



Appendices

F-I

EVERGLADES NATIONAL PARK

2015 FIRE MANAGEMENT PLAN



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MINIMUM REQUIREMENTS DECISION GUIDE

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Everglades Fire Management Plan (FMP) 2011

The Everglades Wilderness Committee performed a comprehensive review of the Everglades Fire Management Plan (FMP). The review was based on the 2010 Draft FMP and associated Multi-Year Fuels Plan.

The Wilderness Minimum Requirements Analysis was broken down into the following five units:

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The Committee approved Alternative #4 – Preferred Alternative for all five units.

The Wilderness Minimum Requirements Analysis was approved on January 20, 2011. The approval covers the plan as described in the attached Minimum Requirements Decision Guide. It will take effect upon approval of the Fire Management Plan/Environmental Assessment, and it will be reevaluated during the 5-year Comprehensive FMP Review. Any changes to the scope of the proposed plan, including activities not detailed in the Minimum Requirements Decision Guide, will require additional review and analysis.



Everglades National Park
MARJORY STONEMAN DOUGLAS WILDERNESS

MINIMUM REQUIREMENTS DECISION GUIDE

WORKSHEETS

Everglades Fire Management Plan (FMP) 2011

Fire Management Unit (FMU) 1

“ . . . except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act...”

– the Wilderness Act, 1964

These worksheets serve as a guide during the planning process to projects within Wilderness. They will expedite the review process if properly completed and provide insight into how the Wilderness Committee at Everglades National Park approaches each individual proposal. It is to be completed and submitted at least one week prior to meeting with the Wilderness Committee along with certificates of completion from the Arthur Carhart Wilderness Training Center online courses, “The Wilderness Act of 1964” and “Minimum Requirements Analysis.” Completing the online courses prior to completing these worksheets is recommended.

Step 1: Summarize the research proposal.

Description: Briefly describe the proposed action, goals, anticipated results, and potential benefits. Also note all proposed actions that may be prohibited under Section 4(c) of the Wilderness Act of 1964 (including use of motor vehicles, motorized equipment or motorboats, land of aircraft, mechanical transport, or construction of any structure or installation).

Urban and agricultural development and the presence of exotic plant species have disrupted the natural fire regime in the fire adapted ecosystems of Everglades National Park; park and community infrastructure is at risk from hazardous fuel build up and unwanted fire effects where it occurs within or adjacent to flammable vegetation. Everglades Fire Management has created a Fire Management Plan (FMP) as required by NPS Management Policies 2006 and Directors Order #18. The FMP identifies how wildland fire and related fire management activities will be managed within the Park. The FMP describes goals and objectives of the fire management program and the methods to achieve those goals and objectives and protect values at risk. Fire management activities include prescribed fire planning, preparation and implementation, fuels management, response to unplanned ignitions, environmental, fire and fire effects monitoring, as well as training and preparedness activities for the fire management program.

This worksheet provides the analysis for prescribed fire and fuels management operations and fire management monitoring activities within FMU 1 in Everglades National Park.

Unplanned ignitions activities in FMU 1 Wilderness will operate under the same guidance for prescribed fire and fuels management operations unless the on-site decision maker determines in his/her professional judgment that the conditions require additional emergency response activities. This direction comes from NPS management Policies 2006 Ch 6 Wilderness Management.

The proposed actions that may be prohibited under section 4(c) of the Wilderness Act include use of motorized equipment, helicopter landings, and rebar plot marker installations.

The activities outlined in the preferred alternative identify those activities that will maintain Wilderness character while providing the necessary resources to safely carry out fire management operations which will provide for the safety of the public, park personnel, infrastructure, surrounding communities, and ENP natural, cultural and social resource values and maintain natural fire adapted ecosystems.

Prohibited uses not mentioned in this document will not be used by Fire Management in FMU 1 Wilderness. Should the need arise, Fire Management will return to the Wilderness Committee with a project-specific MRDG to request a prohibited use not already mentioned in this document.

To help determine if the proposal and its containing prohibited uses can be legally defensible, please answer the questions listed in A - F on the following pages.

A. Describe Options Outside of Wilderness

Are there any potential study areas outside of Wilderness boundaries that could yield similarly significant results? This includes areas within the park not designated as Wilderness.

Yes: ☐ No: ☒

Explain: The Everglades ecosystems that require management, treatment and monitoring occur in Wilderness. Actions and objectives cannot be accomplished outside of Wilderness areas.

B. Describe Valid Existing Rights or Special Provisions of Existing Legislation

Are you aware if the prohibited uses are necessary to satisfy valid existing rights or a special provision in existing legislation (The Wilderness Act of 1964, The Endangered Species Act of 1973, etc...) that allows consideration of the Section 4(c) prohibited uses? Cite law & section.

Yes: ☐ No: ☒ Not Applicable: ☐

Law & Section:

C. Describe Other Guidance

To your knowledge, does the proposal benefit the administration of agency policy, unit and wilderness management plans, species recovery plans, or agreements with tribal, state and local governments or other federal agencies?

Yes: ☒ No: ☐ Not Applicable: ☐

- **Policy or Agency:** NPS Management policies 2006 Section 4.5 Fire Management; Directors Order #18; NPS DO #41 section 5. Fire Management; Federal Wildland Fire Policy and Program Review (2001); Managing the Impact of Wildfires on Communities and the Environment (USDOI/USDA 2000); A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10 Year Implementation Strategy

D. Normally Prohibited Activities

Check of Wilderness Act Section 4(c) prohibited uses you will be seeking the use of:

- | | |
|---|---|
| <input type="checkbox"/> Mechanical transport | <input checked="" type="checkbox"/> Landing of aircraft |
| <input checked="" type="checkbox"/> Motorized equipment | <input type="checkbox"/> Temporary road |

☐ Motor vehicles

☒ Structure or installation

☐ Motorboats

Justification: These items are required to safely carry out fire management activities in the Everglades NP Wilderness, potential Wilderness and Wilderness Study Areas.

☒ Emergency Situation

☒ No Alternative Exists

☒ Personal Health or Safety

☐ Other: _____

E. Wilderness Character

Will the project results help to preserve one or more of the qualities of wilderness character including: untrammeled, undeveloped, natural, outstanding opportunities for solitude or a primitive and unconfined type of recreation, or cultural resources?

Explain how taking acting on this proposal will help preserve wilderness character. If there is no clear benefit to a particular quality, explain how the proposed action may impair that quality and if there are any tradeoffs (like using short-term trammeling to improve long-term naturalness). Please only mark 'Not Applicable' if there are no direct or indirect impacts.

Untrammeled – free from modern human control or manipulation, where nature is allowed to “run free”

Yes: ☐ No: ☒ Not Applicable: ☐

Explain: Fire management activities require modern human manipulation on the landscape and would, therefore, impair the untrammeled quality of the Marjory Stoneman Douglas Wilderness. The short-term effects from trammeling of the Wilderness through fire management increase the long term naturalness of the area.

Undeveloped – retains primeval character and influence, essentially without permanent improvement or human occupation, contrasts with areas where humans and their work dominate the landscape

Yes: ☐ No: ☒ Not Applicable: ☐

Explain: Fire management activities utilize motorized vehicles and equipment, and potential plot installations which would impair the undeveloped quality of the Marjory Stoneman Douglas Wilderness in the short term. These activities increase the long term natural quality of the Wilderness by applying fire management activities in fire adapted areas and protecting fire sensitive natural resources.

Natural – substantially free from the effects of modern civilization, changed by natural occurrences

Yes: ☒ No: ☐ Not Applicable: ☐

Explain: Fire management activities improve the natural quality of the Marjory Stoneman Douglas wilderness by introducing fire as a natural ecological process to the landscape. Fire as a natural disturbance has been hindered by the surrounding urban and agricultural developments of south Florida. Monitoring activities and fuels management support the implementation of fire as a natural ecological process and allow managers to use fire to enhance and maintain the natural quality of the Wilderness.

Outstanding opportunities for solitude or a primitive and unconfined type of recreation – provides opportunities for people to encounter experiences such as natural sights and sounds, solitude, freedom, risk, and the physical and emotional challenges of self-discovery and self-reliance

Yes: ☒ No: ☐ Not Applicable: ☐

Explain: Fire management activities may impact this quality temporarily during the active fire management operations. The short-term effects through fire management increase the long term naturalness of the area.

Cultural – preserves significant artifacts of prior lifestyles, traditions, or historic events

Yes: ☒ No: ☐ Not Applicable: ☐

Explain: Fire management activities are designed to protect cultural resource values within Wilderness and are expected to have little to no negative impact on cultural resources. Through fire management activities, sites of historical or cultural significance may be protected from the effects of unwanted fire spread.

F. Describe Effects to the Public Purposes of Wilderness

Will the project results help to support one or more of the other public purposes for wilderness (as stated in Section 4(b) of the Wilderness Act) of recreation, scenic, education, conservation, and historical use?

Identify which, if any of the public purposes will be impacted if the proposed project is approved. As in Section E, positive AND negative impacts should be described if present.

Recreation – opportunities to practice primitive, outdoor recreation without interference of modern amenities

Yes: ☒ No: ☐ Not Applicable: ☐

Explain: Fire management activities reduce hazardous fuel accumulation and therefore improve visitor safety.

Scenic – opportunities for spectacular landscape-scale views free from modern alterations

Yes: ☐ No: ☐ Not Applicable: ☒

Explain:

Education – opportunities for immersion in biological, ecological, or other educational themes

Yes: ☒ No: ☐ Not Applicable: ☐

Explain: Fire management activities provide opportunities to gather information about fire effects and fire ecology and contribute to management of Wilderness.

Conservation – opportunities to protect habitat beneficial to the survival of an organism of special interest

Yes: ☒ **No:** ☐ **Not Applicable:** ☐

Explain: Fire management activities restore and maintain globally imperiled habitats and the species that depend upon them. Fire management activities may also protect rare and federally listed species from unwanted effects from fire.

Historic– opportunities to practice historically iconic uses or applications no longer available elsewhere

Yes: ☐ **No:** ☐ **Not Applicable:** ☒

Explain:

Please feel free to provide any additional information that may be relevant at this point in the decision process:

Step 1 Decision: <u>Is the proposed project necessary in wilderness?</u>

At this step, the Wilderness Committee will use the information you've provided to determine the appropriateness of this project within the Marjory Stoneman Douglas Wilderness. Please continue to complete Step 2, determining the minimum activity.

Step 2: Determine the minimum activity.

Description of Alternatives

For each alternative, describe what methods and techniques will be used, when the activity will take place, where the activity will take place, what mitigation measures are necessary, and the general effects to the Wilderness resource and character.

Please provide at least four alternate methods for conducting this project in Wilderness. Include a “No Action” alternative to allow for a comprehensive comparison of effects. The second alternative should describe your ideal methods for the proposed action. This alternative is to be written as if the land were not designated Wilderness and therefore without legal restrictions. The third, a Wilderness compliant alternative, should not include any prohibited uses and should describe how the proposal would be completed in more primitive times. Lastly, the fourth alternative, the preferred alternative, should be a compromise between the second and third alternatives. Complete a form for each alternative being considered. Be sure to include how the impacts can be mitigated by: employee training; location of work areas, campsites, and travel routes; project timing; temporary closures; or other actions.

Alternative Comparison Criteria

The following are descriptions of the criteria that will be compared between the alternatives.

Wilderness Character – the following five, previously discussed criteria represent wilderness character as described in The Wilderness Act of 1964

Untrammeled – Discuss the degree to which the components or processes of ecological systems are intentionally controlled or manipulated.

Undeveloped – Identify how “the imprint of man’s work will remain substantially unnoticeable.” Include the effects of the use of any motorized equipment, mechanical transport, structures, or installations on maintaining this quality of wilderness character.

Natural – Describe the potential for protection, impairment, or restoration of natural conditions including endangered, threatened, or rare species, natural biological diversity, and self-regulating ecosystems.

Outstanding opportunities for solicitude or primitive and unconfined type of recreation – Describe effects that will be noticeable to visitors and that could affect their experience in Wilderness. Include effects on visitors from the use of motorized equipment, mechanical transport, landing of aircraft, structures, or installations.

Cultural resources – Describe any effects on protection or management of historic or pre-historic artifacts, sites, structures, or landscapes.

Maintaining Traditional Skills – Explain how the alternative helps maintain proficiency in the use of primitive and traditional skills, non-motorized tools, and non-mechanical travel methods.

Economic and Time Constraints – Describe the costs and the amount of time it will take for implementation of the alternative.

Note: While activities should be accomplished with economic efficiency, neither the cost nor the time required for implementation are overriding factors for use of otherwise prohibited activities.

Safety of Visitors, Personnel, or Contractors – Describe any safety concerns associated with implementing the alternative on visitors, agency personnel, volunteers, and/or contractors. Identify which hazards can and cannot be mitigated. Mitigation might be achieved through providing information to the public; or training, the use of protective equipment, or other requirements for workers. Identify any potential public safety hazards resulting from implementation of the alternatives.

ALTERNATIVE # 1 – NO ACTION

Description:

Under this alternative no fire management actions would be taken. This is not a possible alternative due to the requirements to protect life, property and values at risk from the impacts of unwanted fire.

Effects:

Wilderness Character

Untrammeled: Under this alternative naturally occurring fires would spread unimpeded which would have no effect on the untrammeled quality of the Wilderness, however human ignited fires that spread through the Wilderness would impact the untrammeled quality through human manipulation of the fire regime.

Undeveloped: Under this alternative no actions would occur therefore there would be no equipment to alter the undeveloped quality of the Wilderness.

Natural: Under this alternative fires would spread across the landscape, however due to the unnatural fragmentation of the landscape through development and water delivery, and presence of exotic plant species, unnatural fuel accumulations would exist and fires would have unnatural effects impairing the natural quality of the Wilderness, unnaturally affecting both the fire adapted and fire sensitive ecosystems in the Wilderness.

Outstanding opportunities for solitude or primitive and unconfined type of recreation: Under this alternative visitors would not be impacted by vehicles and equipment used in fire management operations. The potential for closures and the duration of closures may increase due to the increased risk of large scale unwanted fires in the Wilderness.

Cultural resources: Under this alternative fires would spread across the landscape creating increased risk to cultural resources surrounded by unnaturally high fuel loads. The potential exists for fires to be more severe, consuming soils in hammocks, tree islands and other areas in the Park and unearthing and damaging cultural resource artifacts.

Maintaining Traditional Skills: N/A

Economic and Time Constraints: Since there are no actions being taken there are no economic or time constraints

Safety of Visitors, Personnel, or Contractors: This alternative puts life, property, Park values and surrounding communities at risk from impacts of wildland fire.

ALTERNATIVE # 2 – DESCRIPTION OF IDEAL METHODS, IF NOT IN WILDERNESS

Description:

Under this alternative, Rotor wing aircraft landings in both unimproved and created improved helispots, and motorized equipment and tools would be permitted throughout FMU 1 to conduct prescribed fire and fuels management operations, fire and fire effects monitoring and unplanned ignition response operations. For each fire management activity, Minimum Impact Suppression Tactics will be adhered to as described in the FMP.

The proposed actions of this alternative will maximize the efficiency of Fire Management activities, while minimizing the relative risk associated with frequent intense lightning activity, high heat indexes and provide a safe and effective means of transport and escape during prescribed and fuels management operations and monitoring activities.

Fire management activities can occur throughout the year, depending on field conditions and available personnel. Unplanned ignitions requiring response operations can occur at any time of year. Prescribed fire treatment activities occur when environmental conditions and other prescription parameters are met. Prescribed fire treatment preparations, fuels management and monitoring activities will occur as needed throughout the year.

Fire management activities occur in all fire adapted ecosystems and in areas adjacent to fire sensitive ecosystems to protect life, property and natural and cultural values at risk and to restore and maintain ecosystem health.

Methods and Techniques

Helicopter Landings: Helicopters may be used to transport personnel and equipment during prescribed and fuels management operations, monitoring activities, and other fire management operations such as required training exercises. Helicopters may land in unimproved Helispots or improved helispots which may be created using mechanized equipment and/or primitive hand tools. Note: aircraft operations (Single Engine Air Tanker and helicopter) which do not including landings may occur during prescribed fire and unplanned ignition response activities for reconnaissance, fire monitoring, water drops and/or aerial ignitions (helicopter only) which utilizes a Plastic Sphere Dispenser (PLDO) machine, which injects plastic spheres containing potassium permanganate with glycol to ignite fuels on the ground.

Motorized Equipment/ Tools: Weed eaters and mowers may be used during prescribed fire and unplanned ignition response operations to create temporary fire containment lines to hold prescribed fire within designated perimeters and protect values at risk. Pumps may be used to provide a pressurized water source during fire operations.

Effects:

Wilderness Character

Untrammeled: Fire is an ecological process that will be controlled and manipulated by fire managers under this alternative. The implementation of prescribed fire and the suppression of naturally ignited fires affect the untrammeled quality of the Wilderness. Under this alternative the trammeling of fire management actions (which serve to reduce hazardous fuel levels in the Park and around values at risk) will create opportunities to safely and effectively manage naturally occurring

wildfires without suppression action. In these cases the untrammelled quality will not be affected due to the efforts of previous fire management actions.

Undeveloped: *The actual implementation of fire on the ground would leave little imprint as a man-made effect since fire is a natural process for the ecosystems in question. The creation and maintenance of improved helispots created with motorized equipment and/or hand tools would leave noticeable areas of alteration and imprints of development in the Wilderness. Trails and fire breaks created by using motorized equipment will recover quickly with rapid vegetation regrowth leaving a very short term imprint. The substrate would remain intact allowing for faster recovery and a shorter-term developed imprint in the Wilderness. The presence of equipment and helicopters in the Wilderness will temporarily affect the undeveloped quality, however for those that do not leave an imprint after they are gone the effects will only last as long as the equipment and vehicles are present in the area. Rebar installed for fire effects monitoring plots may be considered as a man-made structure, but they are of small diameter and difficult to detect through casual observation.*

Natural: *Fire management activities described in this alternative enhance the natural quality of the Wilderness through the maintenance and management of natural processes of fire. Restoration and maintenance of natural communities and protection of flora, fauna, and natural habitats at risk from unwanted fire impacts maintains fire-adapted vegetation communities and biological diversity improving the natural quality of the Wilderness. Monitoring activities and fuels management support the implementation of fire as a natural ecological process and allow managers to use fire to enhance and maintain the natural quality of the Wilderness.*

Outstanding opportunities for solitude or primitive and unconfined type of recreation: *Opportunities for solitude or primitive and unconfined type of recreation should be relatively unimpaired, except on a very short-term basis. During prescribed fire operations and unplanned wildfires, for safety reasons visitors may be excluded from certain areas within the Wilderness until the fire is officially declared out. Other fire management activities, such as treatment preparation, fire effects monitoring and reconnaissance may require the use of helicopters and equipment, which may disturb this Wilderness quality in the short-term, which will last only as long as the equipment is present in the area.*

Cultural resources: *The use of prescribed fire treatments and management actions taken on unplanned ignitions protect cultural resource values within the Wilderness. Prescribed fire operations reduce the amount of hazardous fuel accumulations around cultural values at risk and suppression actions prevent unwanted impacts from further fire spread. The use of motorized equipment mitigates ground disturbance that has the potential to unearth and damage cultural resource artifacts in the Wilderness. The use of prescribed fire maintains the ethnographic landscapes in the Wilderness and monitoring activities provide knowledge of resources used in planning and decision making regarding the protection of these resources.*

Maintaining Traditional Skills: N/A

Economic and Time Constraints: This alternative would not be more cost effective than other alternatives; however it would allow fire managers to accomplish the required tasks safely and effectively.

Safety of Visitors, Personnel, or Contractors: This alternative affords the greatest level of safety for fire fighters working on the ground as well as protection of life, property and Park values and surrounding communities however diminishes the Wilderness character through actions used to accomplish the task.

ALTERNATIVE # 3 – DESCRIPTION OF WILDERNESS COMPLIANT METHODS, NO PROHIBITED USES

Description:

Under this alternative, rotor wing aircraft landings would be prohibited in FMU 1 Wilderness. Only primitive hand tools would be authorized for prescribed fire and fuels management operations. Motorized tools would be prohibited within FMU 1 Wilderness. Fire management activities that do not require personnel on the ground (aerial ignition operations) may still occur where natural fire breaks occur and where values at risk requiring on the ground protection are not present. Additionally Minimum Impact Suppression Tactics will be adhered to as described in the FMP.

The proposed actions of this alternative will greatly reduce the acreage of Wilderness that can be safely and effectively treated with prescribed fire or monitored for fire effects due to the fact that it is impossible to access and safely carry out operations without helicopter landings and motorized equipment. Due to the continuous nature of fuels, it will be impossible to treat many areas with prescribed fire where un-treated areas exist that must be protected and maintained adjacent to treatment areas in FMU 1 Wilderness. Primitive hand tools, including digging and cutting tools, are known to be ineffective at creating fire breaks due to the presence of a mixture of tall grass, sedges, woody plants, fuels in solution holes, uneven terrain and rock substrate. Weedeaters provide the precision and versatility necessary to create effective fire breaks, the width of which need to be 1.5x the expected flame lengths. The inaccessibility of areas in FMU 1 prevent management actions from taking place without helicopter access. These restrictions will increase the risk to life, property and natural and cultural values. The restoration and maintenance of fire adapted ecosystems will be affected by limiting the amount of prescribed fire, fuels management and monitoring activities that can safely occur. Monitoring activities in FMU1 will not occur. Due to the reduction of acres that can be treated with prescribed fire under this alternative, the frequency and intensity of unplanned ignitions and unwanted fire effects would likely increase, creating incidents where the onsite fire manager is forced to authorize aircraft and equipment to protect life, property and values at risk and safely manage the situation. The impacts of this alternative have the potential to negatively impact Wilderness character to a greater degree by affecting the natural quality of the Wilderness. Additionally, this alternative will limit the ability of the fire management program to adhere to guidelines set forth in NPS management policies 2006 and Directors Order #18 by compromising the ability to proactively protect life and property within and adjacent to the Park and natural and cultural resource values at risk and manage a prescribed fire and fire effects monitoring program in fire adapted areas of the Park.

Fire management activities can occur throughout the year, depending on field conditions and available personnel. Unplanned ignitions requiring response operations can occur at any time of year. Prescribed fire treatment activities occur when environmental conditions and other prescription parameters are met. Prescribed fire treatment preparations, fuels management and monitoring activities will occur as needed throughout the year.

Fire management activities occur in all fire adapted ecosystems and in areas adjacent to fire sensitive ecosystems to protect life, property and natural and cultural values at risk and to restore and maintain ecosystem health.

Effects:

Wilderness Character

***Untrammeled:** Fire is an ecological process that will be controlled and manipulated by fire managers under this alternative. The implementation of prescribed fire and the suppression of naturally ignited fires affect the untrammeled quality of the Wilderness by controlling fire within the*

area. Under this alternative the use of prescribed fire is severely limited lessening the effect upon the trammelled quality, however preventing the likelihood of monitoring naturally occurring fires with no suppression action due to the risks of fire burning in accumulated fuel loads. This alternative may increase trammeling related to fire suppression actions in unplanned ignition response where a situation is created in which onsite fire managers are required to implement techniques to protect life, property and values at risk and safely manage the situation.

Undeveloped: Under this alternative the undeveloped quality of the Wilderness would only be affected by use of aircraft and activities within Wilderness are not expected to impact this quality. As a result of the decrease in prescribed fire activities, this alternative may increase adverse effects to the undeveloped quality of the Wilderness related to fire suppression actions in unplanned ignition response where a situation is created in which onsite fire managers are required to implement techniques to protect life, property and values at risk and safely manage the situation.

