRESCRIBED BURNING

Presented by:

Barbara Glancy
Pine Ridge Sanctuary
2100 SW 300 St.
Homestead, FL 33030

Mrs. Glancy provided an overview of the stewardship activities on her families' private preserve in Homestead. The family removed exotic vegetation and conducted several prescribed burns. Hurricane Andrew devastated the preserve in 1992. Nearly all of the pines were killed from the storm and the remaining were attacked by pine bark beetles. Consulting and developing close working relationships with local resource managers, the Clancy's replanted the property with saplings and developed another burn plan. The Clancy's Pine Ridge Sanctuary is a model for active fire management and stewardship. They have received several regional awards for their stewardship activities and in 1997 received the state of Florida award for stewardship.
FIRE MANAGEMENT AND KEY DEER

Presented by

Monica Folk
The Nature Conservancy
Disney Wilderness Preserve
6075 Scrub Jay Trail
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I studied the Key deer for my dissertation research, from 1987 to 1990. I was part of a team that conducted a habitat study. We characterized the plant communities and monitored fresh water throughout the Key deer's range. I was the last graduate student of Dr. W.D. Klimstra, a great wildlife researcher who studied the Key deer for almost 30 years, until his death several years ago.

The Florida Keys are divided into Upper and Lower segments, both coral reefs that formed at different times, with different substrates and orientations. They are separated by a 7-mile gap. The Key deer are found only in the Lower Keys. The range of the Key deer consists of 25 primary and 11 secondary (small) islands. Big Pine Key is the largest and supports most of the Key deer population. Five of these islands have pineland.

The deer came to the Lower Keys on a land bridge during the last glacier. They have been isolated there for an estimated 4,000-10,000 years. The islands of the Lower Keys are surrounded by shallow water and have subtropical vegetation. The Key deer is the smallest subspecies of the Virginia white-tailed deer, and it is geographically and genetically isolated, with several unique haplotypes. Their small size is an adaptation to climate and limited resources.

The population was reduced to less than 100 animals in the 1950s by poaching. As a result of tremendous public outcry, the Refuge was established in 1957. The deer was listed as endangered in 1957, and the population recovered to about 400 by the mid-1970s. The population declined again during the 1980s as a result of severe habitat loss. It had stabilized at about 250 by the early 1990s, during my study. It appears to be increasing again, probably as a result of a number of consecutive wet years.

Key deer habitat consists of 11 plant communities. The highest in elevation and most important to the deer is pineland. It only occurs on the 5 largest keys. Each island has a freshwater lens that floats on the salt water beneath and is trapped in the porous limestone substrate. Where this lens is exposed, natural freshwater wetlands occur. The freshest of these are in pineland. Pineland is a fire-maintained community. Natural pineland has an open canopy of slash pine with a subcanopy of palms and a very species-rich herbaceous understory. The oolitic limestone is exposed and organics are limited to depressions and solution holes.

From our sampling, we learned that of the 11 habitat types, pineland has the highest species richness, the greatest biomass in the tree layer and the highest shrub layer stem density. Seven of the top 10 Key deer foods (from a rumen study in the 1970s) are pineland species, including: thatch palm fruits, silver palm fruits, sweet acacia fruits and leaves, Indian mulberry fruits and leaves, blacklead fruits and leaves, pencil flower and grasses. 18 of the 20 most dominant plants in pineland (10 woody and 10 herbs) are among the 40 most important Key deer foods. Pineland is also important as bedding, birthing and escape cover areas.

Pineland happens to be the most threatened habitat type because development tends to occur at the highest elevations. According to the results of a habitat characterization study in 1955 by John Dickson and Taylor Alexander, pinelands in the Lower Keys 40 years ago were more open than in my study, especially the understories. They noted the lack of fire on Little Pine and Cudjoe specifically. Little Pine had burned from a wildfire in 1986, but Cudjoe remained unburned until just after my study was completed.
I also compared vegetation sampling data from 10 quadrats on Sugarloaf in both burned and unburned pineland. There was NO pine seedling regeneration at all in the unburned quads. The number of hardwood tree species was 4 times greater in the unburned plots and the unburned understory had only 6 herbs while the burned areas had 9. Incidentally, Big Pine Key pineland understory included 43 herb species.