Natural: As a result of the limited fire management activities permitted under this alternative, the natural quality of the Wilderness would be affected by unplanned fires on the landscape. Fire adapted areas will be impacted by the lack of fire and fire sensitive areas will experience increased risk resulting from unnatural fuel accumulations and unplanned ignitions. Unplanned fires would have unnatural effects impairing the natural quality of the Wilderness affecting unnaturally both the fire adapted and fire sensitive ecosystems in the Wilderness.

Outstanding opportunities for solitude or primitive and unconfined type of recreation: Under this alternative, opportunities for solitude or primitive and unconfined type of recreation should be relatively unimpaired, except on a very short-term basis due to the limitations on prescribed fire management activities. Impacts under this alternative would be short-term.

Cultural resources: Under this alternative cultural resource values would be protected during response to unplanned ignitions, however the use of prescribed fire to pro-actively reduce hazardous fuel loading around cultural resources would be limited. The amount of ground disturbance activities would increase that have the potential to unearth and damage cultural resource artifacts in the Wilderness.

Maintaining Traditional Skills: N/A

Economic and Time Constraints: This alternative would be more cost effective than other alternatives. However this alternative increases the likelihood of large scale, expensive fires that would require management over longer periods of time.

Safety of Visitors, Personnel, or Contractors: Under this alternative many prescribed fire and monitoring activities would not occur due to the risk and safety issues as a result of having fire fighters on the ground without certain tools and equipment. There is less reduction in hazardous fuel loading which in turn may increase risk to life, property and Park values and surrounding communities.

ALTERNATIVE # 4 – PREFERRED ALTERNATIVE

Fire Management Unit 1
Wilderness

Description:

Under this alternative, Rotor wing aircraft landings, and motorized equipment and tools would be permitted in FMU 1 to conduct prescribed fire, fuels management and fire management monitoring operations and unplanned ignition response operations. For unplanned ignition response, fire managers will adhere to guidance from the approved FMP minimum requirements decision guide for prescribed fire and fuels management operations unless the on-site decision maker determines in his/her professional judgment that the conditions dictate otherwise. Additionally Minimum Impact Suppression Tactics will be adhered to as described in the FMP.

The proposed actions of this alternative will maintain Wilderness character to the maximum degree practicable while protecting values at risk and maintaining a safe working environment for firefighters on the ground, minimizing the relative risk associated with fire operations, lightning activity, high heat indexes and provide a safe and effective means of transport and escape during the prescribed fire, fuels management, fire and fire effects monitoring operations and unplanned ignition response operations.

Prescribed Fire and Fuels Management Activities:

Proposed methods and techniques:

- Aircraft
 - Aircraft landings may occur in all project units in FMU 1 during prescribed fire and fuels management operation.
 - Aircraft will be used to transport personnel and equipment, conduct ignition and holding operations and protect specific values at risk during prescribed fire and fuels management operations. Values to be protected include hammocks, camps, hydro and weather stations, and natural and cultural resource values identified by SFNRC and the Cultural resource branch.
 - Note: Aircraft operations (Single Engine Air Tanker and helicopter) which do not including landings may occur during prescribed fire and unplanned ignition response activities for reconnaissance, fire monitoring, water drops and/or aerial ignitions (helicopter only) which utilizes a Plastic Sphere Dispenser (PLDO) machine, which injects plastic spheres containing potassium permanganate with glycol to ignite fuels on the ground.
- Motorized equipment (weed eaters)
 - Motorized equipment (weed eaters) may be used to create safety zones and defensible space and reduce fuel loading around values to be protected (hammocks, camps, hydro and weather stations, and natural and cultural resource values identified by SFNRC and the Cultural resource branch).

When:

- Prescribed fire and fuels management activities may occur throughout the year.
- Prescribed fire treatments will occur when environmental conditions are within stated prescription parameters.
- Specific prescribed fire project implementation schedules can be found in the Fire Management Plan (FMP) Multi Year Fuels Plan.

Where:

- Prescribed fire and fuels management activities will occur throughout FMU 1.
- Specific project unit location maps can be found in the FMP Multi Year Fuels Plan.
- Aircraft

- Aircraft landings may occur adjacent to values to be protected (hammocks, hydro and weather stations, and natural and cultural resource values identified by SFNRC and the Cultural resource branch).
- Estimated 0-8 helicopter landings in Wilderness/year to protect known values located within flammable vegetation.
- The known values at risk currently located within flammable vegetation are campsites and hydrostations.
- Additional helicopter landings in Wilderness may be necessary to protect as yet unidentified natural and cultural resource values. It cannot be determined at this time the number of landings required due to the fact that the number and location of resources are not currently identified.
- Motorized equipment
 - Weedeaters may be used adjacent to and surrounding values to be protected (hammocks, hydro and weather stations, and natural and cultural resource values identified by SFNRC and the Cultural resource branch).
 - The known values at risk currently located within flammable vegetation are 6 campsites and 9 hydrostations.
 - Estimated 0-14 weedeater uses in Wilderness/year to protect known values located within flammable vegetation.
 - Estimated 2-32' fire break width based on 1-21' flame lengths. (Effective fire break size is 1.5 x the predicted flame lengths. Flame length will depend on fuel loading and expected weather conditions, estimated flame lengths from 2008-2012 prescribed fire burn plan).
 - Additional weedeater uses in Wilderness may be necessary to protect as yet unidentified natural and cultural resource values. It cannot be determined at this time the number of weedeater uses required due to the fact that the number and location of resources are not currently identified.

Mitigations:

- Creation of improved helispots is prohibited.
- Motorized equipment is limited to weed eaters.
- Weed eater use is restricted to protection of values within FMU 1.
- Fire breaks for protection of life property and values are limited in size to the area required for successful fuels reduction and protection from unwanted fire spread and effects on the values to be protected.
- Natural and/or existing fire breaks will be used whenever possible.
- Should the need for additional prohibited use arise in the future, Fire Management will return to the Wilderness Committee with project-specific MRDGs to request additional prohibited uses in FMU 1 Wilderness.

Rational for use:

- Aircraft
 - The use of aircraft is the only way to access values at risk in the areas targeted for prescribed fire and fuels management activities.
- Motorized equipment
 - Weedeaters are the necessary equipment to create effective fire breaks to contain fire spread in areas where natural existing fire breaks do not exist, and prevent spread of fire into non-treatment areas and protect values at risk.
 - Primitive hand tools, including digging and cutting tools, are known to be ineffective at creating fire breaks due to the presence of a mixture of tall grass, sedges, woody plants, fuels in solution holes and uneven terrain. Weedeaters provide the precision and versatility necessary to create effective fire breaks, the width of which need to be 1.5x the expected flame lengths (potential 1-21ft flame lengths range).

Monitoring Activities:

Proposed methods and techniques:

- Aircraft
 - Aircraft will be used to transport personnel and equipment for fire management monitoring activities.
- Rebar installation
 - Rebar installation may occur to mark locations of new fire effects monitoring plots where additional fire effects plot installation is required.
- Additional plot installations may be required to further study the effects of fire on exotic plant species.

When:

- Throughout the year – the bulk of field work is completed January - June, however can occur throughout the year.

Where:

- Monitoring activities may occur in all project units in FMU 1.
- Maps of established fire effects plots can be found in the FMP.
- Aircraft
 - Aircraft landings will occur adjacent to established fire effects monitoring plots in FMU 1.
 - Estimated 18 (with a range 10-25) landings/year for established plot monitoring based on fuels plan.
 - Additional aircraft landings are not scheduled in FMU 1 however additional monitoring may be needed to further study the effects of fire on exotic plant species.
 - Estimated 5-25 Wilderness incursions/year for additional monitoring.
- Rebar installation
 - Rebar plot marker installation is not scheduled in FMU 1 however additional plot installations may be required in the exotic plant burn units to further study the effects of fire on exotic plant species.
 - Estimated 2 to 20 additional fire effects monitoring plots consisting of 2 rebar/plot. Plot design: 30-100m belt transect plots with a rebar on each end of the transect.

Mitigations:

- Creation of improved helispots is prohibited.
- Prior to plot installation, number of plots, coordinates and plot design will be presented to the wilderness committee.

Rational for use:

- Aircraft
 - The use of aircraft is the only way to access remote areas within FMU 1 where monitoring activities are required.
- Rebar installation
 - In order to collect needed fire effects data, additional plots may be installed if existing plots do not provide the necessary information
 - Rebar is required to ensure repeatability of plot measurements and ensure collection of high quality data.

Effects:

Wilderness Character

Untrammelled: Fire is an ecological process that will be controlled and manipulated by fire managers under this alternative. The implementation of prescribed fire and the suppression of naturally ignited fires affect the untrammelled quality of the Wilderness. Under this alternative the trammeling of fire management actions (which serve to reduce hazardous fuel levels in the Park and around values at risk) will create opportunities to safely and effectively manage naturally occurring

wildfire without suppression action. In these cases the untrammelled quality will not be affected due to the efforts of previous fire management actions.

Undeveloped: *The actual implementation of fire on the ground would leave little imprint as a man-made effect since fire is a natural process for the ecosystems in question. Trails and fire breaks created by using motorized equipment will recover quickly with rapid vegetation regrowth, leaving a very short term imprint. The substrate would remain intact allowing for faster recovery and a shorter-term developed imprint in the Wilderness. The presence of equipment and helicopters, in the Wilderness will temporarily affect the undeveloped quality, however for those that do not leave an imprint after they are gone the effects will only last as long as the equipment and vehicles are present in the area.*

Natural: *Fire management activities described in this alternative enhance the natural quality of the Wilderness through the maintenance and management of natural processes of fire. Restoration and maintenance of natural communities and protection of flora, fauna, and natural habitats at risk from unwanted fire impacts maintains fire-adapted vegetation communities and biological diversity, improving the natural quality of the Wilderness. Monitoring activities and fuels management support the implementation of fire as a natural ecological process and allow managers to use fire to enhance and maintain the natural quality of the Wilderness.*

Outstanding opportunities for solitude or primitive and unconfined type of recreation: *Opportunities for solitude or primitive and unconfined type of recreation should be relatively unimpaired, except on a very short-term basis. During prescribed fire operations and unplanned wildfires, for safety reasons visitors may be excluded from certain areas within the Wilderness until the fire is officially declared out. Other fire management activities, such as treatment preparation, fire effects monitoring and reconnaissance may require the use of aircraft and equipment, which may disturb this Wilderness quality in the short-term, but will last only as long as the equipment is present in the area.*

Cultural resources: *The use of prescribed fire treatments and management actions taken on unplanned ignitions protect cultural resource values within the Wilderness. Prescribed fire operations reduce the amount of hazardous fuel accumulations around cultural values at risk and suppression actions prevent unwanted impacts from further fire spread. The use of motorized equipment mitigates ground disturbance that has the potential to unearth and damage cultural resource artifacts in the Wilderness. The use of prescribed fire maintains the ethnographic landscapes in the Wilderness and monitoring activities provide knowledge of resources used in planning and decision making regarding the protection of these resources.*

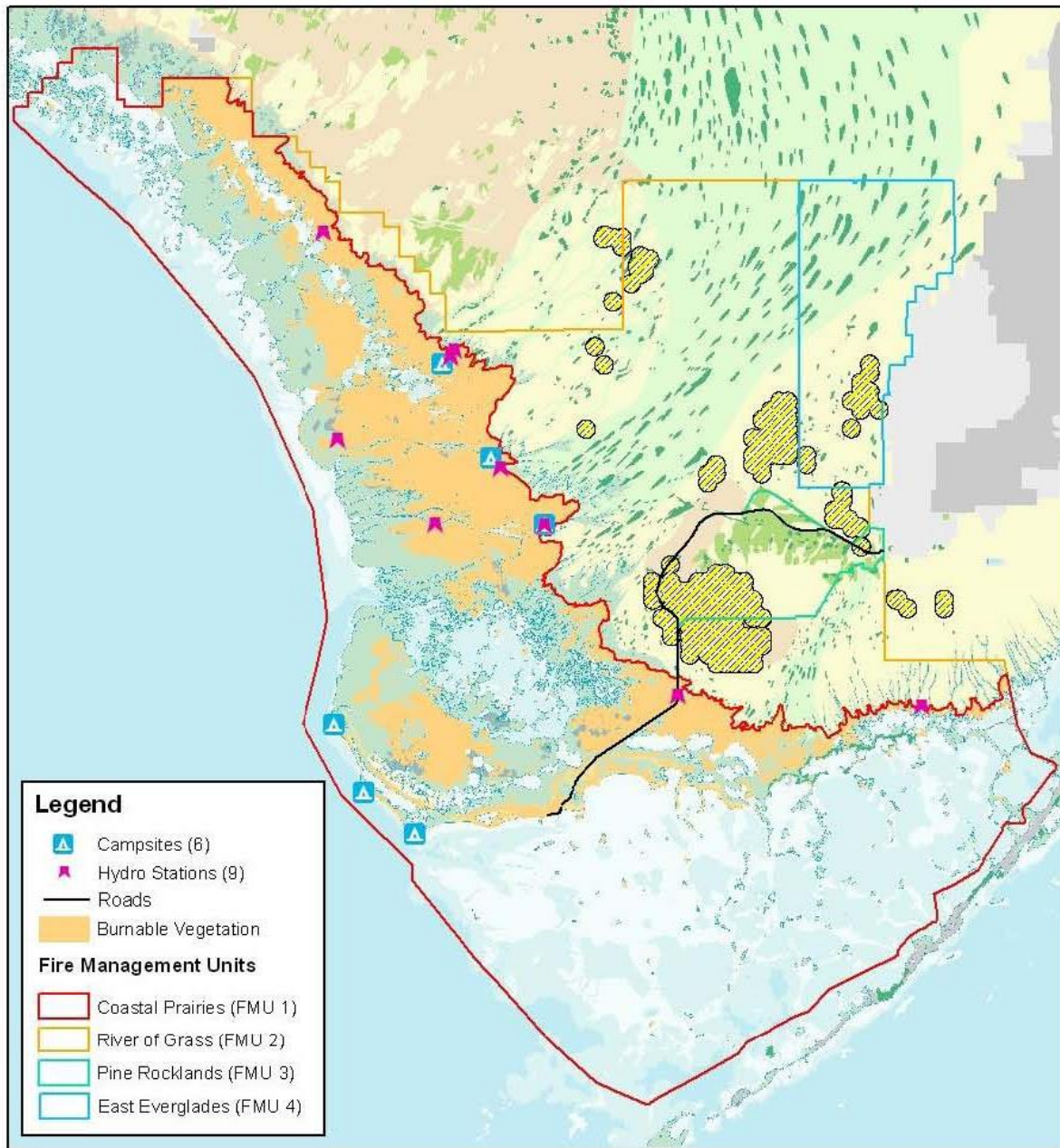
Maintaining Traditional Skills: N/A

Economic and Time Constraints: *The preferred alternative would not be more cost effective than other alternatives; however it would allow fire managers to accomplish the required tasks safely and effectively.*

Safety of Visitors, Personnel, or Contractors: *This alternative affords the greatest level of safety for fire fighters as well as protection of life, property and Park values and surrounding communities while maintaining the Wilderness character to the greatest degree possible while accomplishing the task.*



FMU1 Values at Risk within Wilderness Burnable Area



0 4 8 16 Miles



Map Created By: Everglades National Park Fire & Aviation
Location: M:\GIS\Fire\Products\Min_tool\FMU1_min_tool

December 2010



MINIMUM REQUIREMENTS DECISION GUIDE

WORKSHEETS

Everglades Fire Management Plan (FMP) 2011

Fire Management Unit (FMU) 2

“ . . . except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act...”

– the Wilderness Act, 1964

These worksheets serve as a guide during the planning process to projects within Wilderness. They will expedite the review process if properly completed and provide insight into how the Wilderness Committee at Everglades National Park approaches each individual proposal. It is to be completed and submitted at least one week prior to meeting with the Wilderness Committee along with certificates of completion from the Arthur Carhart Wilderness Training Center online courses, “The Wilderness Act of 1964” and “Minimum Requirements Analysis.” Completing the online courses prior to completing these worksheets is recommended.

Step 1: Summarize the research proposal.

Description: Briefly describe the proposed action, goals, anticipated results, and potential benefits. Also note all proposed actions that may be prohibited under Section 4(c) of the Wilderness Act of 1964 (including use of motor vehicles, motorized equipment or motorboats, land of aircraft, mechanical transport, or construction of any structure or installation).

Urban and agricultural development and the presence of exotic plant species have disrupted the natural fire regime in the fire adapted ecosystems of Everglades National Park and park and community infrastructure is at risk from hazardous fuel build up and unwanted fire effects where it occurs within or adjacent to flammable vegetation. Everglades Fire Management has created a Fire Management Plan (FMP) as required by NPS Management Policies 2006 and Directors Order #18. The FMP identifies how wildland fire and related fire management activities will be managed within the Park. The FMP describes goals and objectives of the fire management program and the methods to achieve those goals and objectives and protect values at risk. Fire management activities include prescribed fire planning, preparation and implementation, fuels management, response to unplanned ignitions, environmental, fire and fire effects monitoring and training and preparedness activities for the fire management program.

This worksheet provides the analysis for prescribed fire and fuels management operations and fire management monitoring activities within FMU 2 in Everglades National Park.

Unplanned ignitions activities in FMU 2 Wilderness will operate under the same guidance for prescribed fire and fuels management operations unless the on-site decision maker determines in his/her professional judgment that the conditions require additional emergency response activities. This direction comes from NPS management Policies 2006 Ch 6 Wilderness Management.

The proposed actions that may be prohibited under section 4(c) of the Wilderness Act include use of motorized equipment, mechanized vehicles, airboats, helicopter landings, and rebar plot marker installations.

The activities outlined in the preferred alternative identify those activities that will maintain Wilderness character while providing the necessary resources to safely carry out fire management operations which will provide for the safety of the public, park personnel, infrastructure, surrounding communities, and ENP natural, cultural and social resource values and maintain natural fire adapted ecosystems.

Prohibited uses not mentioned in this document will not be used by Fire Management in FMU 2 Wilderness. Should the need arise, Fire Management will return to the Wilderness Committee with a project-specific MRDG to request a prohibited use not already mentioned in this document.

To help determine if the proposal and its containing prohibited uses can be legally defensible, please answer the questions listed in A - F on the following pages.

A. Describe Options Outside of Wilderness

Are there any potential study areas outside of Wilderness boundaries that could yield similarly significant results? This includes areas within the park not designated as Wilderness.

Yes: ☐ No: ☒

Explain: The Everglades ecosystems that require management, treatment and monitoring occur in Wilderness. Actions and objectives cannot be accomplished outside of Wilderness areas.

B. Describe Valid Existing Rights or Special Provisions of Existing Legislation

Are you aware if the prohibited uses are necessary to satisfy valid existing rights or a special provision in existing legislation (The Wilderness Act of 1964, The Endangered Species Act of 1973, etc...) that allows consideration of the Section 4(c) prohibited uses? Cite law & section.

Yes: ☐ No: ☒ Not Applicable: ☐

Law & Section:

C. Describe Other Guidance

To your knowledge, does the proposal benefit the administration of agency policy, unit and wilderness management plans, species recovery plans, or agreements with tribal, state and local governments or other federal agencies?

Yes: ☒ No: ☐ Not Applicable: ☐

- **Policy or Agency:** NPS Management policies 2006 Section 4.5 Fire Management; Directors Order #18; NPS DO #41 section 5. Fire Management; Federal Wildland Fire Policy and Program Review (2001); Managing the Impact of Wildfires on Communities and the Environment (USDOI/USDA 2000); A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10 Year Implementation Strategy

D. Normally Prohibited Activities

Check of Wilderness Act Section 4(c) prohibited uses you will be seeking the use of:

- | | |
|--|---|
| <input checked="" type="checkbox"/> Mechanical transport | <input checked="" type="checkbox"/> Landing of aircraft |
| <input checked="" type="checkbox"/> Motorized equipment | <input type="checkbox"/> Temporary road |

☒ Motor vehicles

☒ Structure or installation

☐ Motorboats

Justification: These items are required to safely carry out fire management activities in the Everglades NP Wilderness, potential Wilderness and Wilderness Study Areas.

☒ Emergency Situation

☒ No Alternative Exists

☒ Personal Health or Safety

☐ Other: _____

E. Wilderness Character

Will the project results help to preserve one or more of the qualities of wilderness character including: untrammeled, undeveloped, natural, outstanding opportunities for solitude or a primitive and unconfined type of recreation, or cultural resources?

Explain how taking acting on this proposal will help preserve wilderness character. If there is no clear benefit to a particular quality, explain how the proposed action may impair that quality and if there are any tradeoffs (like using short-term trammeling to improve long-term naturalness). Please only mark 'Not Applicable' if there are no direct or indirect impacts.

Untrammeled – free from modern human control or manipulation, where nature is allowed to “run free”

Yes: ☐ No: ☒ Not Applicable: ☐

Explain: Fire management activities require modern human manipulation on the landscape and would, therefore, impair the untrammeled quality of the Marjory Stoneman Douglas Wilderness. The short-term effects from trammeling of the Wilderness through fire management increase the long term naturalness of the area.

Undeveloped – retains primeval character and influence, essentially without permanent improvement or human occupation, contrasts with areas where humans and their work dominate the landscape

Yes: ☐ No: ☒ Not Applicable: ☐

Explain: Fire management activities utilize motorized vehicles and equipment, which would impair the undeveloped quality of the Marjory Stoneman Douglas Wilderness in the short term. These activities increase the long term natural quality of the Wilderness by applying fire management activities in fire adapted areas and protecting fire sensitive natural resources. Installation of new fire effects monitoring plots may require permanently installing rebar into the ground.

Natural – substantially free from the effects of modern civilization, changed by natural occurrences

Yes: ☒ No: ☐ Not Applicable: ☐

Explain: Fire management activities improve the natural quality of the Marjory Stoneman Douglas wilderness by introducing fire as a natural ecological process to the landscape. Fire as a natural disturbance has been hindered by the surrounding urban and agricultural developments of south Florida. Monitoring activities and fuels management support the implementation of fire as a natural ecological process and allow managers to use fire to enhance and maintain the natural quality of the Wilderness.

Outstanding opportunities for solitude or a primitive and unconfined type of recreation – provides opportunities for people to encounter experiences such as natural sights and sounds, solitude, freedom, risk, and the physical and emotional challenges of self-discovery and self-reliance

Yes: ☒ No: ☐ Not Applicable: ☐

Explain: Fire management activities may impact this quality temporarily during the active fire management operations. The short-term effects through fire management increase the long term naturalness of the area.

Cultural – preserves significant artifacts of prior lifestyles, traditions, or historic events

Yes: ☒ No: ☐ Not Applicable: ☐

Explain: Fire management activities are designed to protect cultural resource values within Wilderness and are expected to have little to no negative impact on cultural resources. Through fire management activities, sites of historical or cultural significance may be protected from the effects of unwanted fire spread.

F. Describe Effects to the Public Purposes of Wilderness

Will the project results help to support one or more of the other public purposes for wilderness (as stated in Section 4(b) of the Wilderness Act) of recreation, scenic, education, conservation, and historical use?

Identify which, if any of the public purposes will be impacted if the proposed project is approved. As in Section E, positive AND negative impacts should be described if present.

Recreation – opportunities to practice primitive, outdoor recreation without interference of modern amenities

Yes: ☒ No: ☐ Not Applicable: ☐

Explain: Fire management activities that reduce hazardous fuel accumulation improve visitor safety.

Scenic – opportunities for spectacular landscape-scale views free from modern alterations

Yes: ☐ No: ☐ Not Applicable: ☒

Explain:

Education – opportunities for immersion in biological, ecological, or other educational themes

Yes: ☒ No: ☐ Not Applicable: ☐

Explain: Fire management activities provide opportunities to gather information about fire effects and fire ecology and contribute to management of Wilderness.

Conservation – opportunities to protect habitat beneficial to the survival of an organism of special interest

Yes: ☒ **No:** ☐ **Not Applicable:** ☐

Explain: Fire management activities restore and maintain globally imperiled habitats and the species that depend upon them. Fire management activities may also protect rare and federally listed species from unwanted effects from fire.

Historic– opportunities to practice historically iconic uses or applications no longer available elsewhere

Yes: ☐ **No:** ☐ **Not Applicable:** ☒

Explain:

Please feel free to provide any additional information that may be relevant at this point in the decision process:

Step 1 Decision: Is the proposed project <u>necessary</u> in wilderness?

At this step, the Wilderness Committee will use the information you've provided to determine the appropriateness of this project within the Marjory Stoneman Douglas Wilderness. Please continue to complete Step 2, determining the minimum activity.

Step 2: Determine the minimum activity.

Description of Alternatives

For each alternative, describe what methods and techniques will be used, when the activity will take place, where the activity will take place, what mitigation measures are necessary, and the general effects to the Wilderness resource and character.

Please provide at least four alternate methods for conducting this project in Wilderness. Include a “No Action” alternative to allow for a comprehensive comparison of effects. The second alternative should describe your ideal methods for the proposed action. This alternative is to be written as if the land were not designated Wilderness and therefore without legal restrictions. The third, a Wilderness compliant alternative, should not include any prohibited uses and should describe how the proposal would be completed in more primitive times. Lastly, the fourth alternative, the preferred alternative, should be a compromise between the second and third alternatives. Complete a form for each alternative being considered. Be sure to include how the impacts can be mitigated by: employee training; location of work areas, campsites, and travel routes; project timing; temporary closures; or other actions.

Alternative Comparison Criteria

The following are descriptions of the criteria that will be compared between the alternatives.

Wilderness Character – the following five, previously discussed criteria represent wilderness character as described in The Wilderness Act of 1964

Untrammeled – Discuss the degree to which the components or processes of ecological systems are intentionally controlled or manipulated.

Undeveloped – Identify how “the imprint of man’s work will remain substantially unnoticeable.” Include the effects of the use of any motorized equipment, mechanical transport, structures, or installations on maintaining this quality of wilderness character.

Natural – Describe the potential for protection, impairment, or restoration of natural conditions including endangered, threatened, or rare species, natural biological diversity, and self-regulating ecosystems.

Outstanding opportunities for solicitude or primitive and unconfined type of recreation – Describe effects that will be noticeable to visitors and that could affect their experience in Wilderness. Include effects on visitors from the use of motorized equipment, mechanical transport, landing of aircraft, structures, or installations.

Cultural resources – Describe any effects on protection or management of historic or pre-historic artifacts, sites, structures, or landscapes.

Maintaining Traditional Skills – Explain how the alternative helps maintain proficiency in the use of primitive and traditional skills, non-motorized tools, and non-mechanical travel methods.

Economic and Time Constraints – Describe the costs and the amount of time it will take for implementation of the alternative.

Note: While activities should be accomplished with economic efficiency, neither the cost nor the time required for implementation are overriding factors for use of otherwise prohibited activities.

Safety of Visitors, Personnel, or Contractors – Describe any safety concerns associated with implementing the alternative on visitors, agency personnel, volunteers, and/or contractors. Identify which hazards can and cannot be mitigated. Mitigation might be achieved through providing information to the public; or training, the use of protective equipment, or other requirements for workers. Identify any potential public safety hazards resulting from implementation of the alternatives.

ALTERNATIVE # 1 – NO ACTION

Description:

Under this alternative no fire management actions would be taken. This is not a possible alternative due to the requirements to protect life, property and values at risk from the impacts of unwanted fire.

Effects:

Wilderness Character

Untrammeled: Under this alternative naturally occurring fires would spread unimpeded which would have no effect on the untrammeled quality of the Wilderness, however human ignited fires that spread through the Wilderness would impact the untrammeled quality through human manipulation of the fire regime.

Undeveloped: Under this alternative no actions would occur therefore there would be no equipment to alter the undeveloped quality of the Wilderness.

Natural: Under this alternative fires would spread across the landscape, however due to the unnatural fragmentation of the landscape through development and water delivery, unnatural fuel accumulation would exist and fires would have unnatural effects impairing the natural quality of the Wilderness, unnaturally affecting both the fire adapted and fire sensitive ecosystems in the Wilderness.

Outstanding opportunities for solitude or primitive and unconfined type of recreation: Under this alternative visitors would not be impacted by vehicles and equipment used in fire management operations. The potential for closures and the duration of closures may increase due to the increased risk of large scale unwanted fires in the Wilderness.

Cultural resources: Under this alternative fires would spread across the landscape creating increased risk to cultural resources surrounded by unnaturally high fuel loads. The potential exists for fires to be more severe, consuming soils in hammocks, tree islands and other areas in the Park and unearthing and damaging cultural resource artifacts.

Maintaining Traditional Skills: N/A

Economic and Time Constraints: Since there are no actions being taken there are no economic or time constraints

Safety of Visitors, Personnel, or Contractors: This alternative puts life, property, Park values and surrounding communities at risk from impacts of wildland fire.

ALTERNATIVE # 2 – DESCRIPTION OF IDEAL METHODS, IF NOT IN WILDERNESS

Description:

Under this alternative, mechanized vehicles (trucks, fire engines, ATVs, UTVs and passenger vehicles), Rotor wing aircraft landings in both unimproved and created improved helispots, specialized vehicles (e.g. bombardiers, rollagons, gyrotracks, marshmasters), airboats, and mechanized equipment and tools would be permitted throughout FMU 2 to conduct prescribed and fuels management operations and monitoring activities. For each fire management activity, Minimum Impact Suppression Tactics will be adhered to as described in the FMP.

The proposed actions of this alternative will maximize the efficiency of Fire Management activities, while minimizing the relative risk associated with frequent intense lightning activity, high heat indexes and provide a safe and effective means of transport and escape during the prescribed fire, fuels management, fire and fire effects monitoring operations and unplanned ignition response operations.

Fire management activities can occur throughout the year, depending on field conditions and available personnel. Unplanned ignitions requiring response operations can occur at any time of year. Prescribed fire treatment activities occur when environmental conditions and other prescription parameters are met. Prescribed fire treatment preparations fuels management and monitoring activities will occur as needed throughout the year.

Fire management activities occur in all fire adapted ecosystems and in areas adjacent to fire sensitive ecosystems to protect life, property and natural and cultural values at risk and to restore and maintain ecosystem health.

Methods and Techniques

Mechanized Vehicles: Mechanized vehicles (fire engines, ATVs, UTVs and passenger vehicles) may be used to transport personnel and equipment during prescribed and fuels management operations, monitoring activities, and other fire management operations such as required training exercises. During prescribed fire and unplanned ignition response operations, fire engines, ATVs and UTVs may be used for ignition and holding operations and protection of values at risk. These vehicles may operate off road in the prairies in FMU 2 Wilderness.

Helicopter Landings: Helicopters may be used to transport personnel and equipment during prescribed and fuels management operations, monitoring activities, and other fire management operations such as required training exercises. Helicopters may land in unimproved helispots or improved helispots which may be created using mechanized equipment and/or primitive hand tools. Note: aircraft operations (Single Engine Air Tanker and helicopter) which do not including landings may occur during prescribed fire and unplanned ignition response activities for reconnaissance, fire monitoring, water drops and/or aerial ignitions (helicopter only) which utilizes a Plastic Sphere Dispenser (PLDO) machine, which injects plastic spheres containing potassium permanganate with glycol to ignite fuels on the ground.

Specialized Vehicles (Rubber Tire/Track): Bombardiers, marsh masters (tracked fire engines) and Rolligons (rubber balloon tired fire engines) may be used to transport personnel and equipment and/or ignition and holding operations during prescribed fire operations, fire monitoring, unplanned ignition response, protection of values at risk and other fire management operations such as required training exercises. These vehicles may be used to create fire breaks in areas with continuous fuel during prescribed fire and unplanned ignition response operations. These vehicles will be used to access areas off road and in areas which are impassable for regular wheeled fire engines. These vehicles

may operate off road in the prairies in FMU 2.

Motorized Equipment/ Tools: Weed eaters, chainsaws and mowers may be used during prescribed fire and unplanned ignition response operations to create temporary fire containment lines to hold prescribed fire within designated perimeters and protect values at risk. Pumps may be used to provide a pressurized water source during fire operations. Battery operated power tools, such as drills, may be used in fire effects monitoring operations to install new permanent monitoring plots where required and in support of remote automated weather stations for fire and environmental monitoring.

Airboats: Airboats may be used to transport personnel and equipment during prescribed fire, fuels management and unplanned ignition response operations, fire and fire effects monitoring, exotic plant control assistance, protection of values at risk and other fire management operations such as required training exercises. Airboats may be used for ignition and holding operations and protection of values at risk, controlling the fire line and/or to create a wet line to slow or stop fire spread. Access off of airboat trails may occur for all activities in the prairies of FMU 2.

Effects:

Wilderness Character

Untrammeled: *Fire is an ecological process that will be controlled and manipulated by fire managers under this alternative. The implementation of prescribed fire and the suppression of naturally ignited fires affect the untrammeled quality of the Wilderness. Under this alternative the trammeling of fire management actions (which serve to reduce hazardous fuel levels in the Park and around values at risk) will create opportunities to safely and effectively manage naturally occurring wildfires without suppression action. In these cases the untrammeled quality will not be affected due to the efforts of previous fire management actions.*

Undeveloped: *The actual implementation of fire on the ground would leave little imprint as a man-made effect since fire is a natural process for the ecosystems in question. The creation and maintenance of improved helispots created with motorized equipment and/or hand tools would leave noticeable areas of alteration and imprints of development in the Wilderness. Trails and fire breaks created by using motorized equipment will recover quickly with rapid vegetation regrowth leaving a very short term imprint. The substrate would remain intact allowing for faster recovery and a shorter-term developed imprint in the Wilderness. Trails and fire breaks created by using specialized motorized vehicles and airboats would occur throughout the Wilderness areas and will leave an imprint until the area recovers. This will be a short term imprint, but longer lasting for the specialized equipment than that created with motorized equipment. The presence of equipment, helicopters, vehicles and airboats in the Wilderness will temporarily affect the undeveloped quality, however for those that do not leave a imprint after they are gone the effects will only last as long as the equipment and vehicles are present in the area. Rebar installed for fire effects monitoring plots may be considered as a man-made structure, but they are of small diameter and difficult to detect through casual observation.*

Natural: *Fire management activities described in this alternative enhance the natural quality of the Wilderness through the maintenance and management of natural processes of fire. Restoration and maintenance of natural communities and protection of flora, fauna, and natural habitats at risk from unwanted fire impacts maintains fire-adapted vegetation communities and biological diversity improving the natural quality of the Wilderness. Monitoring activities and fuels management support the implementation of fire as a natural ecological process and allow managers to use fire to enhance and maintain the natural quality of the Wilderness.*

Outstanding opportunities for solicitude or primitive and unconfined type of recreation: *Opportunities for solitude or primitive and unconfined type of recreation*

should be relatively unimpaired, except on a very short-term basis. During prescribed fire operations and unplanned wildfires, for safety reasons visitors may be excluded from certain areas within the Wilderness until the fire is officially declared out. Other fire management activities, such as treatment preparation, fire effects monitoring and reconnaissance may require the use of motorized vehicles, aircraft, airboats and equipment, which may disturb this Wilderness quality in the short-term, which will last only as long as the equipment is present in the area.

Cultural resources: *The use of prescribed fire treatments and management actions taken on unplanned ignitions protect cultural resource values within the Wilderness. Prescribed fire operations reduce the amount of hazardous fuel accumulations around cultural values at risk and suppression actions prevent unwanted impacts from further fire spread. The use of motorized equipment mitigates ground disturbance that has the potential to unearth and damage cultural resource artifacts in the Wilderness. The use of prescribed fire maintains the ethnographic landscapes in the Wilderness and monitoring activities provide knowledge of resources used in planning and decision making regarding the protection of these resources.*

Maintaining Traditional Skills: N/A

Economic and Time Constraints: This alternative would not be more cost effective than other alternatives; however it would allow fire managers to accomplish the required tasks safely and effectively.

Safety of Visitors, Personnel, or Contractors: This alternative affords the greatest level of safety for fire fighters working on the ground as well as protection of life, property and Park values and surrounding communities however diminishes the Wilderness character through actions used to accomplish the task.

ALTERNATIVE # 3 – DESCRIPTION OF WILDERNESS COMPLIANT METHODS, NO PROHIBITED USES

Description:

Under this alternative, mechanized vehicles (trucks, fire engines, ATVs, UTVs and passenger vehicles), rotor wing aircraft landings and specialized vehicles would be prohibited in FMU 2 Wilderness. Only primitive hand tools would be authorized for prescribed fire and fuels management operations. Motorized tools would be prohibited within FMU 2 Wilderness. Fire management activities that do not require personnel on the ground (aerial ignition operations) may still occur in remote Wilderness areas where natural fire breaks occur and where values at risk requiring on the ground protection are not present. Additionally Minimum Impact Suppression Tactics will be adhered to as described in the FMP.

The proposed actions of this alternative will greatly reduce the acreage of Wilderness that can be safely and effectively treated with prescribed fire or monitored for fire effects due to the fact that it is impossible to access remote areas of the Wilderness without aircraft landings. Due the continuous nature of fuels, it will be impossible to treat many areas with prescribed fire where un-treated areas must be protected and maintained adjacent to treatment areas in FMU 2 in the Wilderness. Primitive hand tools, including digging and cutting tools, are known to be ineffective at creating fire breaks due to the presence of a mixture of tall grass, sedges, woody plants, fuels in solution holes, uneven terrain and rock substrate. Weedeaters provide the precision and versatility necessary to create effective fire breaks, the width of which need to be 1.5x the expected flame lengths. The inaccessibility of areas in FMU 2 prevents management actions from taking place without helicopter access. The high heat indexes and limitations of vehicle and aircraft use for safe and effective means of transport during prescribed fire, fuels management and monitoring, will increase risk to fire personnel and prevent management actions from taking place. These restrictions will increase the risk to life, property and natural and cultural values and increase risk to firefighters working on the ground. The restoration and maintenance of fire adapted ecosystems will be affected by limiting the amount of prescribed fire and monitoring activities that can safely occur. Monitoring activities in FMU 2 will be severely limited. Do to the reduction of acres that can be treated with prescribed fire under this alternative, the frequency and intensity of unplanned ignitions and unwanted fire effects would likely increase, creating incidents where the onsite fire manager is forced to authorize vehicles and equipment to protect life property and values at risk and safely manage the situation. The impacts of this alternative have the potential to negatively impact Wilderness character to a greater degree by affecting the natural quality of the Wilderness and creating situations where the use of specialized vehicles is increased and the undeveloped quality of the Wilderness if affected. Additionally, this alternative will limit the ability of the fire management program to adhere to guidelines set forth in NPS management policies 2006 and Directors Order #18 by compromising the ability to proactively protect life and property within and adjacent to the Park and natural and cultural resource values at risk and manage a prescribed fire and fire effects monitoring program in fire adapted areas of the Park.

Fire management activities can occur throughout the year, depending on field conditions and available personnel. Unplanned ignitions requiring response operations can occur at any time of year. Prescribed fire treatment activities occur when environmental conditions and other prescription parameters are met. Prescribed fire treatment preparations fuels management and monitoring activities will occur as needed throughout the year.

Fire management activities occur in all fire adapted ecosystems and in areas adjacent to fire sensitive ecosystems to protect life, property and natural and cultural values at risk and to restore and maintain ecosystem health.

Effects:

Wilderness Character

Untrammeled: *Fire is an ecological process that will be controlled and manipulated by fire managers under this alternative. The implementation of prescribed fire and the suppression of naturally ignited fires affect the untrammeled quality of the Wilderness by controlling fire within the area. Under this alternative the use of prescribed fire is severely limited lessening the effect upon the trammed quality, however preventing the likelihood of monitoring naturally occurring fires with no suppression action due to the risks of fire burning in accumulated fuel loads. This alternative may increase trammeling related to fire suppression actions in unplanned ignition response where a situation is created in which onsite fire managers are required to implement techniques to protect life, property and values at risk and safely manage the situation.*

Undeveloped: *Under this alternative the undeveloped quality of the Wilderness would only be affected by use of aircraft adjacent to Wilderness and activities within Wilderness are not expected to impact this quality. As a result of the decrease in prescribed fire activities, this alternative may increase adverse effects to the undeveloped quality of the Wilderness related to fire suppression actions in unplanned ignition response where a situation is created in which onsite fire managers are required to implement techniques to protect life, property and values at risk and safely manage the situation.*

Natural: *As a result of the limited fire management activities permitted under this alternative, the natural quality of the Wilderness would be affected by unplanned fires on the landscape. Fire adapted areas will be impacted by the lack of fire and fire sensitive areas will experience increased risk resulting from unnatural fuel accumulations and unplanned ignitions. Unplanned fires would have unnatural effects impairing the natural quality of the Wilderness affecting unnaturally both the fire adapted and fire sensitive ecosystems in the Wilderness.*

Outstanding opportunities for solitude or primitive and unconfined type of recreation: *Under this alternative, opportunities for solitude or primitive and unconfined type of recreation should be relatively unimpaired, except on a very short-term basis due to the limitations on prescribed fire management activities. Impacts under this alternative would be short-term. Under this alternative visitors would not be impacted by vehicles and equipment used in fire management operations. The potential for closures and the duration of closures may increase due to the increased risk of large scale unwanted fires in the Wilderness.*

Cultural resources: *Under this alternative cultural resource values would be protected during response to unplanned ignitions, however the use of prescribed fire to pro-actively reduce hazardous fuel loading around cultural resources would be limited. The amount of ground disturbance activities would increase that have the potential to unearth and damage cultural resource artifacts in the Wilderness.*

Maintaining Traditional Skills: N/A

Economic and Time Constraints: This alternative would be more cost effective than other alternatives. However this alternative increases the likelihood of large scale, expensive fires that would require management over longer periods of time.

Safety of Visitors, Personnel, or Contractors: Under this alternative many prescribed fire and monitoring activities would not occur due to the risk and safety issues as a result of having fire fighters on the ground without certain tools and equipment. There is less reduction in hazardous fuel loading which in turn may increase risk to life, property and Park values and surrounding communities.

ALTERNATIVE # 4 – PREFERRED ALTERNATIVE

Fire Management Unit 2
Wilderness

Description:

Under this alternative, mechanized vehicles (ATVs, UTVs), Rotor wing aircraft landings, airboats, and motorized equipment and tools would be permitted in FMU2 to conduct prescribed fire, fuels management and fire management monitoring operations and unplanned ignition response operations. For unplanned ignition response, fire managers will adhere to guidance from the approved FMP minimum requirements decision guide for prescribed fire and fuels management operations unless the on-site decision maker determines in his/her professional judgment that the conditions dictate otherwise. Additionally Minimum Impact Suppression Tactics will be adhered to as described in the FMP.

The proposed actions of this alternative will maintain Wilderness character to the maximum degree practicable while protecting values at risk and maintaining a safe working environment for firefighters on the ground, minimizing the relative risk associated with fire operations, lightning activity, high heat indexes and provide a safe and effective means of transport and escape during the prescribed fire, fire and fire effects monitoring operations and unplanned ignition response operations.

Prescribed Fire and Fuels Management Activities:

Proposed methods and techniques:

- Aircraft
 - Aircraft will be used to transport personnel and equipment, conduct ignition and holding operations and protect specific values at risk during prescribed fire and fuels management operations. Values to be protected include hammocks, camps, hydro and weather stations, and natural and cultural resource values identified by SFNRC and the Cultural resource branch.
 - Note: Aircraft operations (Single Engine Air Tanker and helicopter) which do not including landings may occur during prescribed fire and unplanned ignition response activities for reconnaissance, fire monitoring, water drops and/or aerial ignitions (helicopter only) which utilizes a Plastic Sphere Dispenser (PLDO) machine, which injects plastic spheres containing potassium permanganate with glycol to ignite fuels on the ground.
- Airboats
 - Airboats will be used to create “holding lines” moving along existing airboat trails and off trail connecting airboat trails to other natural fire breaks to create a complete fire break to contain fire spread. This is accomplished by pushing sawgrass into the water to reduce flammability and increase width of fire breaks.
 - Airboats will be used to transport personnel and equipment, conduct ignition and holding operations and protect specific values at risk during prescribed fire operations where airboat use is already occurring in the creation and holding of fire containment lines (airboats will not be used for transporting personnel and equipment if the operation does not require use of airboats in fire spread containment)
- Mechanized Vehicles (ATV, UTV)
 - ATVs and UTVs may be used to transport personnel and equipment, conduct ignition and holding operations and protect specific values at risk during prescribed fire and fuels management operations. Values to be protected include hammocks, camps, hydro and weather stations, and natural and cultural resource values identified by SFNRC and the Cultural resource branch.

- Motorized equipment (weed eaters, portable pumps, mowers)
 - Weed eaters may be used to create defensible space and reduce fuel loading around values to be protected (hammocks, camps, hydro and weather stations, and natural and cultural resource values identified by SFNRC and the Cultural resource branch).
 - Weed eaters may be used to create fire containment lines to contain fire spread in areas where natural existing fire breaks do not exist, break up larger units into smaller treatment areas and prevent spread of fire into non-treatment areas.
 - Portable pumps may be used to provide pressurized water delivery in support of prescribed fire operations along holding lines and around values to be protected during prescribed fire operations.
 - Mowers will be used to protect sparrow research camps (east camp and west camp) and cultural resource values.

When:

- Prescribed fire and fuels management activities may occur throughout the year.
- Prescribed fire treatments will occur when environmental conditions are within approved prescription parameters.
- Specific prescribed fire project implementation schedules can be found in the Fire Management Plan (FMP) Multi Year Fuels Plan.
- Airboats will be used when water levels allow safe airboat use.
- ATVs and UTVs will be used off road when substrate conditions are dry enough to avoid causing ruts or getting stuck.

Where:

- Prescribed fire and fuels management activities will occur throughout FMU 2.
- Specific project unit location maps can be found in the FMP Multi Year Fuels Plan.
- Aircraft
 - Aircraft landings may occur in all project units in FMU 2 during prescribed fire and fuels management operation.
 - Aircraft landings may occur adjacent to values to be protected (hammocks, hydrostations, RAWS weather stations, and natural and cultural resource values identified by SFNRC and the Cultural resource branch).
 - Estimated 0-38 helicopter landings in Wilderness/year to protect known values located within flammable vegetation.
 - The known values at risk currently located within flammable vegetation are 3 Cape Sable Seaside Sparrow subpopulations, 64 hydrostations, 2 Sparrow research camps and 1 RAWS weather station.
 - Additional helicopter landings in Wilderness may be necessary to protect as yet unidentified natural and cultural resource values. It cannot be determined at this time the number of landings required due to the fact that the number and location of resources are not currently identified.
 - For Project Units where airboats may be used, helicopter landings will occur during prescribed fire operations only when airboats are not being used or if areas that require access are unreachable by airboats used in the prescribed fire operation. (If an airboat is already present in an area and in the location where personnel and equipment are needed, access by airboat will be used rather than adding helicopter landings in the area – if the treatment is being done without airboats or airboats are incapable of transporting the personnel or equipment to the required location due to water levels or other safety restrictions – helicopters will be used.)
- Airboats
 - Airboats will travel along existing airboat trails and access off of airboat trails may occur to complete holding lines – connecting airboat trails to other natural fire breaks to create a holding line to contain fire spread.
 - Airboats may be used to transport personnel and equipment along airboat trails and holding lines during prescribed fire operations.