So how, specifically, does fire in pineland benefit the Key deer. (besides simply maintaining this critical community)? Fire in pineland reduces the hardwood components, allowing more light to reach the herbaceous understory. It keeps woody browse (such as thatch palm fruits) low enough so Key deer can reach them. It increases the nutritive value of browse species, especially immediately after burning. It burns off the organic accumulations in the wetlands, possibly increasing the hydroperiod and thus availability of the water.

Fire is important to a few other Key deer habitats too. The buttonwood prairie on the north end of Big Pine was historically cleared and farmed, then became a grassland. It is critically important to deer on north Big Pine and it is maintained by fire.

The recovery strategies for this endangered subspecies include improving habitat to support more deer, but we MUST also deal with the existing and future human interaction problems. Fire in pine rocklands is critical to the continuation of the Key deer as a wild subspecies.

PRESCRIBED FIRE IN THE WILDLAND/URBAN INTERFACE

Presented by

Jim Murtian and Geoffrey Babb
The Nature Conservancy
222 South Westmonte Drive, Suite 300
Altamonte Springs, FL 32714

The use of prescribed fire in the wildland/urban interface is one of the greater challenges facing land managers today. Ecological goals must be balanced with political and societal constraints, such as laws and regulations and public perceptions regarding fire. Successful (or unsuccessful) prescribed fire begins with the initial preserve design where questions of smoke management and human hazards must be addressed along with ecological needs. Fire planners must ensure cooperation, communication, and coordination with the multiple agencies that are involved. Organizations must be committed to project success and provide appropriate support as planning time, resource needs, and risks are usually greater than in rural situations. Case studies from California, Florida, and New York, will be presented to illustrate various ways how prescribed fire has been addressed in urban areas. This paper will discuss successful urban fire management techniques that include well articulated goals, inclusion of fire managers in the preserve design process, use of the incident command system, and thorough public education programs.
CONSIDERATIONS AND STRATEGIES FOR EFFECTIVE FIRE MANAGEMENT PROGRAMS IN SOUTHERN FLORIDA

Presented by

David Ultey
Florida Division of Forestry
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Davie, FL 33314

The reason government makes rules and passes laws is in response to people. When you don't consider the effect that your action is going to have on people bad things are going to happen.

1. We are all idealistic with regard to our management of natural areas.
   • Turn the property back into the Garden of Eden.
   • We will do what's best for nature.
   • Manage for endangered species.
   • Everyone will like what we are doing and if they don't we know what's best for this property anyway. In ideal world we just may be able to get away with this.
   • When you have to consider how your management of an area is going to effect people living adjacent to it things become much more complicated.

2. People in south Florida don't like to smell smoke, they don't like fires in their backyard, they are uninformed by those doing the burning, and already have a distrust of government to begin with.
   • We need a major educational effort especially the politicians and the media

3. No one who uses fire as a mgmt. tool is using it as frequently as it needs to be used. We all need to burn more.
   • Risk involved.

4. Any fire is better than no fire. Fires burned all year round in Florida don't limit window of opportunity especially when smoke mgmt. concerns force you to burn at a different time of year.
   • Consider using wild fires or human caused conditions to accomplish some of your burning objectives even if conditions are not ideal.

5. Using fire as a management tool can be a humbling experience.
   • No two fires are alike. You will never duplicate exact fire behavior on any two fires

6. Current and future research will change your management goals and objectives.
   • Paradigm shift.
   • Be careful about locking yourself into a rigid set of management objectives.
   • Also be extremely careful about gleaning bits and pieces of the presentations that you have heard here to reinforce your position or defend your program.
   • Listen to other people's opinions and positions with an open mind.
   • Don't be so self-righteous to believe that you know what's best for the environment and your way of managing is the only way.
   • Someone could come along with new research that throws your old paradigm and your management goals and objectives out the window.