- A map displaying airboat trails and expected off trail lines is located at the end of the document.
- Mechanized Vehicles
 - ATVs and UTVs may be used in project units E and S in FMU 2.
 - ATVs and UTVs may operate off road along the eastern boundary of burn unit ROG E and the northern boundary (Old Ingram Highway) of burn unit ROG NW and ROG S in FMU 2.
- Motorized equipment
 - Weed eaters may be used adjacent to and surrounding values to be protected (hammocks, hydro and weather stations, and natural and cultural resource values identified by SFNRC and the Cultural resource branch).
 - The known values at risk currently located within flammable vegetation are 3 Cape Sable Seaside Sparrow subpopulations, 64 hydrostations, 2 Sparrow research camps and 1 RAWS weather station.
 - Estimated 0-38 weed eater uses in Wilderness/year to protect known values located within flammable vegetation.
 - Weed eaters may be used in all project units in FMU 2 where units need to be broken into smaller burn areas to reduce risk and prevent fire spread into unwanted areas and where natural and/or manmade barriers cannot be utilized as fire break containment lines.
 - Estimated 0-10 miles of fire break containment lines/year in FMU 2.
 - Exact length and location of fire break containment lines cannot be determined at this time due to the fact that until the final planning stages, closer to the time of implementation, the status and effectiveness of intermittent natural fire breaks, the amount of fuel loading (height and continuity), water levels, weather conditions, effective escape routes and safety zones needed to determine length and location are unknown.
 - Estimated 2-30' fire break width based on 1-20' flame lengths. (Effective fire break size is 1.5 x the predicted flame lengths. Flame length will depend on fuel loading and expected weather conditions, estimated flame lengths from 2008-2012 prescribed fire burn plan)
 - Additional weedeater uses in Wilderness may be necessary to protect as yet unidentified natural and cultural resource values. It cannot be determined at this time the number of weedeater uses required due to the fact that the number and location of resources are not currently identified.
 - Portable pumps may be used in all project units in FMU 2 to provide pressurized water delivery in support of prescribed fire operations along holding lines and around values to be protected during prescribed fire operations.
 - Mowers will be used to around sparrow research camps (east camp and west camp) and cultural resource values to reduce fuel loads and provide protection from unwanted fire spread.

Mitigations:

- Creation of improved helispots is prohibited.
- Motorized equipment is limited to weed eaters, portable pumps and mowers.
- Fire breaks for protection of values are limited in size to the area required for successful fuels reduction and protection from unwanted fire spread and effects on the values to be protected.
- Natural and/or existing fire breaks will be used whenever possible.
- Specialized Vehicles are prohibited.
- Airboat use is restricted to prescribed fire activities (fuels management and protection of values will use helicopter transportation)
- Aircraft will not be used to transport personnel in areas where airboats are present and capable of transporting personnel and equipment to avoid additional wilderness incursions.
- Should the need for additional prohibited use such as airboat and ATV/UTV use in areas not described on the map and/or use of specialized vehicles arise in the future, Fire Management

will return to the Wilderness Committee with project-specific MRDGs to request additional prohibited uses in FMU 2 Wilderness.

Rational for use:

- Aircraft
 - Aircraft landings are the only way to access remote areas within FMU 2 targeted for treatment which contain values to be protected and areas where fuels management is needed (see FMP Multi Year Fuels Plan maps for specific project areas).
- Airboats
 - The use of airboats enables managers to utilize existing trails to create and enhance “wet line” fire breaks.
 - Use of existing fire breaks is preferred to creating new man made breaks.
 - Airboats provide a means of transportation for performing precise hand ignition operations along the fire breaks to create a “black line” that enhances the fire break.
- Mechanized Vehicles
 - ATVs and UTVs enable firefighters to patrol greater distances along the line, respond to spot fires more efficiently and safely and provide water sources where engines are unable to travel. ATV and UTV water sources are necessary to slow and stop fire spread safely and more efficiently than hand tool use alone and in many cases without water, fire spread cannot be stopped.
- Motorized equipment
 - Weed eaters are the necessary equipment to create effective fire breaks to contain fire spread in areas where natural existing fire breaks do not exist, break up larger units into smaller treatment areas and prevent spread of fire into non-treatment areas and protect values at risk.
 - Primitive hand tools, including digging and cutting tools, are known to be ineffective at creating fire breaks due to the presence of a mixture of tall grass, sedges, woody plants, fuels in solution holes and uneven terrain. Weedeaters provide the precision and versatility necessary to create effective fire breaks, the width of which need to be 1.5x the expected flame lengths (potential range 1-21ft flame lengths).
 - Portable pumps are necessary for firefighters to have access to pressurized water sources during prescribed fire operations where it is impossible for engines and additional water delivery equipment to reach. A pressurized water source is necessary to slow and stop fire spread safely and more efficiently than hand tool use alone and in many cases without water, fire spread cannot be stopped.
 - Mowers enable fire managers to manage fuel loads and create large, wide fire breaks around existing sparrow research camps and cultural resource sites to protect life and values from unwanted fire spread. The size of these fire breaks is necessary due to the surrounding fuel loads and risk of wildfire and adverse impacts on life, property and resources.

Monitoring Activities:

Proposed methods and techniques:

- Aircraft
 - Aircraft will be used to transport personnel and equipment for fire management monitoring activities.
- Motorized equipment (rock drill, power drill)
 - A power drill will be used to maintain the RAWs monitoring station in FMU 2.
 - A rock drill may be used to install rebar plot markers where additional fire effects plot installation is required.
- Rebar installation
 - Rebar installation may occur to mark locations of new fire effects monitoring plots where additional fire effects plot installation is required.

- Additional plot installations may be required to further study the effects of fire in the ridge and slough and cypress/prairie areas of FMU 2.

When:

- Throughout the year – the bulk of field work is completed January - June, however can occur throughout the year.

Where:

- Monitoring activities may occur in all project units in FMU 2.
- Maps of established fire effects plots can be found in the FMP.
- Aircraft
 - Aircraft landings will occur adjacent to RAWS weather station and hammocks for soil moisture monitoring.
 - There are no existing fire effects plots in FMU 2.
 - Additional aircraft landings are not scheduled in FMU 2 however additional monitoring may be needed in regards to fire effects throughout FMU 2 as the Multi Year Fuels Plan is implemented.
 - Estimated 5 to 30 landings/year for additional monitoring.
- Motorized Equipment
 - A power drill will be used at the location of the RAWS station in FMU 2.
 - Rock drill use in plot installation is not scheduled in FMU 2 however additional plot installations may be required in project units NW, NE, E and W to study the effects of fire in the ridge and slough and cypress/prairie areas of FMU 2.
 - Estimated 5 to 30 additional fire effects monitoring plots consisting of 2 rebar/plot. Plot design: 30-50m belt transect plots with a rebar on each end of the transect.
- Rebar installation
 - Rebar plot marker installation is not scheduled in FMU 2 however additional plot installations may be required in project units NW, NE, E and W to study the effects of fire in the ridge and slough and cypress/prairie areas of FMU 2.
 - Estimated 5 to 30 additional fire effects monitoring plots consisting of 2 rebar/plot. Plot design: 30-50m belt transect plots with a rebar on each end of the transect.

Mitigations:

- Creation of improved helispots is prohibited.
- Specialized Vehicles are prohibited.
- Airboat are prohibited for monitoring activities.
- Motorized equipment is limited to rock drill and power drills.
- Prior to plot installation, number of plots, coordinates and plot design will be presented to the wilderness committee.
- Hand hammering of rebar will be tried prior to using the rock drill. The rock drill will not be used if hand hammering rebar is successful.

Rational for use:

- Aircraft
 - The use of aircraft is the only way to access remote areas within FMU 2 where monitoring activities are required. Airboat use provides access to limited areas however aircraft landings are the preferred access method for all areas.
- Motorized equipment
 - Rock drills are required to effectively install rebar plot markers due to the rock substrate.
 - Power drills are necessary to maintain the RAWS station in FMU 2. No primitive tool exists that is capable of removing bolted panels for RAWS station maintenance.
 - Rebar installation
 - In order to collect needed fire effects data, additional plots may be installed if existing plots do not provide the necessary information
 - Rebar is required to ensure repeatability of plot measurements and ensure collection of high quality data.

Effects:

Wilderness Character

Untrammeled: Fire is an ecological process that will be controlled and manipulated by fire managers under this alternative. The implementation of prescribed fire and the suppression of naturally ignited fires affect the untrammeled quality of the Wilderness. Under this alternative the trammeling of fire management actions (which serve to reduce hazardous fuel levels in the Park and around values at risk) will create opportunities to safely and effectively manage naturally occurring wildfire without suppression action. In these cases the untrammeled quality will not be affected due to the efforts of previous fire management actions.

Undeveloped: The actual implementation of fire on the ground would leave little imprint as a man-made effect since fire is a natural process for the ecosystems in question. Trails and fire breaks created by using motorized equipment will recover quickly with rapid vegetation regrowth, leaving a very short term imprint. The substrate would remain intact allowing for faster recovery and a shorter-term developed imprint in the Wilderness. Trails and fire breaks created by using specialized motorized vehicles and airboats would occur throughout the Wilderness areas and will leave an imprint until the area recovers. This will be a short term imprint, but longer lasting with specialized vehicles than that created with motorized equipment. In this alternative the type of vehicle, areas in which they are used and options for use are limited, which limits the amount of trails created and areas where the undeveloped quality is affected. The presence of equipment, helicopters, vehicles and airboats in the Wilderness will temporarily affect the undeveloped quality, however for those that do not leave a imprint after they are gone the effects will only last as long as the equipment and vehicles are present in the area. Rebar installed for fire effects monitoring plots may be considered as a man-made structure, but they are of small diameter and difficult to detect through casual observation and will most likely go unnoticed by most visitors.

Natural: Fire management activities described in this alternative enhance the natural quality of the Wilderness through the maintenance and management of natural processes of fire. Restoration and maintenance of natural communities and protection of flora, fauna, and natural habitats at risk from unwanted fire impacts maintains fire-adapted vegetation communities and biological diversity, improving the natural quality of the Wilderness. Monitoring activities and fuels management support the implementation of fire as a natural ecological process and allow managers to use fire to enhance and maintain the natural quality of the Wilderness.

Outstanding opportunities for solitude or primitive and unconfined type of recreation: Opportunities for solitude or primitive and unconfined type of recreation should be relatively unimpaired, except on a very short-term basis. During prescribed fire operations and unplanned wildfires, for safety reasons visitors may be excluded from certain areas within the Wilderness until the fire is officially declared out. Other fire management activities, such as treatment preparation, fire effects monitoring and reconnaissance may require the use of motorized vehicles, aircraft, airboats and equipment, which may disturb this Wilderness quality in the short-term, which will last only as long as the equipment is present in the area.

Cultural resources: The use of prescribed fire treatments and management actions taken on unplanned ignitions protect cultural resource values within the Wilderness. Prescribed fire operations reduce the amount of hazardous fuel accumulations around cultural values at risk and suppression actions prevent unwanted impacts from further fire spread. The use of motorized equipment mitigates ground disturbance that has the potential to unearth and damage cultural resource artifacts in the Wilderness. The use of prescribed fire maintains the ethnographic landscapes in the Wilderness and monitoring activities provide knowledge of resources used in planning and decision making regarding the protection of these resources.

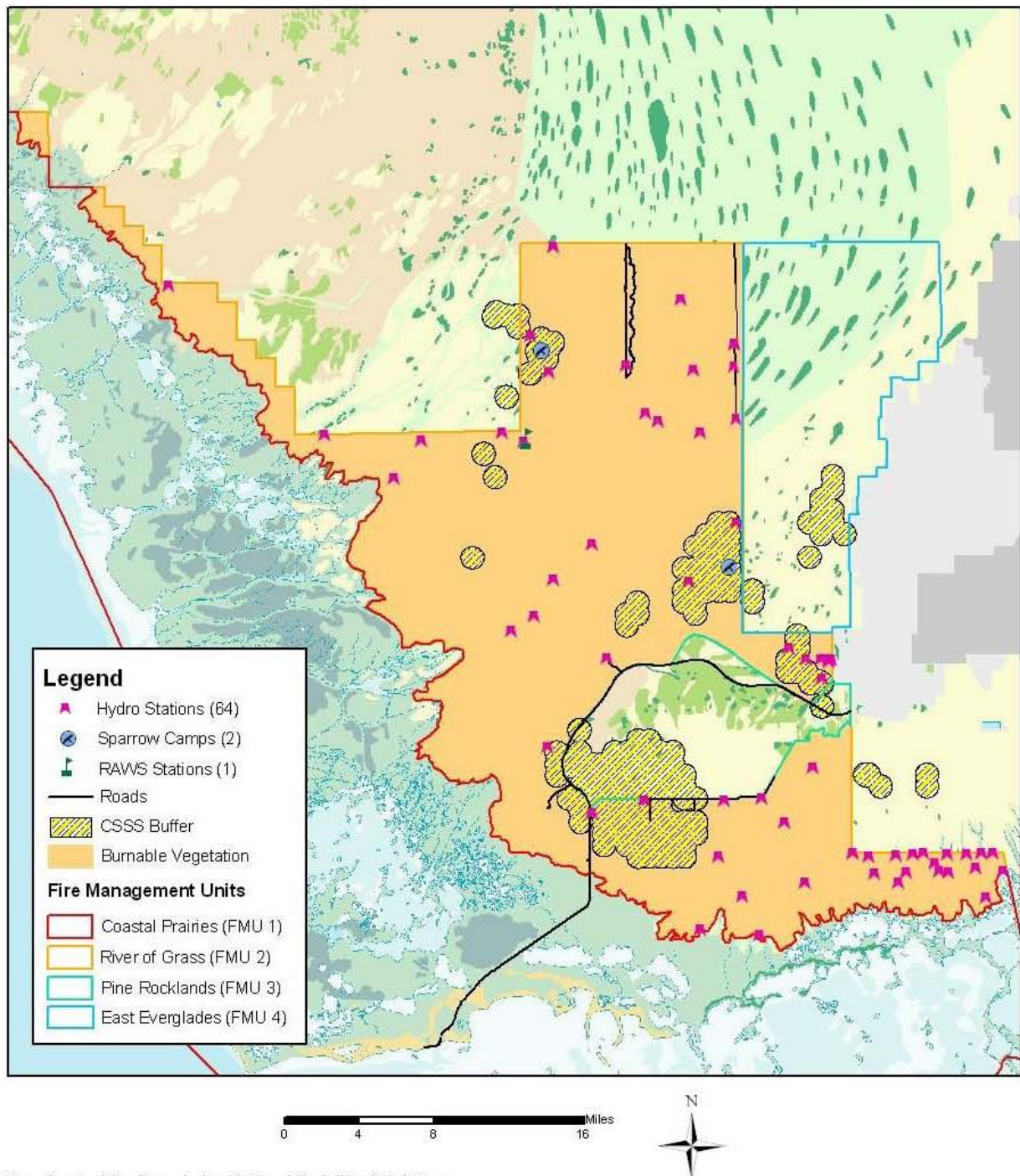
Maintaining Traditional Skills: N/A

Economic and Time Constraints: The preferred alternative would not be more cost effective than other alternatives; however it would allow fire managers to accomplish the required tasks safely and effectively.

Safety of Visitors, Personnel, or Contractors: This alternative affords the greatest level of safety for fire fighters working on the ground as well as protection of life, property and Park values and surrounding communities while maintaining the Wilderness character to the greatest degree possible while accomplishing the task.



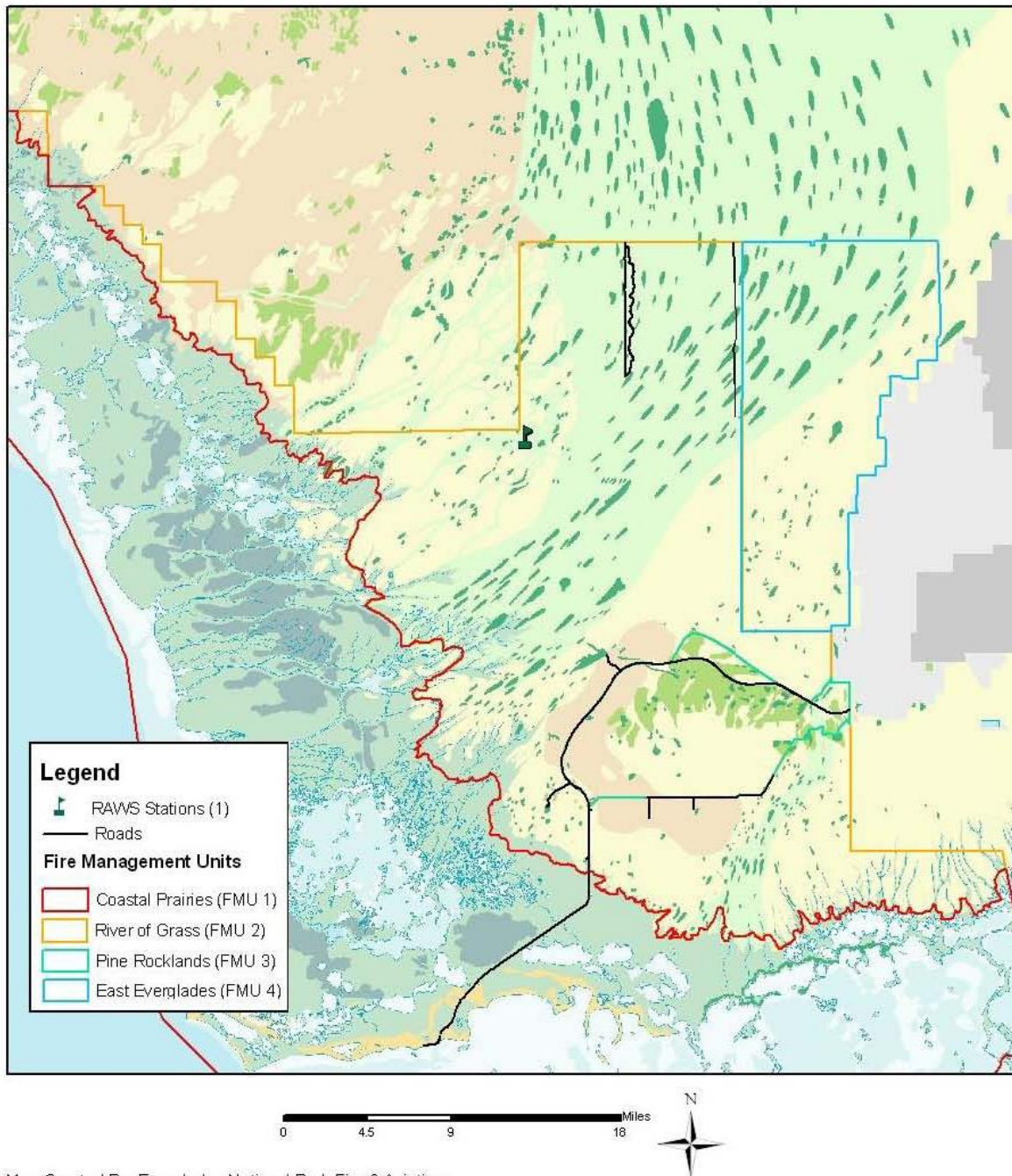
FMU2 Values at Risk within Wilderness Burnable Area



December 2010



FMU2 RAWS Weather Station Monitoring Location

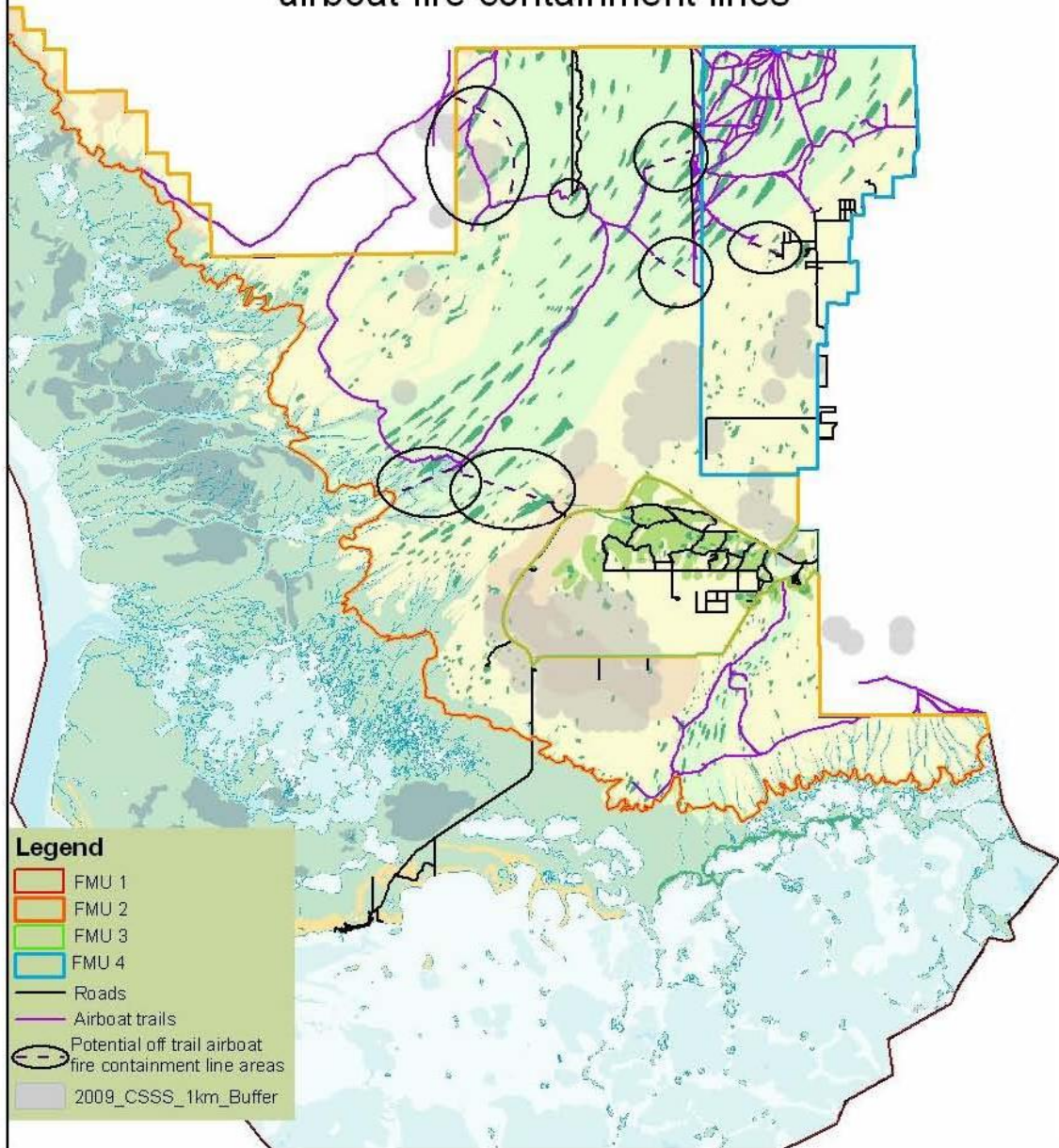


Map Created By: Everglades National Park Fire & Aviation
Location: M:\GIS\FireProducts\Min_tool\FMU2_monitoring_locations_min_tool

December 2010



Airboats trails and potential off trail airboat fire containment lines



Everglades Fire and Aviation Management
M:\GIS\WildernessAirboats_WildernessMinTool_2010.mxd

0 1.5 3 6 9 12 Miles



Dec 2010



Everglades National Park
MARJORY STONEMAN DOUGLAS WILDERNESS

MINIMUM REQUIREMENTS DECISION GUIDE

WORKSHEETS

Everglades Fire Management Plan (FMP) 2011

Fire Management Unit (FMU) 3

“ . . . except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act...”

– the Wilderness Act, 1964

These worksheets serve as a guide during the planning process to projects within Wilderness. They will expedite the review process if properly completed and provide insight into how the Wilderness Committee at Everglades National Park approaches each individual proposal. It is to be completed and submitted at least one week prior to meeting with the Wilderness Committee along with certificates of completion from the Arthur Carhart Wilderness Training Center online courses, “The Wilderness Act of 1964” and “Minimum Requirements Analysis.” Completing the online courses prior to completing these worksheets is recommended.

Step 1: Summarize the research proposal.

Description: Briefly describe the proposed action, goals, anticipated results, and potential benefits. Also note all proposed actions that may be prohibited under Section 4(c) of the Wilderness Act of 1964 (including use of motor vehicles, motorized equipment or motorboats, land of aircraft, mechanical transport, or construction of any structure or installation).

Urban and agricultural development and the presence of exotic plant species have disrupted the natural fire regime in the fire adapted ecosystems of Everglades National Park and park and community infrastructure is at risk from hazardous fuel build up and unwanted fire effects where it occurs within or adjacent to flammable vegetation. Everglades Fire Management has created a Fire Management Plan (FMP) as required by NPS Management Policies 2006 and Directors Order #18. The FMP identifies how wildland fire and related fire management activities will be managed within the Park. The FMP describes goals and objectives of the fire management program and the methods to achieve those goals and objectives and protect values at risk. Fire management activities include prescribed fire planning, preparation and implementation, response to unplanned ignitions, environmental, fire and fire effects monitoring and training and preparedness activities for the fire management program.

This worksheet provides the analysis for prescribed fire and fuels management operations and fire management monitoring activities within FMU 3 in Everglades National Park.

Unplanned ignitions activities in FMU 3 Wilderness will operate under the same guidance for prescribed fire and fuels management operations unless the on-site decision maker determines in his/her professional judgment that the conditions require additional emergency response activities. This direction comes from NPS management Policies 2006 Ch 6 Wilderness Management.

The proposed actions that may be prohibited under section 4(c) of the Wilderness Act include use of motorized equipment and transport vehicles, and rebar plot marker installations.

The activities outlined in the preferred alternative identify those activities that will maintain Wilderness character while providing the necessary resources to safely carry out fire management operations which will provide for the safety of the public, park personnel, infrastructure, surrounding communities, and ENP natural, cultural and social resource values and maintain natural fire adapted ecosystems.

Prohibited uses not mentioned in this document will not be used by Fire Management in FMU 3 Wilderness. Should the need arise, Fire Management will return to the Wilderness Committee with a project-specific MRDG to request a prohibited use not already mentioned in this document.

To help determine if the proposal and its containing prohibited uses can be legally defensible, please answer the questions listed in A - F on the following pages.

A. Describe Options Outside of Wilderness

Are there any potential study areas outside of Wilderness boundaries that could yield similarly significant results? This includes areas within the park not designated as Wilderness.

Yes: ☐ No: ☒

Explain: The Everglades ecosystems that require management, treatment and monitoring occur in Wilderness. Actions and objectives cannot be accomplished outside of Wilderness areas.

B. Describe Valid Existing Rights or Special Provisions of Existing Legislation

Are you aware if the prohibited uses are necessary to satisfy valid existing rights or a special provision in existing legislation (The Wilderness Act of 1964, The Endangered Species Act of 1973, etc...) that allows consideration of the Section 4(c) prohibited uses? Cite law & section.

Yes: ☐ No: ☒ Not Applicable: ☐

Law & Section:

C. Describe Other Guidance

To your knowledge, does the proposal benefit the administration of agency policy, unit and wilderness management plans, species recovery plans, or agreements with tribal, state and local governments or other federal agencies?

Yes: ☒ No: ☐ Not Applicable: ☐

- **Policy or Agency:** NPS Management policies 2006 Section 4.5 Fire Management; Directors Order #18; NPS DO #41 section 5. Fire Management; Federal Wildland Fire Policy and Program Review (2001); Managing the Impact of Wildfires on Communities and the Environment (USDOI/USDA 2000); A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10 Year Implementation Strategy

D. Normally Prohibited Activities

Check of Wilderness Act Section 4(c) prohibited uses you will be seeking the use of:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Mechanical transport | <input type="checkbox"/> Landing of aircraft |
| <input checked="" type="checkbox"/> Motorized equipment | <input type="checkbox"/> Temporary road |

☒ Motor vehicles

☒ Structure or installation

☐ Motorboats

Justification: These items are required to safely carry out fire management activities in the Everglades NP Wilderness, potential Wilderness and Wilderness Study Areas.

☒ Emergency Situation

☒ No Alternative Exists

☒ Personal Health or Safety

☐ Other: _____

E. Wilderness Character

Will the project results help to preserve one or more of the qualities of wilderness character including: untrammeled, undeveloped, natural, outstanding opportunities for solitude or a primitive and unconfined type of recreation, or cultural resources?

Explain how taking acting on this proposal will help preserve wilderness character. If there is no clear benefit to a particular quality, explain how the proposed action may impair that quality and if there are any tradeoffs (like using short-term trammeling to improve long-term naturalness). Please only mark 'Not Applicable' if there are no direct or indirect impacts.

Untrammeled – free from modern human control or manipulation, where nature is allowed to “run free”

Yes: ☐ No: ☒ Not Applicable: ☐

Explain: Fire management activities require modern human manipulation on the landscape and would, therefore, impair the untrammeled quality of the Marjory Stoneman Douglas Wilderness. The short-term effects from trammeling of the Wilderness through fire management increase the long term naturalness of the area.

Undeveloped – retains primeval character and influence, essentially without permanent improvement or human occupation, contrasts with areas where humans and their work dominate the landscape

Yes: ☐ No: ☒ Not Applicable: ☐

Explain: Fire management activities utilize motorized vehicles and equipment, and potential plot installations which would impair the undeveloped quality of the Marjory Stoneman Douglas Wilderness in the short term. These activities increase the long term natural quality of the Wilderness by applying fire management activities in fire adapted areas and protecting fire sensitive natural resources.

Natural – substantially free from the effects of modern civilization, changed by natural occurrences

Yes: ☒ No: ☐ Not Applicable: ☐

Explain: Fire management activities improve the natural quality of the Marjory Stoneman Douglas wilderness by introducing fire as a natural ecological process to the landscape. Fire as a natural disturbance has been hindered by the surrounding urban and agricultural developments of south Florida. Monitoring activities and fuels management support the implementation of fire as a natural ecological process and allow managers to use fire to enhance and maintain the natural quality of the Wilderness.

Outstanding opportunities for solitude or a primitive and unconfined type of recreation – provides opportunities for people to encounter experiences such as natural sights and sounds, solitude, freedom, risk, and the physical and emotional challenges of self-discovery and self-reliance

Yes: ☒ No: ☐ Not Applicable: ☐

Explain: Fire management activities may impact this quality temporarily during the active fire management operations. The short-term effects through fire management increase the long term naturalness of the area.

Cultural – preserves significant artifacts of prior lifestyles, traditions, or historic events

Yes: ☒ No: ☐ Not Applicable: ☐

Explain: Fire management activities are designed to protect cultural resource values within Wilderness and are expected to have little to no negative impact on cultural resources. Through fire management activities, sites of historical or cultural significance may be protected from the effects of unwanted fire spread.

F. Describe Effects to the Public Purposes of Wilderness

Will the project results help to support one or more of the other public purposes for wilderness (as stated in Section 4(b) of the Wilderness Act) of recreation, scenic, education, conservation, and historical use?

Identify which, if any of the public purposes will be impacted if the proposed project is approved. As in Section E, positive AND negative impacts should be described if present.

Recreation – opportunities to practice primitive, outdoor recreation without interference of modern amenities

Yes: ☒ No: ☐ Not Applicable: ☐

Explain: Fire management activities reduce hazardous fuel accumulation and therefore improve visitor safety.

Scenic – opportunities for spectacular landscape-scale views free from modern alterations

Yes: ☐ No: ☐ Not Applicable: ☒

Explain:

Education – opportunities for immersion in biological, ecological, or other educational themes

Yes: ☒ No: ☐ Not Applicable: ☐

Explain: Fire management activities provide opportunities to gather information about fire effects and fire ecology and contribute to management of Wilderness.

Conservation – opportunities to protect habitat beneficial to the survival of an organism of special interest

Yes: ☒ **No:** ☐ **Not Applicable:** ☐

Explain: Fire management activities restore and maintain globally imperiled habitats and the species that depend upon them. Fire management activities may also protect rare and federally listed species from unwanted effects from fire.

Historic– opportunities to practice historically iconic uses or applications no longer available elsewhere

Yes: ☐ **No:** ☐ **Not Applicable:** ☒

Explain:

Please feel free to provide any additional information that may be relevant at this point in the decision process:

Step 1 Decision: Is the proposed project necessary in wilderness?
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At this step, the Wilderness Committee will use the information you've provided to determine the appropriateness of this project within the Marjory Stoneman Douglas Wilderness. Please continue to complete Step 2, determining the minimum activity.

Step 2: Determine the minimum activity.

Description of Alternatives

For each alternative, describe what methods and techniques will be used, when the activity will take place, where the activity will take place, what mitigation measures are necessary, and the general effects to the Wilderness resource and character.

Please provide at least four alternate methods for conducting this project in Wilderness. Include a “No Action” alternative to allow for a comprehensive comparison of effects. The second alternative should describe your ideal methods for the proposed action. This alternative is to be written as if the land were not designated Wilderness and therefore without legal restrictions. The third, a Wilderness compliant alternative, should not include any prohibited uses and should describe how the proposal would be completed in more primitive times. Lastly, the fourth alternative, the preferred alternative, should be a compromise between the second and third alternatives. Complete a form for each alternative being considered. Be sure to include how the impacts can be mitigated by: employee training; location of work areas, campsites, and travel routes; project timing; temporary closures; or other actions.

Alternative Comparison Criteria

The following are descriptions of the criteria that will be compared between the alternatives.

Wilderness Character – the following five, previously discussed criteria represent wilderness character as described in The Wilderness Act of 1964

Untrammeled – Discuss the degree to which the components or processes of ecological systems are intentionally controlled or manipulated.

Undeveloped – Identify how “the imprint of man’s work will remain substantially unnoticeable.” Include the effects of the use of any motorized equipment, mechanical transport, structures, or installations on maintaining this quality of wilderness character.

Natural – Describe the potential for protection, impairment, or restoration of natural conditions including endangered, threatened, or rare species, natural biological diversity, and self-regulating ecosystems.

Outstanding opportunities for solicitude or primitive and unconfined type of recreation – Describe effects that will be noticeable to visitors and that could affect their experience in Wilderness. Include effects on visitors from the use of motorized equipment, mechanical transport, landing of aircraft, structures, or installations.

Cultural resources – Describe any effects on protection or management of historic or pre-historic artifacts, sites, structures, or landscapes.

Maintaining Traditional Skills – Explain how the alternative helps maintain proficiency in the use of primitive and traditional skills, non-motorized tools, and non-mechanical travel methods.

Economic and Time Constraints – Describe the costs and the amount of time it will take for implementation of the alternative.

Note: While activities should be accomplished with economic efficiency, neither the cost nor the time required for implementation are overriding factors for use of otherwise prohibited activities.

Safety of Visitors, Personnel, or Contractors – Describe any safety concerns associated with implementing the alternative on visitors, agency personnel, volunteers, and/or contractors. Identify which hazards can and cannot be mitigated. Mitigation might be achieved through providing information to the public; or training, the use of protective equipment, or other requirements for workers. Identify any potential public safety hazards resulting from implementation of the alternatives.

ALTERNATIVE # 1 – NO ACTION

Description:

Under this alternative no fire management actions would be taken. This is not a possible alternative due to the requirements to protect life, property and values at risk from the impacts of unwanted fire.

Effects:

Wilderness Character

Untrammeled: Under this alternative naturally occurring fires would spread unimpeded which would have no effect on the untrammeled quality of the Wilderness, however human ignited fires that spread through the Wilderness would impact the untrammeled quality through human manipulation of the fire regime.

Undeveloped: Under this alternative no actions would occur therefore there would be no equipment to alter the undeveloped quality of the Wilderness.

Natural: Under this alternative fires would spread across the landscape, however due to the unnatural fragmentation of the landscape through development and water delivery, unnatural fuel accumulation would exist and fires would have unnatural effects impairing the natural quality of the Wilderness, unnaturally affecting both the fire adapted and fire sensitive ecosystems in the Wilderness.

Outstanding opportunities for solitude or primitive and unconfined type of recreation: Under this alternative visitors would not be impacted by vehicles and equipment used in fire management operations including prescribed fire and fuels management and monitoring activities. The potential for closures and the duration of closures may increase due to the increased risk of large scale unwanted fires in the Wilderness.

Cultural resources: Under this alternative fires would spread across the landscape creating increased risk to cultural resources surrounded by unnaturally high fuel loads. The potential exists for fires to be more severe, consuming soils in hammocks, tree islands and other areas in the Park and unearthing and damaging cultural resource artifacts.

Maintaining Traditional Skills: N/A

Economic and Time Constraints: Since there are no actions being taken there are no economic or time constraints

Safety of Visitors, Personnel, or Contractors: This alternative puts life, property, Park values and surrounding communities at risk from impacts of wildland fire.

ALTERNATIVE # 2 – DESCRIPTION OF IDEAL METHODS, IF NOT IN WILDERNESS

Description:

Under this alternative, mechanized vehicles (trucks, fire engines, ATVs, UTVs and passenger vehicles), Rotor wing aircraft landings in both unimproved and created improved helispots, specialized vehicles (e.g. bombardiers, rollagons, gyrotracks, marshmasters), and mechanized equipment and tools would be permitted throughout FMU 3 to conduct prescribed and fuels management operations and monitoring activities. For each fire management activity, Minimum Impact Suppression Tactics will be adhered to as described in the FMP.

The proposed actions of this alternative will maximize the efficiency of Fire Management activities, while minimizing the relative risk associated with frequent intense lightning activity, high heat indexes and provide a safe and effective means of transport and escape during prescribed and fuels management operations and monitoring activities.

Fire management activities can occur throughout the year, depending on field conditions and available personnel. Unplanned ignitions requiring response operations can occur at any time of year. Prescribed fire treatment activities occur when environmental conditions and other prescription parameters are met. Prescribed fire treatment preparations fuels management and monitoring activities will occur as needed throughout the year.

Fire management activities occur in all fire adapted ecosystems and in areas adjacent to fire sensitive ecosystems to protect life, property and natural and cultural values at risk and to restore and maintain ecosystem health.

Methods and Techniques

Mechanized Vehicles: Mechanized vehicles (fire engines, ATVs, UTVs and passenger vehicles) may be used to transport personnel and equipment during prescribed and fuels management operations, monitoring activities, and other fire management operations such as required training exercises. During prescribed fire and unplanned ignition response operations, fire engines, ATVs and UTVs may be used for ignition and holding operations and protection of values at risk. These vehicles may operate along essential and non-essential wilderness roads within the FMU 3 pine rocklands Wilderness and off road in the prairies in FMU 3.

Helicopter Landings: Helicopters may be used to transport personnel and equipment during prescribed and fuels management operations, monitoring activities, and other fire management operations such as required training exercises. Helicopters may land in unimproved Helispots or improved helispots which may be created using mechanized equipment and/or primitive hand tools. These landings / improved helispot creations may occur within the pine rocklands and prairies of FMU 3.

Note: aircraft operations (Single Engine Air Tanker and helicopter) which do not including landings may occur during prescribed fire and unplanned ignition response activities for reconnaissance, fire monitoring, water drops and/or aerial ignitions (helicopter only) which utilizes a Plastic Sphere Dispenser (PLDO) machine, which injects plastic spheres containing potassium permanganate with glycol to ignite fuels on the ground.

Specialized Vehicles (Rubber Tire/Track): Bombardiers, marsh masters (tracked fire engines) and Rolligons (rubber balloon tired fire engines) may be used to transport personnel and equipment and/or ignition and holding operations during prescribed and fuels management operations, monitoring activities, and other fire management operations such as required training exercises. These vehicles may be used off road to create fire breaks in areas with continuous fuel during prescribed fire and

unplanned ignition response operations. These vehicles will be used to access areas off road and in areas which are impassable for regular wheeled fire engines. These vehicles may operate off road in the prairies in FMU 3 Wilderness.

Motorized Equipment/ Tools: Weed eaters, chainsaws and mowers may be used during prescribed fire and unplanned ignition response operations to create temporary fire containment lines to hold prescribed fire within designated perimeters and protect values at risk. Pumps may be used to provide a pressurized water source during fire operations. Battery operated power tools, such as drills, may be used in monitoring operations to install new permanent monitoring plots where required.

Effects:

Wilderness Character

Untrammeled: *Fire is an ecological process that will be controlled and manipulated by fire managers under this alternative. The implementation of prescribed fire and the suppression of naturally ignited fires affect the untrammeled quality of the Wilderness. Under this alternative the trammeling of fire management actions (which serve to reduce hazardous fuel levels in the Park and around values at risk) will create opportunities to safely and effectively manage naturally occurring wildfires without suppression action. In these cases the untrammeled quality will not be affected due to the efforts of previous fire management actions.*

Undeveloped: *The actual implementation of fire on the ground would leave little imprint as a man-made effect since fire is a natural process for the ecosystems in question. The creation and maintenance of improved helispots created with motorized equipment and/or hand tools would leave noticeable areas of alteration and imprints of development in the Wilderness. Trails and fire breaks created by using motorized equipment will recover quickly with rapid vegetation regrowth leaving a very short term imprint. The substrate would remain intact allowing for faster recovery and a shorter-term developed imprint in the Wilderness. Trails and fire breaks created by using specialized motorized vehicles and airboats would occur throughout the Wilderness areas and will leave an imprint until the area recovers. This will be a short term imprint, but longer lasting than that created with motorized equipment. The presence of equipment, helicopters, vehicles in the Wilderness will temporarily affect the undeveloped quality, however for those that do not leave a imprint after they are gone the effects will only last as long as the equipment and vehicles are present in the area. Rebar installed for fire effects monitoring plots may be considered as a man-made structure, but they are of small diameter and difficult to detect through casual observation.*

Natural: *Fire management activities described in this alternative enhance the natural quality of the Wilderness through the maintenance and management of natural processes of fire. Restoration and maintenance of natural communities and protection of flora, fauna, and natural habitats at risk from unwanted fire impacts maintains fire-adapted vegetation communities and biological diversity improving the natural quality of the Wilderness. Monitoring activities and fuels management support the implementation of fire as a natural ecological process and allow managers to use fire to enhance and maintain the natural quality of the Wilderness.*

Outstanding opportunities for solitude or primitive and unconfined type of recreation: *Opportunities for solitude or primitive and unconfined type of recreation should be relatively unimpaired, except on a very short-term basis. During prescribed fire operations and unplanned wildfires, for safety reasons visitors may be excluded from certain areas within the Wilderness until the fire is officially declared out. Other fire management activities, such as treatment preparation, monitoring and reconnaissance may require the use of motorized vehicles, and equipment, which may disturb this Wilderness quality in the short-term, which will last only as long as the equipment is present in the area.*

Cultural resources: *The use of prescribed fire treatments and management actions taken of unplanned ignitions protect cultural resource values within the Wilderness. Prescribed fire operations reduce the amount of hazardous fuel accumulations around cultural values at risk and suppression actions prevent unwanted impacts from further fire spread. The use of motorized equipment mitigates ground disturbance that has the potential to unearth and damage cultural resource artifacts in the Wilderness. The use of prescribed fire maintains the ethnographic landscapes in the Wilderness and monitoring activities provide knowledge of resources used in planning and decision making regarding the protection of these resources.*

Maintaining Traditional Skills: N/A

Economic and Time Constraints: This alternative would not be more cost effective than other alternatives; however it would allow fire managers to accomplish the required tasks safely and effectively.

Safety of Visitors, Personnel, or Contractors: This alternative affords the greatest level of safety for fire fighters working on the ground as well as protection of life, property and Park values and surrounding communities however diminishes the Wilderness character through actions used to accomplish the task.

ALTERNATIVE # 3 – DESCRIPTION OF WILDERNESS COMPLIANT METHODS, NO PROHIBITED USES

Description:

Under this alternative, mechanized vehicles (trucks, fire engines, ATVs, UTVs and passenger vehicles) would be restricted to non-wilderness roads in FMU 3 to conduct prescribed fire and fuels management operations, and monitoring activities. Only primitive hand tools would be authorized for prescribed fire and fuels management operations. Motorized tools would be prohibited within FMU 3 Wilderness. Fire management activities will be restricted to those areas of FMU 3 that can be accessed by non-Wilderness roads and can be safely managed with only primitive hand tools. Additionally Minimum Impact Suppression Tactics will be adhered to as described in the FMP.

The proposed actions of this alternative will greatly reduce the acreage of Wilderness that can be safely and effectively treated with prescribed fire or monitored for fire effects due to the fact that it is impossible to access and safely carry out operations without motorized vehicles and equipment. Due to the continuous nature of fuels, it will be impossible to treat many areas with prescribed fire where un-treated areas exist that must be protected and maintained adjacent to treatment areas in FMU 3 Wilderness. Primitive hand tools, including digging and cutting tools, are known to be ineffective at creating fire breaks due to the presence of a mixture of tall grass, sedges, woody plants, fuels in solution holes, uneven terrain and rock substrate. Weed eaters provide the precision and versatility necessary to create effective fire breaks, the width of which need to be 1.5x the expected flame lengths. The frequent intense lightning activity, high heat indexes and limitations of vehicle use for safe and effective means of escape and transport during prescribed and fuels management operations, monitoring activities will increase risk to fire personnel and prevent management actions from taking place. These restrictions will increase the risk to life, property and natural and cultural values and increase risk to firefighters working on the ground. The restoration and maintenance of fire adapted ecosystems will be affected by limiting the amount of prescribed fire and monitoring activities that can safely occur. The number of fire effects plots that can be monitored in FMU 3 will be greatly reduced. Due to the reduction of acres that can be treated with prescribed fire under this alternative, the frequency and intensity of unplanned ignitions and unwanted fire effects would likely increase, creating incidents where the onsite fire manager is forced to authorize vehicles and equipment to protect life, property and values at risk and safely manage the situation. The impacts of this alternative have the potential to negatively impact Wilderness character to a greater degree by affecting the natural quality of the Wilderness and creating situations where the use of specialized vehicles is increased and the undeveloped quality of the Wilderness is affected. Additionally, this alternative will limit the ability of the fire management program to adhere to guidelines set forth in NPS management policies 2006 and Directors Order #18 by compromising the ability to proactively protect life and property within and adjacent to the Park and natural and cultural resource values at risk and manage a prescribed fire and fire effects monitoring program in fire adapted areas of the Park.

Fire management activities can occur throughout the year, depending on field conditions and available personnel. Unplanned ignitions requiring response operations can occur at any time of year. Prescribed fire treatment activities occur when environmental conditions and other prescription parameters are met. Prescribed fire treatment preparations fuels management and monitoring activities will occur as needed throughout the year.