7. There are no absolutes when it comes to the management of natural systems
   • The more you learn the more your perspective changes and the more you realize how much you don't know.
   • I believe there are systems in nature that are too complex for us to ever fully understand.
   • We must be flexible we must learn to adapt to new conditions.
   • We must be innovative in our approach especially when using fire. Use different methods, different techniques, and different timing. Strive for diversity and variability.
   • Be a risk taker - admit it when you're wrong - then try a different tactic.

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MIAMI-DADE COUNTY'S PRESCRIBED FIRE PUBLIC OUTREACH

Presented by

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Over the last eight years Miami-Dade County DERM has been trying to organize and increase the use of prescribed fire. Two years ago, at the South Florida Ecosystem Restoration Initiative, talk focused around pine rockland endangered species. After much discussion, the consensus was to manage the whole ecosystem, not focus on single species management. The most important item to aid pine rockland recovery is the use of prescribed and controlled fires. The U.S. F & W.S. then requested DERM to take the lead and develop a strategic fire plan. As a result of this challenge, the Miami-Dade County Wildland Fire Working Group was formed including all the agencies that work with fire. Since the group had some adversarial components, The Nature Conservancy was brought in to facilitate the process. The group pooled their resources and found that there are approximately 250,000 acres of flammable habitats including sixty pine rockland sites in Miami-Dade County. As a result, they developed the Miami-Dade County Strategic Fire Plan, which is a multi-agency planning tool. This plan addresses agency responsibility, resource allotment, smoke management, safety, liability and training. The group also discovered that strong intra-agency education (supervisors, department directors, commissioners) was needed as well as inter-agency education (cross train municipal fire departments on wildland fires, have ecologist co-write prescriptions with fire fighters, etc.).

Public education is also needed as notification letters are sent out to adjoining properties prior to burning, as well as press releases. The Miami-Dade County Parks Department has a program called "Adopt a Natural Area" which involves the neighbors next to the preserves in restoration and nature walks. Other public agencies, the State School Board and Turnpike Authority, were involved to help them gain the confidence and preplanning to do a successful burn. School presentations are also important, as spring break is the worst week for wild fires. During a fire, have a public relations representation who can handle the questions as the fire-fighters work, as people are curious and want to ask questions. If you get complaints, document the problem and ask if they were pre-notified. DERM also has an outreach program for private landowners, which provides technical assistance, herbicide, fire coordination, plant identification, and fire break placement. Landowners may enter into a covenant to get a tax break for management. Private landowners must notify their neighbors regarding a burn so you get grassroots education. Other tools for education includes web sites and local fire councils where you can pool local resources, as there are a lot of school curriculum, videos, and brochures available. As a result, 1996 was a record year for prescribed burns in Miami-Dade County. Although a large number have been planned for 1997, El Niño has made it too wet to burn. People now equate pineland sites with live pine trees to prescribed burning of the site.
ADAPTIVE FIRE MANAGEMENT DATABASE

Presented by

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Disney Wilderness Preserve
6075 Scrub Jay Trail
Kissimmee, FL 34759

Presentation outline:

Objectives
- Introduce GIS
- Present GIS application to fire management
  - Examples of use at site level
  - Conceivable future uses
- Spark thought about possible utility for your fire program
- Discuss logistics of setting up & using GIS
- Geographic Information System
- Combines spatial features and attributes
- Features organized in layers
- Layers in coordinate system
- GIS data formats:
  - Vector
  - Raster

GIS Elements

Needs of Fire Managers
1. Fire history compilation
2. Fire management planning
3. Burn execution
4. Fire documentation
5. Fire management evaluation/analysis
- Need system that is:
  - Comprehensive
  - Consistent
  - Efficient & implementable

Fire History of Big Pine Key

Conceptual Fire Database Design
TNC Fire Management Database

GIS
- Captures spatial relationships
- Unmatched analysis capability
- Map is worth 10,000 words

Relational Database
- Flexible structure
- Customized forms
- Customized reports
- Powerful query/analysis

Fire Management Planning

GIS

Burn Unit Data:

- Fire History
- Veg./Fuel Models
- Special Elements
- Smoke Hazards
- Water Sources

Relational Database

Burn Prescription:
- Site Description
- Weather Parameters
- Fire Behavior Params.
- Equipment/Personnel Needs

Planning Map
- FUEL MODELS OF DP-25A
  Prescription Attribute Forms
  DWP Burn Mapping
- DP-25A BURN MAP

Fire Documentation

GIS

Situational Mapping:
- Ignition Patterns
- Staging Areas
- Location of Fire Behavior Observations

Relational Database

Day-Of-Burn Info.
- Crew Assignments
- Observed Weather
- Observed Fire Behavior

Fire Evaluation/Analysis

GIS
- Burn Mapping (GPS, etc.)
- Sampling/Photo Point Mapping
- Veg./Fuel Change Analysis
- Time-Since-Burn Analysis

Relational Database
- Post-Burn Evaluation
- Vegetative Response Evaluation
- Reality Check
- Computer requirements
  - Hardware
    - Any fairly new PC
Software
- ArcView
- Getting data
- Public agencies
- Staff requirements
- Initial learning curve steep

Software Requirements
- ArcView
  - Great mapping
  - Great data compatibility
  - Good on-screen digitizing
  - Decent attribute manipulation
  - User friendly
  - New version just released
  - Won’t do most high-end analyses/other manipulations
- Other programs out there
  - AtlasGIS
  - MapInfo
- Even with ArcView or other program, may still need access to fully functional GIS lab

Hardware Requirements
- ArcView
  - Pentium recommended
  - 12 megs RAM minimum
  - Hard drive space requirements vary
  - Windows 95 recommended (!)

Data Requirements
- Fire unit boundaries
- Property boundaries
- Roads
- Vegetation
- Aerial photos (current/historical)
- Endangered spp occurrences
- Topography

Data Sources
- Public agencies
  - Cost usually low/free
  - Amount of data exploding
  - Tracking down can be tough
  - Internet good resource
  - Compatibility?
- Private sector
  - Cost can be high
  - Availability limited
- Generate Yourself
  - GPS
  - On-screen digitizing (ArcView, etc.)
  - May need access to full-function GIS lab

Learning/Using GIS
- Classes available
  - Expensive
  - Usefulness varies
- Internships to:
  - Get system up and running
  - Train permanent staff
  - Tackle larger projects

Bottom Line
- GIS is a tool, not a black box
- Initial learning curve is steep
- Payoffs are high
- Help is available
DADE COUNTY GIS COVERAGES

Presented by

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Note: Coverages that are DERM's responsibility are followed by (DERM).

**Line Coverages:**
- Edges of Pavement (streets, parking lots, airport runways)
- All streets
- Water (DERM)
- Salt Intrusion Line
- Levees (DERM)
- Urban Development Boundaries (2000 and 2010)

**Polygon Coverages:**
- Parcels (Properties)
- FEMA Flood Zones (DERM)
- Municipalities
- DERM Compliance Zones (DERM)
- Commission Districts
- Wellfield Protection Areas (DERM)
- Township Sections
- Landfills (DERM)
- Hurricane Debris Zone (DERM)
- Large Building Footprints
- Soils (DERM) (Soils Conservancy and altered by SFWMD)
- Environmentally Endangered Lands (EEL) (DERM)
- Environmentally Endangered Parks (DERM)
- County Parks
- Wetland Zones (DERM)
- Pinelands (DERM)
- Census Tracts
- Stormwater Outfall Basins (DERM)
- Landuse
- Golf Courses (DERM)
- Water

**Point Coverages:**
- Hospitals
- Drinking Water Wells (DERM)
- Schools
- Fire Stations
- Pump Stations (DERM)
- Hurricane Shelters
- Mobile Homes
- Canal Structures (SFWMD dams) (DERM)
- Dry Cleaners (DERM)
- DERM Permitted Facilities (storage tanks, dry cleaners, agricultural waste, ...)(DERM)
- DERM Enforcement Cases (DERM)
A wide range of information on wildland fire and air quality issues is available on the Internet.