Fire management activities occur in all fire adapted ecosystems and in areas adjacent to fire sensitive ecosystems to protect life, property and natural and cultural values at risk and to restore and maintain ecosystem health.

Effects:

Wilderness Character

Untrammelled: *Fire is an ecological process that will be controlled and manipulated by fire managers under this alternative. The implementation of prescribed fire and the suppression of naturally ignited fires affect the untrammelled quality of the Wilderness by controlling fire within the area. Under this alternative the use of prescribed fire is severely limited lessening the effect upon the trammelled quality, however preventing the likelihood of monitoring naturally occurring fires with no suppression action due to the risks of fire burning in accumulated fuel loads. This alternative may increase trammeling related to fire suppression actions in unplanned ignition response where a situation is created in which onsite fire managers are required to implement techniques to protect life, property and values at risk and safely manage the situation.*

Undeveloped: *Under this alternative the undeveloped quality of the Wilderness would only be affected by use of vehicles and equipment adjacent to Wilderness and activities within Wilderness are not expected to impact this quality. As a result of the decrease in prescribed fire activities, this alternative may increase adverse effects to the undeveloped quality of the Wilderness related to fire suppression actions in unplanned ignition response where a situation is created in which onsite fire managers are required to implement techniques to protect life, property and values at risk and safely manage the situation.*

Natural: *As a result of the limited fire management activities permitted under this alternative, the natural quality of the Wilderness would be affected by unplanned fires on the landscape. Fire adapted areas will be impacted by the lack of fire and fire sensitive areas will experience increased risk resulting from unnatural fuel accumulations and unplanned ignitions. Unplanned fires would have unnatural effects impairing the natural quality of the Wilderness affecting unnaturally both the fire adapted and fire sensitive ecosystems in the Wilderness. Monitoring activities and fuels management support the implementation of fire as a natural ecological process and allow managers to use fire to enhance and maintain the natural quality of the Wilderness.*

Outstanding opportunities for solitude or primitive and unconfined type of recreation: *Under this alternative, opportunities for solitude or primitive and unconfined type of recreation should be relatively unimpaired, except on a very short-term basis due to the limitations on prescribed fire management activities. Impacts under this alternative would be short-term. Under this alternative visitors would not be impacted by vehicles and equipment used in fire management operations. The potential for closures and the duration of closures may increase due to the increased risk of large scale unwanted fires in the Wilderness.*

Cultural resources: *Under this alternative cultural resource values would be protected during response to unplanned ignitions, however the use of prescribed fire to pro-actively reduce hazardous fuel loading around cultural resources would be limited. The amount of ground disturbance activities would increase that have the potential to unearth and damage cultural resource artifacts in the Wilderness.*

Maintaining Traditional Skills: N/A

Economic and Time Constraints: This alternative would be more cost effective than other alternatives. However this alternative increases the likelihood of large scale, expensive fires that would require management over longer periods of time.

Safety of Visitors, Personnel, or Contractors: Under this alternative many prescribed fire and monitoring activities would not occur due to the risk and safety issues as a result of having fire fighters on the ground without certain tools and equipment. There is less reduction in hazardous fuel

loading which in turn may increase risk to life, property and Park values and surrounding communities.

ALTERNATIVE # 4 – PREFERRED ALTERNATIVE

Fire Management Unit 3
Wilderness

Description:

Under this alternative, mechanized vehicles (trucks, fire engines, ATVs, UTVs and passenger vehicles), and motorized equipment and tools would be permitted in FMU 3 Wilderness to conduct prescribed fire, fuels management and fire management monitoring operations. Additionally Minimum Impact Suppression Tactics will be adhered to as described in the FMP.

The proposed actions of this alternative will maintain Wilderness character to the maximum degree practicable while maintaining a safe working environment for firefighters on the ground, minimizing the relative risk associated with fire operations, lightning activity, high heat indexes and provide a safe and effective means of transport and escape during the prescribed fire, fuels management and fire management monitoring operations while protecting values at risk.

Prescribed Fire and Fuels Management Activities:

Proposed methods and techniques:

- Mechanized Vehicles (Engines, Passenger Vehicles, ATV, UTV)
 - Mechanized vehicles (Engines, Passenger Vehicles, ATV, UTV) will be used to transport personnel and equipment, conduct ignition and holding operations and protect specific values at risk during prescribed fire and fuels management operations. Values to be protected include hammocks, camps, hydro stations, and natural and cultural resource values identified by SFNRC and the Cultural resource branch.
- Motorized equipment (weed eaters, portable pumps, chainsaws)
 - Weed eaters may be used to create safety zones and defensible space and reduce fuel loading around values to be protected (hammocks, camps, hydro stations, and natural and cultural resource values identified by SFNRC and the Cultural resource branch).
 - Weed eaters may be used to create fire containment lines to contain fire spread in areas where natural existing fire breaks do not exist, break up larger units into smaller treatment areas and prevent spread of fire into non-treatment areas.
 - Portable pumps may be used to provide pressurized water delivery in support of prescribed fire operations along holding lines and around values to be protected during prescribed fire operations.
 - Motorized equipment (chainsaws) may be used to fall trees that present a hazard to firefighter safety during prescribed fire operations or may carry fire across a fire break.
- Note: Aircraft operations (Single Engine Air Tanker and helicopter) which do not including landings may occur during prescribed fire and unplanned ignition response activities for reconnaissance, fire monitoring, water drops and/or aerial ignitions (helicopter only) which utilizes a Plastic Sphere Dispenser (PLDO) machine, which injects plastic spheres containing potassium permanganate with glycol to ignite fuels on the ground.

When:

- Prescribed fire and fuels management activities may occur throughout the year.
- Prescribed fire treatments will occur when environmental conditions are within approved prescription parameters.

- Specific prescribed fire project implementation schedules can be found in the Fire Management Plan (FMP) Multi Year Fuels Plan.
- Mechanized Vehicles (ATV, UTV) will be used off road when substrate conditions are dry enough to avoid causing ruts or getting stuck.

Where:

- Prescribed fire and fuels management activities may occur throughout FMU 3.
- Specific project unit location maps can be found in the FMP Multi Year Fuels Plan.
- Mechanized Vehicles
 - Engines, Passenger Vehicles, ATVs and UTVs may operate along essential and non-essential wilderness roads within the pine rocklands of FMU 3.
 - ATVs and UTVs may operate off-road along fire containment lines in the prairies of FMU 3.
 - On rare occasions ATVs and UTVs may operate off-road within the interior of a burn unit to protect special values identified by SFNRC or Cultural Resources staff.
- Motorized equipment
 - Weed eaters may be used adjacent to and surrounding values to be protected (hammocks, hydro stations, and natural and cultural resource values identified by SFNRC and the Cultural resource branch).
 - The known values at risk currently located within flammable vegetation are 1 Cape Sable Seaside Sparrow subpopulation and 5 hydrostations.
 - Estimated 0-6 weedeater uses in Wilderness/year to protect known values located within flammable vegetation.
 - Weed eaters may be used in all project units in FMU 3 where units need to be broken into smaller burn areas to reduce risk and prevent fire spread into unwanted areas and where natural and/or manmade barriers cannot be utilized as fire break containment lines.
 - Estimated 0- 6 miles of fire break containment lines/year in FMU 3.
 - Exact length and location of fire break containment lines cannot be determined at this time due to the fact that until the final planning stages, closer to the time of implementation, the status and effectiveness of intermittent natural fire breaks, the amount of fuel loading (height and continuity), water levels, weather conditions, effective escape routes and safety zones needed to determine length and location are unknown.
 - Estimated 2-24' fire break width based on 1-16' flame lengths. (Effective fire break size is 1.5 x the predicted flame lengths. Flame length will depend on fuel loading and expected weather conditions, estimated flame lengths from 2008-2012 prescribed fire burn plan).
 - Additional weedeater uses in Wilderness may be necessary to protect as yet unidentified natural and cultural resource values and to create habitat refugia for species of special concern. It cannot be determined at this time the number of weedeater uses required due to the fact that the number and location of resources and refugia areas are not currently identified.
 - Portable pumps may be used in all project units in FMU 3 to provide pressurized water delivery in support of prescribed fire operations, along holding lines and around values to be protected.
 - Chainsaws will be used along the essential and non-essential wilderness roads in the pine rocklands of FMU 3 when a tree presents a safety hazard and/or may carry fire across a fire break and cannot be removed manually.

Mitigations:

- The use of helicopter landings and specialized vehicles is not being requested at this time. Should the need for either prohibited use arise, Fire Management will return to the Wilderness Committee with a project-specific MRDG to request additional prohibited uses in FMU 3 Wilderness.
- Motorized equipment is limited to weed eaters, portable pumps and chainsaws.

- Fire breaks for protection of values are limited in size to the area required for successful fuels reduction and protection from unwanted fire spread and effects on the values to be protected.
- Natural and/or existing fire breaks will be used whenever possible.
- ATV, UTV off road travel is restricted to travel along fire breaks within the burn unit, except in rare cases to protect special values at risk identified by SFNRC or Cultural Resources staff.
- Chainsaws will be used to remove logs that may carry fire across a fire break only when the logs cannot be removed manually.

Rational for use:

- Mechanized Vehicles
 - Engines, ATVs and UTVs enable firefighters to patrol greater distances along the line, respond to spot fires more efficiently and safely and provide water sources.
 - Engine, ATV and UTV water sources are necessary to slow and stop fire spread safely and more efficiently than hand tool use alone and in many cases without water, fire spread cannot be stopped.
- Motorized equipment
 - Weedeaters are the necessary equipment to create effective fire breaks to contain fire spread in areas where natural existing fire breaks do not exist, break up larger units into smaller treatment areas and prevent spread of fire into non-treatment areas and protect values at risk.
 - Primitive hand tools, including digging and cutting tools, are known to be ineffective at creating fire breaks due to the presence of a mixture of tall grass, sedges, woody plants, fuels in solution holes and uneven terrain. Weedeaters provide the precision and versatility necessary to create effective fire breaks, the width of which need to be 1.5x the expected flame lengths (potential range 1-16ft flame lengths).
 - Portable pumps are necessary for firefighters to have access to pressurized water sources during prescribed fire operations where it is impossible for engines and additional water delivery equipment to reach. A pressurized water source is necessary to slow and stop fire spread safely and more efficiently than hand tool use alone and in many cases without water, fire spread cannot be stopped.
 - Chainsaws are required to safely remove trees that present a hazard to firefighters or may carry fire across fire breaks.

Fire Management Monitoring Activities:

Proposed methods and techniques:

- Mechanized Vehicles (Passenger vehicles, UTV)
 - Mechanized vehicles (passenger vehicles, UTV) will be used to transport personnel and equipment during fire management monitoring activities.
- Motorized equipment (rock drill)
 - A rock drill may be used to install rebar plot markers where additional fire effects plot installation is required.
- Rebar installation
 - Rebar installation may occur to mark locations of new fire effects monitoring plots where additional fire effects plot installation is required.
- Additional plot installations may be required in the pine rocklands to further study the effects of fire on specific plant and animal species of concern and in the cypress/prairie areas of the Park.

When:

- Fire management monitoring activities may occur throughout the year with the bulk of field work being completed January - June.

Where:

- Monitoring activities may occur in all project units in FMU 3.
- Maps of established fire effects plots can be found in the FMP.
- Mechanized Vehicles

- Engines, Passenger Vehicles, ATVs and UTVs may operate along essential wilderness roads within the pine rocklands of FMU 3.
- Estimated 5-25 Wilderness incursions/year for additional monitoring.
- Estimated 18 (with a range 10-25) of incursions/year for established plot monitoring based on fuels plan.
- Motorized Equipment
 - Rock drill use in plot installation is not scheduled in FMU 3 however additional plot installations may be required in the Pine Blocks of FMU 3 to further study the effects of fire on specific plant and animal species of concern and in the Pineland/Prairie project units to study the effects of fire in the cypress/prairie areas of FMU 3.
 - Estimated 5 to 30 additional fire effects monitoring plots consisting of 2-8 rebar/plot. Plot design: 30-50m belt transects, using 2 rebar, with a rebar on each end of the transect or 30x50m rectangular plots using 8 rebar marking the corners and middle points.
- Rebar installation
 - Rebar plot marker installation is not scheduled in FMU 3 however additional plot installations may be required in the Pine Blocks of FMU 3 to further study the effects of fire on specific plant and animal species of concern and in the Pineland/Prairie project units of FMU 3 to study the effects of fire in the cypress/prairie areas of the Park.
 - Estimated 5 to 30 additional fire effects monitoring plots consisting of 2-8 rebar/plot. Plot design: 30-50m belt transects, using 2 rebar, with a rebar on each end of the transect or 20x50m rectangular plots using 8 rebar marking the corners and middle points.

Mitigations:

- Helicopter landings are prohibited.
- Specialized Vehicles are prohibited.
- Existing plots will be considered for use prior to determining that additional rebar plot markers are required.
- Prior to plot installation, number of plots, coordinates and plot design will be presented to the wilderness committee.
- Motorized equipment is limited to rock drill for plot installation.
- Mechanized vehicles are restricted to essential wilderness roads
- Hand hammering of rebar will be tried prior to using the rock drill. The rock drill will not be used if hand hammering rebar is successful.

Rational for use:

- Mechanized Vehicles
 - Due to the hazardous terrain and environmental conditions (lightning etc.) hiking to all FMH from non-wilderness roads is prohibitive. See map for plots requiring wilderness incursion access.
- Motorized equipment
 - Rock drills are required to effectively install rebar plot markers due to the rock substrate.
- Rebar installation
 - In order to collect needed fire effects data, additional plots may be installed if existing plots do not provide the necessary information
 - Rebar is required to ensure repeatability of plot measurements and ensure collection of high quality data.

Effects:

Wilderness Character

Untrammeled: *Fire is an ecological process that will be controlled and manipulated by fire managers under this alternative. The implementation of prescribed fire and the suppression of naturally ignited fires affect the untrammeled quality of the Wilderness. Under this alternative the trammeling of fire management actions (which serve to reduce hazardous fuel levels in the Park and around values at risk) will create opportunities to safely and effectively manage naturally occurring wildfire without suppression action. In these cases the untrammeled quality will not be affected due to the efforts of previous fire management actions.*

Undeveloped: *The actual implementation of fire on the ground would leave little imprint as a man-made effect since fire is a natural process for the ecosystems in question. Trails and fire breaks created by using motorized equipment will recover quickly with rapid vegetation regrowth, leaving a very short term imprint. The substrate would remain intact allowing for faster recovery and a shorter-term developed imprint in the Wilderness. Trails and fire breaks created by using specialized motorized vehicles and airboats would occur throughout the Wilderness areas and will leave an imprint until the area recovers. This will be a short term imprint, but longer lasting than that created with motorized equipment. In this alternative the type of vehicle, areas in which they are used and options for use are limited, which limits the amount of trails created and areas where the undeveloped quality is affected. The presence of equipment, helicopters, vehicles and airboats in the Wilderness will temporarily affect the undeveloped quality, however for those that do not leave a imprint after they are gone the effects will only last as long as the equipment and vehicles are present in the area. Rebar installed for fire effects monitoring plots may be considered as a man-made structure, but they are of small diameter and difficult to detect through casual observation.*

Natural: *Fire management activities described in this alternative enhance the natural quality of the Wilderness through the maintenance and management of natural processes of fire. Restoration and maintenance of natural communities and protection of flora, fauna, and natural habitats at risk from unwanted fire impacts maintains fire-adapted vegetation communities and biological diversity, improving the natural quality of the Wilderness.*

Outstanding opportunities for solitude or primitive and unconfined type of recreation: *Opportunities for solitude or primitive and unconfined type of recreation should be relatively unimpaired, except on a very short-term basis. During prescribed fire operations and unplanned wildfires, for safety reasons visitors may be excluded from certain areas within the Wilderness until the fire is officially declared out. Other fire management activities, such as treatment preparation, fire effects monitoring and reconnaissance may require the use of motorized vehicles, aircraft, airboats and equipment, which may disturb this Wilderness quality in the short-term, which will last only as long as the equipment is present in the area.*

Cultural resources: *The use of prescribed fire treatments and management actions taken on unplanned ignitions protect cultural resource values within the Wilderness. Prescribed fire operations reduce the amount of hazardous fuel accumulations around cultural values at risk and suppression actions prevent unwanted impacts from further fire spread. The use of motorized equipment mitigates ground disturbance that has the potential to unearth and damage cultural resource artifacts in the Wilderness. The use of prescribed fire maintains the ethnographic landscapes in the Wilderness and monitoring activities provide knowledge of resources used in planning and decision making regarding the protection of these resources.*

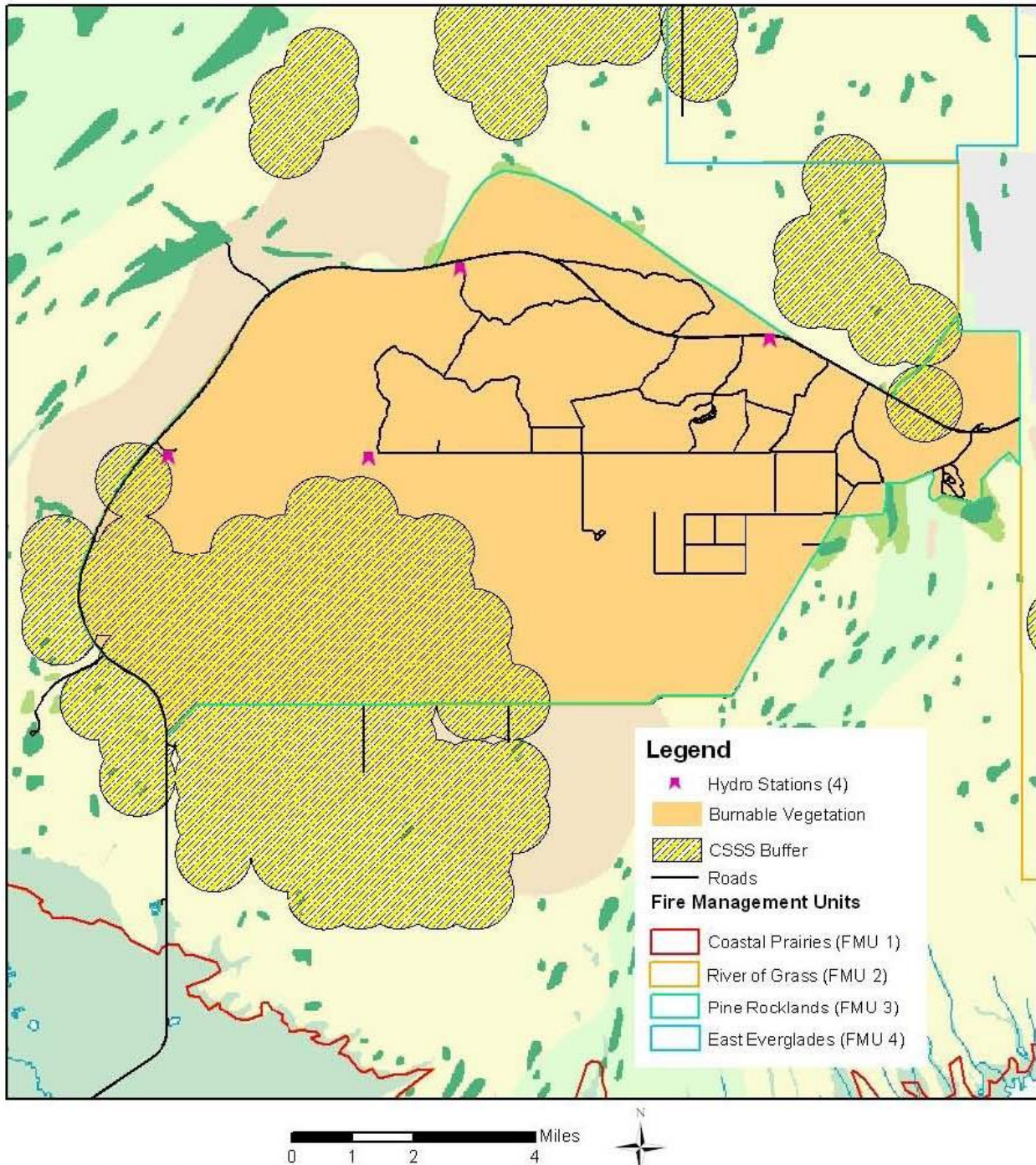
Maintaining Traditional Skills: N/A

Economic and Time Constraints: *The preferred alternative would not be more cost effective than other alternatives; however it would allow fire managers to accomplish the required tasks safely and effectively.*

Safety of Visitors, Personnel, or Contractors: This alternative affords the greatest level of safety for fire fighters working on the ground as well as protection of life, property and Park values and surrounding communities while maintaining the Wilderness character to the greatest degree possible while accomplishing the task.



FMU3 Values at Risk within Wilderness Burnable Area



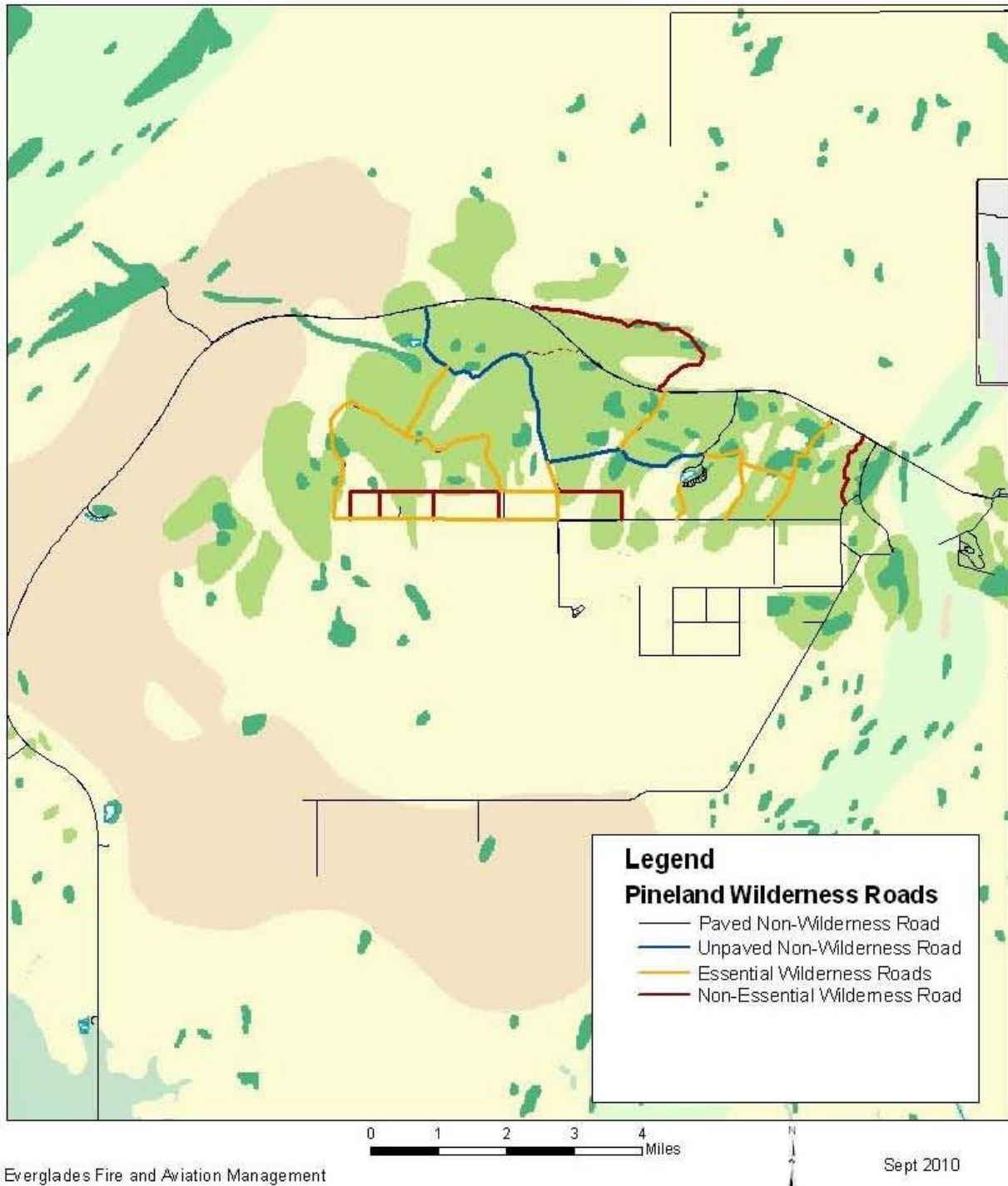
Map Created By: Everglades National Park Fire & Aviation

Location: M:\GIS\Fire\Products\Min_tool\FMU3_min_tool

December 2010



FMU 3 Wilderness Roads





MINIMUM REQUIREMENTS DECISION GUIDE

WORKSHEETS

Everglades Fire Management Plan (FMP) 2011

Hole in the Donut (HID) Potential Wilderness

“ . . . except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act...”