The one I used is:
http://ttnwww.rtpnc.epa.gov/html/o3pmrh/faca.htm
   - for information on wildland fires and EPA's ozone and particulate matter air quality standards

Western State Air Resource Council (WESTAR) homepage:
http://www.westar.org
   - for Wildland Fire/Air Quality Policy Workgroup meeting notes and other information

Environmental Protection Agency's Office of Air & Radiation homepages:
http://www.epa.gov/airlinks/
   - for more information on EPA's ozone and particulate matter national ambient air quality standards and the Regional Haze Program

http://ttnwww.rtpnc.epa.gov/html/o3pmrh/facahome.htm
   - for further information on the FACAH process and implementation issues related to EPA's ozone and particulate matter air quality standards

http://www.epa.gov/air/cQAQPS
   - for more information on visibility issues

Wildland Fire and Forest Health Issues:
http://www.denemeh.com/flycots/wildfire/
http://www.nacf.forestry.ca/fire/12:50pm/index.html
http://www.fire.ca.gov/index.html
http://www.fs.fed.us/database/foire/welcome.htm
http://www.firewise.org/
http://met.rsl.pswirs.gov/forecast.html
http://www.fsu.edu/~7Elbreman/
http://www.neotecinc.com/wildfire/
http://www.firewise.org/pubs/win/
http://www.fs.fed.us/land/wfsx/welcome.htm
http://fire.r5.fws.gov
STRATEGIC FIRE MANAGEMENT PLAN

for

DADE COUNTY, FL

MARCH 1997

PREPARED FOR:

Dade County
Department of Environmental Resource Management
33 SW 2nd Ave
Miami, FL 33130

and

Dade County
Park and Recreation Department
175 NW 1st Ave, 12th Floor
Miami, FL 33128

Prepared By:

The Nature Conservancy
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Altamonte Springs, FL 32714
GOAL: Develop a long-term fire management strategy for wildland areas within Dade County.

I. INTRODUCTION
The wildlands of Dade County, including pine rocklands, and coastal and freshwater marshes, are an endangered resource; only 4 percent of the original extent of pine rocklands remain outside Everglades National Park. Metro Dade County Departments of Environmental Resource Management and Park and Recreation are responsible for the management of county owned lands and cooperate in the management of other wildlands in the county. Fire management, including wildfire response and prescribed burning is necessary for the management of wildlands. A coordinated effort among county, state, and federal land managers and fire services is needed to ensure sound fire management of these unique resources.

The South Florida Ecosystem Restoration Initiative of the U.S. Fish and Wildlife Service (USFWS) recognizes the importance of fire in the restoration and maintenance of South Florida species and ecosystems. The need for a strategic approach to fire management, including implementation of prescribed burning, and the education of the public and political leaders is a high priority.

It is recognized that the task of fire management cannot be borne solely by one agency; no single agency has all the necessary resources. This process continues the historic and current spirit of cooperation between the various local, state, and federal agencies involved with fire management in Dade County. Between July and September 1996 the Dade County Prescribed Fire Working Group, comprised of representatives of the Metro - Dade County departments of Park and Recreation (P&R), Environmental Resource Management (DERM), Risk Management (RM), and Fire and Rescue (MDFR), the Florida Division of Forestry (DOF), Everglades National Park (ENP), Metro Dade Fire Academy (MDFA), and The Nature Conservancy (TNC) met to identify issues affecting fire management and develop a long-term fire management strategy for wildland areas in Dade County.

This strategic plan addresses wildland fire management needs for over 250,000 acres of wildlands in Dade County, including 60 pine rockland sites, and provides the direction for detailed implementation plans including wildfire response, prescribed fire, and public education and information.

II. REVIEW OF EXISTING LAWS, ORDINANCES, MEMORANDA OF UNDERSTANDING, POLICIES AND OTHER AGREEMENTS THAT AFFECT FIRE MANAGEMENT.

A. Florida’s Forest Fire Laws and Open Burning Regulations

The Florida Division of Forestry is charged by Florida Statute 590.02 with the authority to enforce forest fire and forest protection laws of the state. The Florida Prescribed Burning Act (sec. 590.028) states that prescribed burning is a land management tool that benefits the safety of the public, the environment, and the economy of Florida. Chapter 51-2 of the Florida Administrative Code defines rules pertaining to rural open burning (see Appendix I).

The mission of the Division of Forestry is to protect and manage Florida’s forest resources through a stewardship ethic to assure these resources will be available for future generations.

B. Dade County Fire Code

Authority is vested in the Metro-Dade County Fire Chief by Florida Statute 125.01; sections 4.01 and 4.02 of the Metro-Dade County Charter; Chapter 14 Code of Metro-Dade County; section 6.101 of the South Florida Fire Prevention Code; State Department of Environmental Regulation, Chapter 17-5; and by the Florida Division of Forestry, Chapter 590 (F.S.S.) and Chapter 51-2 (F.A.C.) (see Appendix II).

The South Florida Fire Prevention Code states that the Metropolitan Dade County Fire Chief shall issue all permits for burning of natural areas within Dade County. All fires set within the unincorporated areas of the county shall be under the authority of the Metropolitan Dade County fire chief and in accordance
with such rules and regulations as may be prescribed therefor. Standard Operating Procedures currently in draft define the permitting process required for open burning in Metro-Dade County.

C. Interagency Memorandum of Understanding
The current Memorandum of Understanding between Everglades National Park, Florida Division of Forestry, Metro Dade Fire and Rescue, and Florida Game and Freshwater Fish Commission provides for mutual assistance in the management of fires occurring on lands which adjoin and are protected by the above agencies in Metropolitan Dade County, Florida (see Appendix III).

D. U.S. Fish and Wildlife Service South Florida Ecosystem Restoration Initiative
The purpose of the South Florida Ecosystem Restoration Initiative is to restore and maintain the elements of the South Florida ecosystem to most resemble the natural functions of a healthy, balanced, and functioning environment where human activities occur in a manner that supports healthy natural conditions.

This plan will be used by USFWS to identify recovery tasks that are specifically designed for the tools available to federal and state agencies. Major objectives of the South Florida Ecosystem Restoration Initiative include: a) restoration and maintenance of the biodiversity of the native plants and animals in the upland, wetland, estuarine, and marine communities of the South Florida ecosystem; and b) recover species that are threatened or endangered.

E. Metro Dade County Park and Recreation Department Natural Areas Management
The mission of Metro Dade Park and Recreation Natural Areas Management is to serve as a responsible land steward of Dade County's natural areas and ensure the preservation of our natural heritage for future generations.

Natural Area Management's goals include: a) to preserve, protect and properly manage the natural resources of Dade County, and b) to implement the goals pertaining to the conservation of natural resources as outlined in Dade County's Comprehensive Development Master Plan.

F. Metro Dade Department of Environmental Resource Management Environmentally Endangered Lands Program
The Department of Environmental Resource Management is responsible for the oversight of all wildlands within Dade County. The Environmentally Endangered Lands Program was established in 1990 for the acquisition, preservation, enhancement, restoration, conservation and maintenance of environmentally endangered lands in Dade County for the benefit of present and future generations (see Appendix IV).

G. Everglades National Park
Everglades National Park was authorized by Congress in 1935 to "...be permanently reserved as a wilderness..." for "...the preservation intact of the unique flora and fauna and the essential primitive natural conditions now prevailing in the area...". The park manages hydrology, fire, and other natural processes to perpetuate a healthy, viable, dynamic native ecosystem. Fire is actively managed to meet these goals through the suppression of wildfires and the management of prescribed fires.

III. AGENCY RESPONSIBILITIES

Table 1 summarizes the current land management and emergency response responsibilities of the respective agencies in Dade County.

IV. MANAGED WILDLAND ACREAGE

Table 2 contains a summary of fire dependent wildland acreage in Dade County.

V. ISSUES AFFECTING FIRE MANAGEMENT OF WILDLANDS
The following issues were identified as the most important by the Dade County Fire Management Working Group July 1, 1996:

1. Agency responsibilities/roles need better clarification
2. Wildfire response
3. Safety and liability
4. Permitting
5. Public Support
6. Who will do the burning?
7. Funding
8. Identify agencies involved
9. Smoke management and air quality
10. Passage of county resolution supporting prescribed fire
11. Identify all lands in question
12. Fuel management alternatives
13. Research needs

VI. OBJECTIVES AND STRATEGIES

For the key issues identified in section V above, objectives and strategies were developed to address them. The issues fall into 4 primary categories: wildfire response, prescribed fire operations, risk and liability, and education. An agency, or agencies, was identified to be responsible for developing the steps necessary to complete each strategy. These strategies form the basis for an Implementation Plan to be completed by June 30, 1997.