– the Wilderness Act, 1964

These worksheets serve as a guide during the planning process to projects within Wilderness. They will expedite the review process if properly completed and provide insight into how the Wilderness Committee at Everglades National Park approaches each individual proposal. It is to be completed and submitted at least one week prior to meeting with the Wilderness Committee along with certificates of completion from the Arthur Carhart Wilderness Training Center online courses, “The Wilderness Act of 1964” and “Minimum Requirements Analysis.” Completing the online courses prior to completing these worksheets is recommended.

Step 1: Summarize the research proposal.

<p>Description: Briefly describe the proposed action, goals, anticipated results, and potential benefits. Also note all proposed actions that may be prohibited under Section 4(c) of the Wilderness Act of 1964 (including use of motor vehicles, motorized equipment or motorboats, land of aircraft, mechanical transport, or construction of any structure or installation).</p>

Urban and agricultural development and the presence of exotic plant species have disrupted the natural fire regime in the fire adapted ecosystems of Everglades National Park; park and community infrastructure is at risk from hazardous fuel build up and unwanted fire effects where it occurs within or adjacent to flammable vegetation. Everglades Fire Management has created a Fire Management Plan (FMP) as required by NPS Management Policies 2006 and Directors Order #18. The FMP identifies how wildland fire and related fire management activities will be managed within the Park. The FMP describes goals and objectives of the fire management program and the methods to achieve those goals and objectives and protect values at risk. Fire management activities include prescribed fire planning, preparation and implementation, fuels management, response to unplanned ignitions, environmental, fire and fire effects monitoring and training and preparedness activities for the fire management program.

This worksheet provides the analysis for prescribed fire and fuels management operations and fire management monitoring activities within the Hole in the Donut (HID) in Everglades National Park.

Unplanned ignitions activities in HID Potential Wilderness will operate under the same guidance for prescribed fire and fuels management operations unless the on-site decision maker determines in his/her professional judgment that the conditions require additional emergency response activities. This direction comes from NPS management Policies 2006 Ch 6 Wilderness Management.

The proposed actions that may be prohibited under section 4(c) of the Wilderness Act include use of motorized equipment and transport vehicles, helicopter landings, and rebar plot marker installations.

The activities outlined in the preferred alternative identify those activities that will maintain Wilderness character while providing the necessary resources to safely carry out fire management operations which will provide for the safety of the public, park personnel, infrastructure, surrounding communities, and Park natural, cultural and social resource values and maintain natural fire adapted ecosystems.

Prohibited uses not mentioned in this document will not be used by Fire Management in HID Potential Wilderness. Should the need arise, Fire Management will return to the Wilderness Committee with a project-specific MRDG to request a prohibited use not already mentioned in this document. Additional uses not described in this document may be necessary to conduct prescribed fire fuels management and fire management monitoring operations in the HID. Project specific MRDGs will be presented to the Wilderness Committee to request additional prohibited uses in the HID potential Wilderness.

To help determine if the proposal and its containing prohibited uses can be legally defensible, please answer the questions listed in A - F on the following pages.

A. Describe Options Outside of Wilderness

Are there any potential study areas outside of Wilderness boundaries that could yield similarly significant results? This includes areas within the park not designated as Wilderness.

Yes: ☐ No: ☒

Explain: The Everglades ecosystems that require management, treatment and monitoring occur in potential Wilderness areas. Actions and objectives cannot be accomplished outside of potential Wilderness areas.

B. Describe Valid Existing Rights or Special Provisions of Existing Legislation

Are you aware if the prohibited uses are necessary to satisfy valid existing rights or a special provision in existing legislation (The Wilderness Act of 1964, The Endangered Species Act of 1973, etc...) that allows consideration of the Section 4(c) prohibited uses? Cite law & section.

Yes: ☐ No: ☒ Not Applicable: ☐

Law & Section:

C. Describe Other Guidance

To your knowledge, does the proposal benefit the administration of agency policy, unit and wilderness management plans, species recovery plans, or agreements with tribal, state and local governments or other federal agencies?

Yes: ☒ No: ☐ Not Applicable: ☐

- **Policy or Agency:** NPS Management policies 2006 Section 4.5 Fire Management; Directors Order #18; NPS DO #41 section 5. Fire Management; Federal Wildland Fire Policy and Program Review (2001); Managing the Impact of Wildfires on Communities and the Environment (USDOI/USDA 2000); A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10 Year Implementation Strategy

D. Normally Prohibited Activities

Check of Wilderness Act Section 4(c) prohibited uses you will be seeking the use of:

☒ Mechanical transport

☐ Landing of aircraft

☒ Motorized equipment

☐ Temporary road

☒ Motor vehicles

☐ Structure or installation

☐ Motorboats

Justification: These items are required to safely carry out fire management activities in the Everglades NP Wilderness, potential Wilderness and Wilderness Study Areas.

☒ Emergency Situation

☒ No Alternative Exists

☒ Personal Health or Safety

☐ Other: _____

E. Wilderness Character

Will the project results help to preserve one or more of the qualities of wilderness character including: untrammeled, undeveloped, natural, outstanding opportunities for solitude or a primitive and unconfined type of recreation, or cultural resources?

Explain how taking action on this proposal will help preserve wilderness character. If there is no clear benefit to a particular quality, explain how the proposed action may impair that quality and if there are any tradeoffs (like using short-term trammeling to improve long-term naturalness). Please only mark 'Not Applicable' if there are no direct or indirect impacts.

Untrammeled – free from modern human control or manipulation, where nature is allowed to “run free”

Yes: ☐

No: ☒

Not Applicable: ☐

Explain: Fire management activities require modern human manipulation on the landscape and would, therefore, impair the untrammeled quality of the Marjory Stoneman Douglas Wilderness. The short-term effects from trammeling of the Wilderness through fire management increase the long term naturalness of the area.

Undeveloped – retains primeval character and influence, essentially without permanent improvement or human occupation, contrasts with areas where humans and their work dominate the landscape

Yes: ☐

No: ☒

Not Applicable: ☐

Explain: Fire management activities utilize motorized vehicles and equipment, which would impair the undeveloped quality of the Marjory Stoneman Douglas Wilderness in the short term. These activities increase the long term natural quality of the Wilderness by applying fire management activities in fire adapted areas and protecting fire sensitive natural resources.

Natural – substantially free from the effects of modern civilization, changed by natural occurrences

Yes: ☒

No: ☐

Not Applicable: ☐

Explain: Fire management activities improve the natural quality of the Marjory Stoneman Douglas wilderness by introducing fire as a natural ecological process to the landscape. Fire as a natural disturbance has been hindered by the surrounding urban and agricultural developments of south Florida.

Outstanding opportunities for solitude or a primitive and unconfined type of recreation – provides

opportunities for people to encounter experiences such as natural sights and sounds, solitude, freedom, risk, and the physical and emotional challenges of self-discovery and self-reliance

Yes: ☒ No: ☐ Not Applicable: ☐

Explain: Fire management activities may impact this quality temporarily during the active fire management operations. The short-term effects through fire management increase the long term naturalness of the area.

Cultural – preserves significant artifacts of prior lifestyles, traditions, or historic events

Yes: ☒ No: ☐ Not Applicable: ☐

Explain: Fire management activities are designed to protect cultural resource values within Wilderness and are expected to have little to no negative impact on cultural resources. Through fire management activities, sites of historical or cultural significance may be protected from the effects of unwanted fire spread.

F. Describe Effects to the Public Purposes of Wilderness

Will the project results help to support one or more of the other public purposes for wilderness (as stated in Section 4(b) of the Wilderness Act) of recreation, scenic, education, conservation, and historical use?

Identify which, if any of the public purposes will be impacted if the proposed project is approved. As in Section E, positive AND negative impacts should be described if present.

Recreation – opportunities to practice primitive, outdoor recreation without interference of modern amenities

Yes: ☒ No: ☐ Not Applicable: ☐

Explain: Fire management activities reduce hazardous fuel accumulation and therefore improve visitor safety.

Scenic – opportunities for spectacular landscape-scale views free from modern alterations

Yes: ☐ No: ☐ Not Applicable: ☒

Explain:

Education – opportunities for immersion in biological, ecological, or other educational themes

Yes: ☒ No: ☐ Not Applicable: ☐

Explain: Fire management activities provide opportunities to gather information about fire effects and fire ecology and contribute to management of Wilderness.

Conservation – opportunities to protect habitat beneficial to the survival of an organism of special interest

Yes: ☒ **No:** ☐ **Not Applicable:** ☐

Explain: Fire management activities restore and maintain globally imperiled habitats and the species that depend upon them. Fire management activities may also protect rare and federally listed species from unwanted effects from fire.

Historic– opportunities to practice historically iconic uses or applications no longer available elsewhere

Yes: ☐ **No:** ☐ **Not Applicable:** ☒

Explain:

Please feel free to provide any additional information that may be relevant at this point in the decision process:

Step 1 Decision: <u>Is the proposed project necessary in wilderness?</u>

At this step, the Wilderness Committee will use the information you've provided to determine the appropriateness of this project within the Marjory Stoneman Douglas Wilderness. Please continue to complete Step 2, determining the minimum activity.

Step 2: Determine the minimum activity.

Description of Alternatives

For each alternative, describe what methods and techniques will be used, when the activity will take place, where the activity will take place, what mitigation measures are necessary, and the general effects to the Wilderness resource and character.

Please provide at least four alternate methods for conducting this project in Wilderness. Include a “No Action” alternative to allow for a comprehensive comparison of effects. The second alternative should describe your ideal methods for the proposed action. This alternative is to be written as if the land were not designated Wilderness and therefore without legal restrictions. The third, a Wilderness compliant alternative, should not include any prohibited uses and should describe how the proposal would be completed in more primitive times. Lastly, the fourth alternative, the preferred alternative, should be a compromise between the second and third alternatives. Complete a form for each alternative being considered. Be sure to include how the impacts can be mitigated by: employee training; location of work areas, campsites, and travel routes; project timing; temporary closures; or other actions.

Alternative Comparison Criteria

The following are descriptions of the criteria that will be compared between the alternatives.

Wilderness Character – the following five, previously discussed criteria represent wilderness character as described in The Wilderness Act of 1964

Untrammeled – Discuss the degree to which the components or processes of ecological systems are intentionally controlled or manipulated.

Undeveloped – Identify how “the imprint of man’s work will remain substantially unnoticeable.” Include the effects of the use of any motorized equipment, mechanical transport, structures, or installations on maintaining this quality of wilderness character.

Natural – Describe the potential for protection, impairment, or restoration of natural conditions including endangered, threatened, or rare species, natural biological diversity, and self-regulating ecosystems.

Outstanding opportunities for solicitude or primitive and unconfined type of recreation – Describe effects that will be noticeable to visitors and that could affect their experience in Wilderness. Include effects on visitors from the use of motorized equipment, mechanical transport, landing of aircraft, structures, or installations.

Cultural resources – Describe any effects on protection or management of historic or pre-historic artifacts, sites, structures, or landscapes.

Maintaining Traditional Skills – Explain how the alternative helps maintain proficiency in the use of primitive and traditional skills, non-motorized tools, and non-mechanical travel methods.

Economic and Time Constraints – Describe the costs and the amount of time it will take for implementation of the alternative.

Note: While activities should be accomplished with economic efficiency, neither the cost nor the time required for implementation are overriding factors for use of otherwise prohibited activities.

Safety of Visitors, Personnel, or Contractors – Describe any safety concerns associated with implementing the alternative on visitors, agency personnel, volunteers, and/or contractors. Identify which hazards can and cannot be mitigated. Mitigation might be achieved through providing information to the public; or training, the use of protective equipment, or other requirements for workers. Identify any potential public safety hazards resulting from implementation of the alternatives.

ALTERNATIVE # 1 – NO ACTION

Description:

Under this alternative no fire management actions would be taken. This is not a possible alternative due to the requirements to protect life, property and values at risk from the impacts of unwanted fire.

Effects:

Wilderness Character

Untrammeled: Under this alternative naturally occurring fires would spread unimpeded which would have no effect on the untrammeled quality of the potential Wilderness, however human ignited fires that spread through the potential Wilderness would impact the untrammeled quality through human manipulation of the fire regime.

Undeveloped: Under this alternative no actions would occur therefore there would be no equipment to alter the undeveloped quality of the potential Wilderness.

Natural: Under this alternative fires would spread across the landscape, however due to the unnatural fragmentation of the landscape through development and water delivery, and exotic plant species and the altered nature of the restoration area, unnatural fuel accumulation would exist and fires would have unnatural effects impairing the natural quality of the potential Wilderness, unnaturally affecting both the fire adapted and fire sensitive ecosystems in the potential Wilderness.

Outstanding opportunities for solitude or primitive and unconfined type of recreation: Under this alternative visitors would not be impacted by vehicles and equipment used in fire management operations. The potential for closures and the duration of closures may increase due to the increased risk of large scale unwanted fires in the potential Wilderness.

Cultural resources: Under this alternative fires would spread across the landscape creating increased risk to cultural resources surrounded by unnaturally high fuel loads. The potential exists for fires to be more severe, consuming soils in hammocks, tree islands and other areas in the Park and unearthing and damaging cultural resource artifacts.

Maintaining Traditional Skills: N/A

Economic and Time Constraints: Since there are no actions being taken there are no economic or time constraints

Safety of Visitors, Personnel, or Contractors: This alternative puts life, property, Park values and surrounding communities at risk from impacts of wildland fire.

ALTERNATIVE # 2 – DESCRIPTION OF IDEAL METHODS, IF NOT IN WILDERNESS

Description:

Under this alternative, mechanized vehicles (trucks, fire engines, ATVs, UTVs and passenger vehicles), Rotor wing aircraft landings in both unimproved and created improved helispots, specialized vehicles (e.g. bombardiers, rollagons, gyrotracks, marshmasters), and mechanized equipment and tools would be permitted throughout the HID potential Wilderness to conduct prescribed fire and fuels management operations, fire and fire effects monitoring and unplanned ignition response operations. For each fire management activity, Minimum Impact Suppression Tactics will be adhered to as described in the FMP.

The proposed actions of this alternative will maximize the efficiency of Fire Management activities, while minimizing the relative risk associated with frequent intense lightning activity, high heat indexes and provide a safe and effective means of transport and escape during the prescribed fire and fuels management operations, fire and fire effects monitoring and unplanned ignition response operations.

Fire management activities can occur throughout the year, depending on field conditions and available personnel. Unplanned ignitions requiring response operations can occur at any time of year. Prescribed fire treatment activities occur when environmental conditions and other prescription parameters are met. Prescribed fire treatment preparations, fuels management and monitoring activities will occur as needed throughout the year.

Fire management activities occur in all fire adapted ecosystems and in areas adjacent to fire sensitive ecosystems to protect life, property and natural and cultural values at risk and to restore and maintain ecosystem health.

Methods and Techniques

Mechanized Vehicles: Mechanized vehicles (fire engines, ATVs, UTVs and passenger vehicles) may be used to transport personnel and equipment during prescribed and fuels management operations, monitoring activities, and other fire management operations such as required training exercises. During prescribed fire and unplanned ignition response operations, fire engines, ATVs and UTVs may be used for ignition and holding operations and protection of values at risk. These vehicles may operate off road in the Hole in the Donut potential wilderness area.

Helicopter Landings: Helicopters may be used to transport personnel and equipment during prescribed and fuels management operations, monitoring activities, and other fire management operations such as required training exercises. Helicopters may land in unimproved Helispots or improved helispots which may be created using mechanized equipment and/or primitive hand tools. These landings / improved helispot creations may occur within HID potential Wilderness.

Note: aircraft operations (Single Engine Air Tanker and helicopter) which do not including landings may occur during prescribed fire and unplanned ignition response activities for reconnaissance, fire monitoring, water drops and/or aerial ignitions (helicopter only) which utilizes a Plastic Sphere Dispenser (PLDO) machine, which injects plastic spheres containing potassium permanganate with glycol to ignite fuels on the ground.

Specialized Vehicles (Rubber Tire/Track): Bombardiers, marsh masters (tracked fire engines) and Rolligons (rubber balloon tired fire engines) may be used to transport personnel and equipment and/or ignition and holding operations during prescribed fire operations, fire monitoring, unplanned ignition response, protection of values at risk and other fire management operations such as required training exercises. These vehicles may be used to create fire breaks in areas with continuous fuel during prescribed fire and unplanned ignition response operations. These vehicles will be used to access

areas off road and in areas which are impassable for regular wheeled fire engines. These vehicles may operate off road in the Hole in the Donut potential Wilderness area.

Motorized Equipment/ Tools: Weed eaters, chainsaws and mowers may be used during prescribed fire operations to create temporary fire containment lines to hold prescribed fire within designated perimeters and protect values at risk. Pumps may be used to provide a pressurized water source during fire operations. Battery operated power tools, such as drills, may be used in fire effects monitoring operations to install new permanent monitoring plots where required and in support of remote automated weather stations for fire and environmental monitoring.

Effects:

Wilderness Character

Untrammeled: *Fire is an ecological process that will be controlled and manipulated by fire managers under this alternative. The implementation of prescribed fire and the suppression of naturally ignited fires affect the untrammeled quality of the potential Wilderness. Under this alternative the trammeling of fire management actions (which serve to reduce hazardous fuel levels in the Park and around values at risk) will create opportunities to safely and effectively manage naturally occurring wildfires without suppression action. In these cases the untrammeled quality will not be affected due to the efforts of previous fire management actions.*

Undeveloped: *The actual implementation of fire on the ground would leave little imprint as a man-made effect since fire is a natural process for the ecosystems in question. The creation and maintenance of improved helispots created with motorized equipment and/or hand tools would leave noticeable areas of alteration and imprints of development in the potential Wilderness. Trails and fire breaks created by using motorized equipment will recover quickly with rapid vegetation regrowth leaving a very short term imprint. The substrate would remain intact allowing for faster recovery and a shorter-term developed imprint in the Wilderness. Trails and fire breaks created by using specialized motorized vehicles would occur throughout the potential Wilderness areas and will leave an imprint until the area recovers. This will be a short term imprint, but longer lasting than that created with motorized equipment. The presence of equipment, helicopters, and vehicles in the potential Wilderness will temporarily affect the undeveloped quality, however for those that do not leave an imprint after they are gone the effects will only last as long as the equipment and vehicles are present in the area. Rebar installed for fire effects monitoring plots may be considered as a man-made structure, but they are of small diameter and difficult to detect through casual observation.*

Natural: *Fire management activities described in this alternative enhance the natural quality of the Wilderness through the maintenance and management of natural processes of fire. Restoration and maintenance of natural communities and protection of flora, fauna, and natural habitats at risk from unwanted fire impacts maintains fire-adapted vegetation communities and biological diversity improving the natural quality of the potential Wilderness.*

Outstanding opportunities for solitude or primitive and unconfined type of recreation: *Opportunities for solitude or primitive and unconfined type of recreation should be relatively unimpaired, except on a very short-term basis. During prescribed fire operations and unplanned wildfires, for safety reasons visitors may be excluded from certain areas within the potential Wilderness until the fire is officially declared out. Other fire management activities, such as fuels management, treatment preparation, fire effects monitoring and reconnaissance may require the use of motorized vehicles, aircraft, airboats and equipment, which may disturb this Wilderness quality in the short-term, which will last only as long as the equipment is present in the area.*

Cultural resources: *The use of prescribed fire and fuels management treatments and management actions taken on unplanned ignitions protect cultural resource values within the potential Wilderness. Prescribed fire and fuels management operations reduce the amount of*

hazardous fuel accumulations around cultural values at risk and suppression actions prevent unwanted impacts from further fire spread. The use of motorized equipment mitigates ground disturbance that has the potential to unearth and damage cultural resource artifacts in the Wilderness. The use of prescribed fire maintains the ethnographic landscapes in the potential Wilderness and monitoring activities provide knowledge of resources used in planning and decision making regarding the protection of these resources.

Maintaining Traditional Skills: N/A

Economic and Time Constraints: This alternative would not be more cost effective than other alternatives; however it would allow fire managers to accomplish the required tasks safely and effectively.

Safety of Visitors, Personnel, or Contractors: This alternative affords the greatest level of safety for fire fighters working on the ground as well as protection of life, property and Park values and surrounding communities however diminishes the Wilderness character through actions used to accomplish the task.

ALTERNATIVE # 3 – DESCRIPTION OF WILDERNESS COMPLIANT METHODS, NO PROHIBITED USES

Description:

Under this alternative, mechanized vehicles (trucks, fire engines, ATVs, UTVs and passenger vehicles) would be restricted to non-wilderness roads to conduct prescribed fire and fuels management operations, and monitoring. Rotor wing aircraft landings and specialized vehicles would be prohibited in HID potential Wilderness. Only primitive hand tools would be authorized for prescribed fire and fuels management. Motorized tools would be prohibited within the HID potential Wilderness. Fire management activities that do not require personnel on the ground (aerial ignition operations) may still occur in remote areas where natural fire breaks occur and where values at risk requiring on the ground protection are not present. Fire management activities within other areas of the Park will be restricted to those areas of HID that can be accessed by non-Wilderness roads and trails and can be safely managed with only primitive hand tools. Additionally Minimum Impact Suppression Tactics will be adhered to as described in the FMP.

The proposed actions of this alternative will greatly reduce the acreage of potential Wilderness that can be safely and effectively treated with prescribed fire or monitored for fire effects due to the fact that it is impossible to access all areas of HID without motorized vehicles. Due the continuous nature of fuels in the HID potential Wilderness, the use of only hand tools will increase the relative risk associated with firefighting and make it impossible to create fire breaks that will safely contain fires within prescribed fire perimeters and prevent further spread of unplanned. The frequent intense lightning activity, high heat indexes and limitations of vehicle use for safe and effective means of escape and transport during prescribed fire, fuels management, fire and fire effects monitoring operations will increase risk to fire personnel and prevent management actions from taking place. These restrictions will increase the risk to life, property and natural and cultural values and increase risk to firefighters working on the ground. The restoration and maintenance of fire adapted ecosystems will be affected by limiting the amount of prescribed fire and monitoring activities that can safely occur. Do to the reduction of acres that can be treated with prescribed fire under this alternative, the restoration efforts for HID would be negatively impacted and the frequency and intensity of unplanned ignitions and unwanted fire effects would likely increase, creating incidents where the onsite fire manager is forced to authorize vehicles and equipment to protect life, property and values at risk and safely manage the situation. The impacts of this alternative have the potential to negatively impact Wilderness character to a greater degree by affecting the natural quality of the Wilderness and may create situations where the use of specialized vehicles is increased and the undeveloped quality of the Wilderness is affected. Additionally, this alternative will limit the ability of the fire management program to adhere to guidelines set forth in NPS management policies 2006 and Directors Order #18 by compromising the ability to proactively protect life and property within and adjacent to the Park and natural and cultural resource values at risk and manage a prescribed fire and fire effects monitoring program in fire adapted areas of the Park.