A. Wildfire response

Wildfire suppression zones and responsibilities are identified in the 1992 Memorandum of Understanding between Everglades National Park, Florida Division of Forestry, Metro Dade Fire Rescue, and Game and Freshwater Fish Commission.

Fire ground communications often are difficult due to agencies operating on different radio frequencies. The ability for Metro Dade Fire Rescue, the Division of Forestry, and Everglades National Park to communicate during wildfire response is critical.

Fire suppression actions have the potential to damage the natural environment. Protection of life and property are the highest priorities in wildfire response, but suppression agencies will attempt to minimize negative impacts when possible.

Objective: Continue to improve interagency cooperation and communication.

Strategies:

1. Review and revise Memorandum of Understanding (MOU).
   a. Review annually.
   b. Revise every 5 years (1997 next revision).
   c. Ensure that draft copies of the MOU are provided to Working Group members for their comment.

   Responsibility: ENP

2. Improve common and interagency fire ground radio communications.
   a. Continue to acquire radios with Red, White, and Blue emergency frequencies where feasible (see Appendix III).
3. Improve wildfire response operations.
   
   a. Define a chain of communication to include: 1) fire size-up and assessment by MDFR officers; and 2) notification of DERM (when necessary).
   
   Responsibility: MDFR
   
   b. Include DERM and Metro-Parks in the chain of communication when necessary.
   
   Responsibility: DOF
   
4. Hold annual Dade County Fire Management meeting each September. This meeting will identify: 1) target hazards and suppression concerns and constraints; 2) training needs; and 3) post incident critiques and assessments.
   
   Responsibility: DOF
   
5. Draft and submit for approval by the Board of Dade County Commissioners a resolution sanctioning the Dade County Wildland Fire Working Group.
   
   Responsibility: DERM

B. Prescribed Fire Operations
Over 250,000 acres of wildlands exist in Dade County. The Division of Forestry has a limited number of rangers and resources in Dade County and must remain ready for wildfires. Metro Dade Fire Rescue has no resources available for prescribed fire. Currently, DERM and Park and Recreation are limited by lack of proper resources and cannot independently conduct prescribed burns. The National Park Service is responsible for prescribed fire within Everglades National Park.

Prescribed fire operations, particularly in urban areas, are very time and resource intensive. Particular attention needs to be given to smoke management and contingency planning, mop-up, and public education and notification. Limited financial resources are currently available to achieve prescribed fire goals. The costs of conducting prescribed fire have not been fully determined. An assessment of the wildlands based on fuel loads, endangered species, exotic, and smoke management is necessary to define annual prescribed fire costs, priorities and targets.

Objective: Ensure resources are available to safely and effectively meet annual prescribed burning needs.

Strategies:
1. Define total number of wildland sites and prescribed burn units.
2. Define annual burn targets.
3. Estimate what personnel and equipment resources are necessary.

Responsibility (1, 2, 3): DERM, P&R
4. Identify the cost of wildfire response in comparison to prescribed fire through cost/benefit analysis data currently available.

**Responsibility:** DOF

5. Define future resource standards to complete fire needs.

**Responsibility:** Dade County Prescribed Fire Working Group

6. Define costs of fuel management.

**Responsibility:** DERM, P&R

7. Determine funding needs.

**Responsibility:** DERM, P&R

8. Determine fire management priorities for public and private sites.

**Responsibility:** DERM, P&R, DOF

**Objective:** Implement prescribed fire operations.

**Strategy:** Develop long-term implementation plan that considers fuels management, seasonal burning windows, agency responsibilities, and site preparation needs.

**Responsibility:** Dade County Prescribed Fire Working Group

C. **Risk and Liability**

Management of risk associated with fire management is vital to future of prescribed fire. The Office of Safety, Dade County Risk Management will be involved in the assessment and planning of prescribed fire needs. All personnel must be adequately trained and equipped to participate in prescribed fire activities.

The regulation of open burning in Dade County has been delegated by the State of Florida to Metro Dade Department of Environmental Resource Management, which has in turn delegated the permitting process to Metro Dade Fire Rescue. Permitting is described in the MDFR policy and procedure for open burning (in draft, MDFR). DERM and DOF retain enforcement capability along with MDFR.

**Objective:** Conform with laws and regulations to minimize risks to life and property.

**Strategies:**

1. Identify pertinent laws and regulations.

2. Identify risks to life and property, i.e., smoke, traffic, proximity to structures.

3. Define smoke management needs and issues.

4. Review fire management plans, prescriptions, and observe fire management operations.

**Responsibility (1,2,3,4):** DERM, RM, MDFR, ENP, DOF

5. Conduct training for fire crews to meet nationally recognized training standards.

**Responsibility:** DOF, ENP
D. Education
The long-term viability of Dade County's wildlands depends upon internal and public support of fire management programs. It is critical that individuals within county government and the public at large understand the role of fire in maintaining wildlands and as a tool to reduce wildfire hazards.

Objective: Increase county government's awareness of the benefits of prescribed burning and the acceptance of cost, risk and inconvenience of prescribed fires in comparison to wildfires.

Strategy: Draft and submit for approval by Dade County Commission a resolution in support of prescribed fire

Responsibility: DERM, P&R, DOF

Objective: Continue and expand prescribed fire education to the general public, especially people adjacent to wildlands.

Strategies:

1. Utilize Dade County public access television for prescribed fire public service announcements

2. Encourage more exposure of prescribed fire education through existing vehicles, including: Dade County Environmental Education Council; teacher training workshops; Natural Area Neighbors Program; Fairchild Tropical Gardens; Everglades National Park; and, Adopt a Natural Area.

Responsibility: DERM, P&R

3. Encourage Fire Information Officers to talk about the benefits of prescribed fire at wildfire incidents.

Responsibility: MDFR, DOF, ENP

Objective: Develop a Metro-Dade Prescribed Fire Educational Education Program.

Strategy: Submit proposal to appropriate funding sources.

Responsibility: DERM, P&R, DOF
<table>
<thead>
<tr>
<th>METRO DADE FIRE RESCUE (MDFR)</th>
<th>WILDFIRE RESPONSE</th>
<th>LIABILITY AND SAFETY</th>
<th>PERMITTING</th>
<th>PUBLIC EDUCATION</th>
<th>PRESCRIBED BURNING</th>
<th>SMOKE MANAGEMENT</th>
<th>POTENTIAL FUNDING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial attack IC; coordinate interagency command</td>
<td>X</td>
<td>X</td>
<td>none as related to Rx burning</td>
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<td>As related to permitting</td>
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<tr>
<td>PARK AND RECREATION (P&amp;R)</td>
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<td>---</td>
<td>Landowner notification; education programs</td>
<td>planning; site prep; mop-up; technical assistance</td>
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<td>Safe Neighborhood Parks Act</td>
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<td>DEPT ENVY RES MGMT (DERM)</td>
<td>Technical support</td>
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<td>Landowner notification, education programs</td>
<td>Planning (w/DOF), site prep, mop-up, technical support</td>
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<td>Dedicated funds for PFL sites</td>
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<td>EVERGLADES NF (ENT)</td>
<td>In ENP manual aid w/DOF</td>
<td>Stringent training requirements</td>
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<td>Within ENP and outreach</td>
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<td>---</td>
<td>Planning and support</td>
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<td>US FISH AND WILDLIFE (USFWS)</td>
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<td>S FL WATER MGMT DIST (FWMD)</td>
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<tr>
<td>PL GAME AND FISH COMM (GPC)</td>
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<tr>
<td>OTHER JURISDICTIONS</td>
<td>In Juris. of Broward Co, Miami, or Coral Gables</td>
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</table>

X = responsible for
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