Fire management activities can occur throughout the year, depending on field conditions and available personnel. Unplanned ignitions requiring response operations can occur at any time of year. Prescribed fire treatment activities occur when environmental conditions and other prescription parameters are met. Prescribed fire treatment preparations, fuels management and monitoring activities will occur as needed throughout the year.

Fire management activities occur in all fire adapted ecosystems and in areas adjacent to fire sensitive ecosystems to protect life, property and natural and cultural values at risk and to restore and maintain ecosystem health.

Effects:

Wilderness Character

Untrammeled: *Fire is an ecological process that will be controlled and manipulated by fire managers under this alternative. The implementation of prescribed fire and the suppression of naturally ignited fires affect any untrammeled quality of the HID potential Wilderness by controlling fire within the area. Under this alternative the use of prescribed fire is severely limited lessening the effect upon the trammled quality, however preventing the likelihood of monitoring naturally occurring fires with no suppression action due to the risks of fire burning in accumulated fuel loads. This alternative may increase trammeling related to fire suppression actions in unplanned ignition response where a situation is created in which onsite fire managers are required to implement techniques to protect life, property and values at risk and safely manage the situation.*

Undeveloped: *Under this alternative the undeveloped quality of the Wilderness would only be affected by use of vehicles and equipment adjacent to Wilderness and activities within Wilderness are not expected to impact this quality. As a result of the decrease in prescribed fire activities, this alternative may increase adverse effects to the undeveloped quality of the Wilderness related to fire suppression actions in unplanned ignition response where a situation is created in which onsite fire managers are required to implement techniques to protect life, property and values at risk and safely manage the situation.*

Natural: *As a result of the limited fire management activities permitted under this alternative, the natural quality of the Wilderness would be affected by unplanned fires on the landscape. Fire adapted areas will be impacted by the lack of fire and fire sensitive areas will experience increased risk resulting from unnatural fuel accumulations and unplanned ignitions. Unplanned fires would have unnatural effects impairing the natural quality of the potential Wilderness.*

Outstanding opportunities for solitude or primitive and unconfined type of recreation: *Under this alternative, opportunities for solitude or primitive and unconfined type of recreation should be relatively unimpaired, except on a very short-term basis due to the limitations on prescribed fire management activities. Impacts under this alternative would be short-term. Under this alternative visitors would not be impacted by vehicles and equipment used in fire management operations. The potential for closures and the duration of closures may increase due to the increased risk of large scale unwanted fires in the potential Wilderness.*

Cultural resources: *Under this alternative cultural resource values would be protected during response to unplanned ignitions, however the use of prescribed fire to pro-actively reduce hazardous fuel loading around cultural resources would be limited. The amount of ground disturbance activities would increase that have the potential to unearth and damage cultural resource artifacts in the Wilderness.*

Maintaining Traditional Skills: N/A

Economic and Time Constraints: This alternative would be more cost effective than other alternatives. However this alternative increases the likelihood of large scale, expensive fires that would require management over longer periods of time.

Safety of Visitors, Personnel, or Contractors: Under this alternative many prescribed fire and monitoring activities would not occur due to the risk and safety issues as a result of having fire fighters on the ground without certain tools and equipment. There is less reduction in hazardous fuel loading which in turn may increase risk to life, property and Park values and surrounding communities.

ALTERNATIVE # 4 – PREFERRED ALTERNATIVE

Hole in the Donut (HID) Potential Wilderness
Fire Management Unit 3

Description:

Under this alternative, mechanized vehicles (trucks, fire engines, ATVs, UTVs and passenger vehicles), and motorized equipment and tools would be permitted in Hole in the Donut (HID) potential wilderness within FMU 3 to conduct prescribed fire and fuels management operations. Additionally Minimum Impact Suppression Tactics will be adhered to as described in the FMP.

The proposed actions of this alternative will maintain Wilderness character to the maximum degree practicable while maintaining a safe working environment for firefighters on the ground, minimizing the relative risk associated with fire operations, lightning activity, high heat indexes and provide a safe and effective means of transport and escape during the prescribed fire, fuels management and fire management monitoring operations while protecting values at risk.

Prescribed Fire and Fuels Management Activities:

Proposed methods and techniques:

- Mechanized Vehicles (Engines, Passenger Vehicles, ATV, UTV)
 - Engines, Passenger Vehicles, ATVs and UTVs will be used to transport personnel and equipment, conduct ignition and holding operations and protect specific values at risk during prescribed fire and fuels management operations. Values to be protected include hammocks, hydro stations, and natural and cultural resource values identified by SFNRC and the Cultural resource branch.
- Motorized equipment (weed eaters, portable pumps)
 - Weed eaters may be used to create safety zones and defensible space and reduce fuel loading around values to be protected (hammocks, hydro stations, and natural and cultural resource values identified by SFNRC and the Cultural resource branch).
 - Weed eaters may be used to create fire containment lines to contain fire spread in areas where natural existing fire breaks do not exist, break up larger units into smaller treatment areas and prevent spread of fire into non-treatment areas.
 - Portable pumps may be used to provide pressurized water delivery in support of prescribed fire operations along holding lines and around values to be protected during prescribed fire operations.
 - Chainsaws may be used to fall trees that present a hazard to firefighter safety during prescribed fire operations or may carry fire across a fire break.
- Note: Aircraft operations (Single Engine Air Tanker and helicopter) which do not including landings may occur during prescribed fire and unplanned ignition response activities for reconnaissance, fire monitoring, water drops and/or aerial ignitions (helicopter only) which utilizes a Plastic Sphere Dispenser (PLDO) machine, which injects plastic spheres containing potassium permanganate with glycol to ignite fuels on the ground.

When:

- Prescribed fire and fuels management activities may occur throughout the year.
- Prescribed fire treatments will occur when environmental conditions are within approved prescription parameters.
- Specific prescribed fire project implementation schedules can be found in the Fire Management Plan (FMP) Multi Year Fuels Plan.
- ATVs and UTVs will be used off road when substrate conditions are dry enough to avoid causing ruts or getting stuck.

Where:

- Prescribed fire and fuels management activities may occur throughout the HID in FMU 3.
- Specific project unit location maps can be found in the FMP Multi Year Fuels Plan.

- Mechanized Vehicles
 - Engines, Passenger Vehicles, ATVs and UTVs may operate along existing roads within the HID of FMU 3.
 - ATVs and UTVs may operate off-road along fire containment lines.
 - On rare occasions ATVs and UTVs may operate off-road within the interior of a burn unit to protect special values (ex. Research plots, cultural resources) identified by SFNRC or Cultural Resources staff.
- Motorized equipment
 - Weed eaters may be used adjacent to and surrounding values to be protected (hammocks, hydro stations, and natural and cultural resource values identified by SFNRC and the Cultural resource branch).
 - The known values at risk currently located within flammable vegetation are 3 hydrostations.
 - Estimated 0-2 weedeater uses in potential Wilderness/year to protect known values located within flammable vegetation.
 - Weedeaters may be used in all project units in the HID where units need to be broken into smaller burn areas to reduce risk and prevent fire spread into unwanted areas and where natural and/or manmade barriers cannot be utilized as fire break containment lines.
 - Estimated 0-1.5 miles of fire break containment lines/year in the HID project units.
 - Exact length and location of fire break containment lines cannot be determined at this time due to the fact that until the final planning stages, closer to the time of implementation, the status and effectiveness of intermittent natural fire breaks, the amount of fuel loading (height and continuity), water levels, weather conditions, effective escape routes and safety zones needed to determine length and location of fire breaks are unknown.
 - Estimated 2-32' fire break width based on 1-21' flame lengths. (Effective fire break size is 1.5 x the predicted flame lengths. Flame length will depend on fuel loading and expected weather conditions, estimated flame lengths from 2008-2012 prescribed fire burn plan).
 - Additional weedeater uses in potential Wilderness may be necessary to protect as yet unidentified natural and cultural resource values. It cannot be determined at this time the number of weedeater uses required due to the fact that the number and location of resources are not currently identified.
 - Portable pumps may be used in all project units in the HID to provide pressurized water delivery in support of prescribed fire operations, along holding lines and around values to be protected.
 - Chainsaws may be used on rare occasions in the HID potential Wilderness where a tree presents a safety hazard and/or may carry fire across a containment line and cannot be removed manually.

Mitigations:

- The use of helicopter landings and specialized vehicles is not being requested at this time. Should the need for either prohibited use arise in the future, Fire Management will return to the Wilderness Committee with a project-specific MRDG to request additional prohibited uses in the HID.
- Motorized equipment is limited to weedeaters, portable pumps and chainsaws.
- Fire breaks created around values at risk are limited in size to the area required for successful fuels reduction and protection from unwanted fire spread and effects from fire.
- Natural and/or existing fire breaks will be used whenever possible.
- ATV and UTV travel is restricted to travel along fire containment lines within the burn unit, except in rare cases to protect special values at risk identified by SFNRC or Cultural Resources staff.
- Chainsaws will be used to remove logs that may carry fire across a fire break only when the logs cannot be removed manually.

Rational for use:

- Mechanized Vehicles
 - Engines, ATVs and UTVs enable firefighters to patrol greater distances along the line, respond to spot fires more efficiently and safely and provide water sources.
 - Engine, ATV and UTV water sources are necessary to slow and stop fire spread safely and more efficiently than hand tool use alone and in many cases without water, fire spread cannot be stopped.
- Motorized equipment
 - Weedeaters are the necessary equipment to create effective fire breaks to contain fire spread in areas where natural existing fire breaks do not exist, break up larger units into smaller treatment areas and prevent spread of fire into non-treatment areas and protect values at risk.
 - Primitive hand tools, including digging and cutting tools, are known to be ineffective at creating fire breaks due to the presence of a mixture of tall grass, sedges, woody plants, fuels in solution holes and uneven terrain. Weedeaters provide the precision and versatility necessary to create effective fire breaks, the width of which need to be 1.5x the expected flame lengths (potential 1-21ft flame lengths range).
 - Portable pumps are necessary for firefighters to have access to pressurized water sources during prescribed fire operations where it is impossible for engines and additional water delivery equipment to reach. A pressurized water source is necessary to slow and stop fire spread safely and more efficiently than hand tool use alone and in many cases without water, fire spread cannot be stopped.
 - Chainsaws are required to safely remove trees that present a hazard to firefighters or may carry fire across fire breaks.

Monitoring activities performed by Fire Management staff are not planned in the HID at this time (SFNRC research provides fire effects data in the HID).

Effects:

Wilderness Character

Untrammeled: Fire is an ecological process that will be controlled and manipulated by fire managers under this alternative. The implementation of prescribed fire and the suppression of naturally ignited fires affect the untrammeled quality of the potential Wilderness. Under this alternative the trammeling of fire management actions (which serve to reduce hazardous fuel levels in the Park and around values at risk) will create opportunities to safely and effectively manage naturally occurring wildfire without suppression action. In these cases the untrammeled quality will not be affected due to the efforts of previous fire management actions.

Undeveloped: The actual implementation of fire on the ground would leave little imprint as a man-made effect since fire is a natural process for the ecosystems in question. Trails and fire breaks created by using motorized equipment will recover quickly with rapid vegetation regrowth, leaving a very short term imprint. The substrate would remain intact allowing for faster recovery and a shorter-term developed imprint in the potential Wilderness. Trails and fire breaks created by using mechanized vehicles will leave an imprint until the area recovers. This will be a short term imprint, but longer lasting than that created with motorized equipment. In this alternative the type of vehicle, areas in which they are used and options for use are limited, which limits the amount of trails created and areas where the undeveloped quality is affected. The presence of equipment, and vehicles in the potential Wilderness will temporarily affect the undeveloped quality, however for those that do not leave an imprint after they are gone the effects will only last as long as the equipment and vehicles are present in the area.

Natural: Fire management activities described in this alternative enhance the natural quality of the potential Wilderness through the maintenance and management of natural processes of fire. Restoration and maintenance of natural communities and protection of flora, fauna, and natural habitats at risk from unwanted fire impacts maintains fire-adapted vegetation communities and biological diversity, improving the natural quality of the potential Wilderness.

Outstanding opportunities for solitude or primitive and unconfined type of recreation: Opportunities for solitude or primitive and unconfined type of recreation should be relatively unimpaired, except on a very short-term basis. During prescribed fire operations and unplanned wildfires, for safety reasons visitors may be excluded from certain areas within the potential Wilderness until the fire is officially declared out. Other fire management activities, such as treatment preparation and reconnaissance may require the use of motorized vehicles, aircraft and equipment, which may disturb this Wilderness quality in the short-term, but will last only as long as the equipment is present in the area.

Cultural resources: The use of prescribed fire treatments and management actions taken on unplanned ignitions protect cultural resource values within the Wilderness. Prescribed fire operations reduce the amount of hazardous fuel accumulations around cultural values at risk and suppression actions prevent unwanted impacts from further fire spread. The use of motorized equipment mitigates ground disturbance that has the potential to unearth and damage cultural resource artifacts in the potential Wilderness. The use of prescribed fire maintains the ethnographic landscapes in the potential Wilderness and monitoring activities provide knowledge of resources used in planning and decision making regarding the protection of these resources.

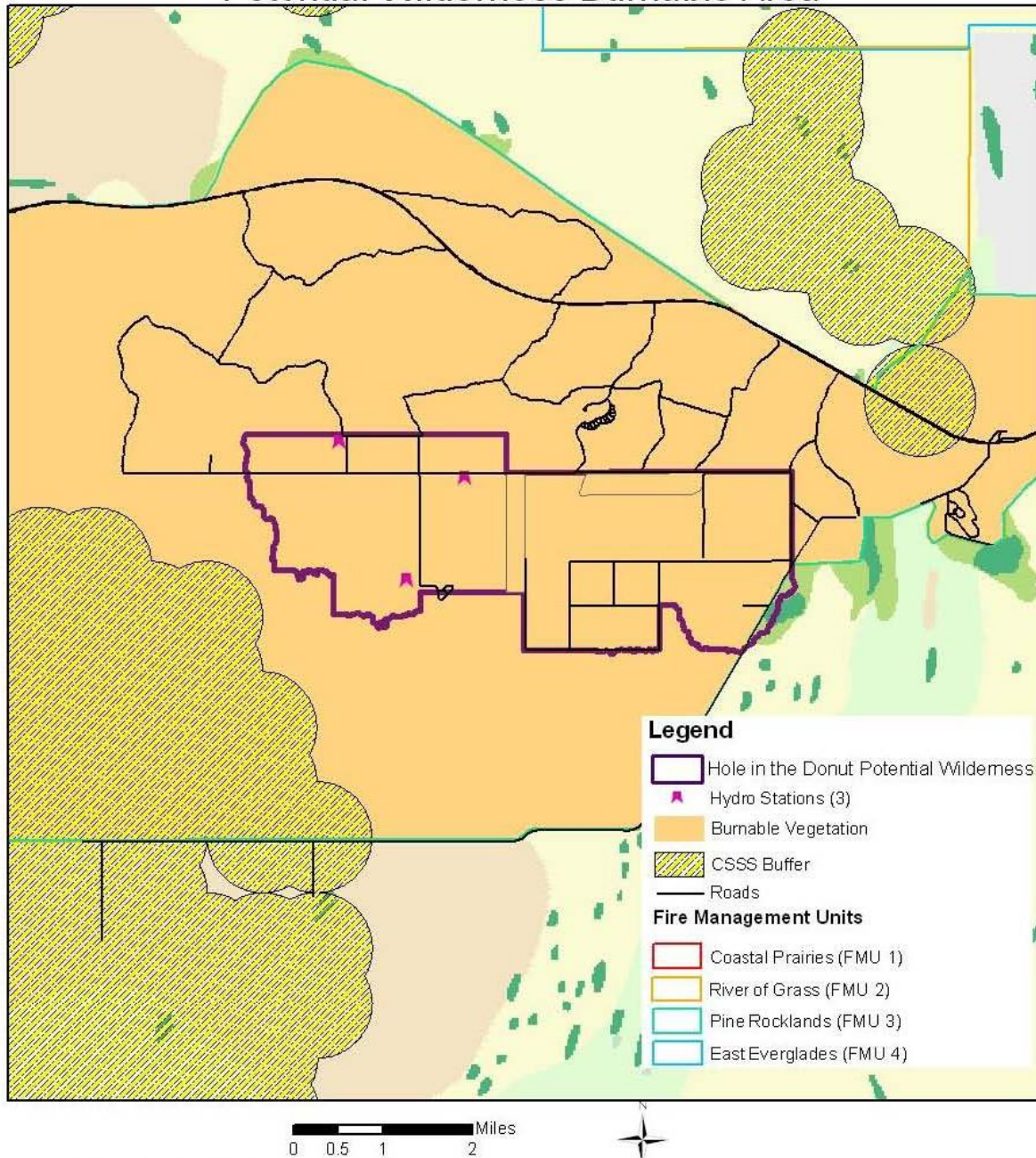
Maintaining Traditional Skills: N/A

Economic and Time Constraints: The preferred alternative would not be more cost effective than other alternatives; however it would allow fire managers to accomplish the required tasks safely and effectively.

Safety of Visitors, Personnel, or Contractors: This alternative affords the greatest level of safety for fire fighters working on the ground as well as protection of life, property and Park values and surrounding communities while maintaining the Wilderness character to the greatest degree possible while accomplishing the task.



Hole in the Donut (HID) Values at Risk within Potential Wilderness Burnable Area



Map Created By: Everglades National Park Fire & Aviation
M:\GIS\Fire\Products\Min_toolHID_min_tool.mxd

December 2010



Everglades National Park
MARJORY STONEMAN DOUGLAS WILDERNESS

MINIMUM REQUIREMENTS DECISION GUIDE

WORKSHEETS

Everglades Fire Management Plan (FMP) 2011

Fire Management Unit (FMU) 4 Wilderness Study Area

“ . . . except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act...”

– the Wilderness Act, 1964

These worksheets serve as a guide during the planning process to projects within Wilderness. They will expedite the review process if properly completed and provide insight into how the Wilderness Committee at Everglades National Park approaches each individual proposal. It is to be completed and submitted at least one week prior to meeting with the Wilderness Committee along with certificates of completion from the Arthur Carhart Wilderness Training Center online courses, “The Wilderness Act of 1964” and “Minimum Requirements Analysis.” Completing the online courses prior to completing these worksheets is recommended.

Step 1: Summarize the research proposal.

Description: Briefly describe the proposed action, goals, anticipated results, and potential benefits. Also note all proposed actions that may be prohibited under Section 4(c) of the Wilderness Act of 1964 (including use of motor vehicles, motorized equipment or motorboats, land of aircraft, mechanical transport, or construction of any structure or installation).

Urban and agricultural development and the presence of exotic plant species have disrupted the natural fire regime in the fire adapted ecosystems of Everglades National Park and park and community infrastructure is at risk from hazardous fuel build up and unwanted fire effects where it occurs within or adjacent to flammable vegetation. Everglades Fire Management has created a Fire Management Plan (FMP) as required by NPS Management Policies 2006 and Directors Order #18. The FMP identifies how wildland fire and related fire management activities will be managed within the Park. The FMP describes goals and objectives of the fire management program and the methods to achieve those goals and objectives and protect values at risk. Fire management activities include prescribed fire planning, preparation and implementation, response to unplanned ignitions, environmental, fire and fire effects monitoring and training and preparedness activities for the fire management program.

This worksheet provides the analysis for prescribed fire and fuels management operations and fire management monitoring activities within FMU 4 in Everglades National Park.

Unplanned ignitions activities in FMU 4 Wilderness Study Area will operate under the same guidance for prescribed fire and fuels management operations unless the on-site decision maker determines in his/her professional judgment that the conditions require additional emergency response activities. This direction comes from NPS management Policies 2006 Ch 6 Wilderness Management.

The proposed actions that may be prohibited under section 4(c) of the Wilderness Act include use of motorized equipment, motorized vehicles, specialized vehicles, airboats, helicopter landings, and rebar plot marker installations.

The activities outlined in the preferred alternative identify those activities that will maintain Wilderness character while providing the necessary resources to safely carry out fire management operations which will provide for the safety of the public, park personnel, infrastructure, surrounding communities, and Park natural, cultural and social resource values and maintain natural fire adapted ecosystems.

Prohibited uses not mentioned in this document will not be used by Fire Management in FMU 4 Wilderness Study Area. Should the need arise, Fire Management will return to the Wilderness Committee with a project-specific MRDG to request a prohibited use not already mentioned in this document.

To help determine if the proposal and its containing prohibited uses can be legally defensible, please answer the questions listed in A - F on the following pages.

A. Describe Options Outside of Wilderness

Are there any potential study areas outside of Wilderness boundaries that could yield similarly significant results? This includes areas within the park not designated as Wilderness.

Yes: ☐ No: ☒

Explain: The Everglades ecosystems that require management, treatment and monitoring occur in a Wilderness Study Area. Actions and objectives cannot be accomplished outside of WSA areas.

B. Describe Valid Existing Rights or Special Provisions of Existing Legislation

Are you aware if the prohibited uses are necessary to satisfy valid existing rights or a special provision in existing legislation (The Wilderness Act of 1964, The Endangered Species Act of 1973, etc...) that allows consideration of the Section 4(c) prohibited uses? Cite law & section.

Yes: ☐ No: ☒ Not Applicable: ☐

Law & Section:

C. Describe Other Guidance

To your knowledge, does the proposal benefit the administration of agency policy, unit and wilderness management plans, species recovery plans, or agreements with tribal, state and local governments or other federal agencies?

Yes: ☒ No: ☐ Not Applicable: ☐

- **Policy or Agency:** NPS Management policies 2006 Section 4.5 Fire Management; Directors Order #18; NPS DO #41 section 5. Fire Management; Federal Wildland Fire Policy and Program Review (2001); Managing the Impact of Wildfires on Communities and the Environment (USDOI/USDA 2000); A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10 Year Implementation Strategy

D. Normally Prohibited Activities

Check of Wilderness Act Section 4(c) prohibited uses you will be seeking the use of:

- | | |
|--|---|
| <input checked="" type="checkbox"/> Mechanical transport | <input checked="" type="checkbox"/> Landing of aircraft |
| <input checked="" type="checkbox"/> Motorized equipment | <input type="checkbox"/> Temporary road |

☒ Motor vehicles

☒ Structure or installation

☐ Motorboats

Justification: These items are required to safely carry out fire management activities in the Everglades NP Wilderness, potential Wilderness and Wilderness Study Areas.

☒ Emergency Situation

☒ No Alternative Exists

☒ Personal Health or Safety

☐ Other: _____

E. Wilderness Character

Will the project results help to preserve one or more of the qualities of wilderness character including: untrammeled, undeveloped, natural, outstanding opportunities for solitude or a primitive and unconfined type of recreation, or cultural resources?

Explain how taking action on this proposal will help preserve wilderness character. If there is no clear benefit to a particular quality, explain how the proposed action may impair that quality and if there are any tradeoffs (like using short-term trammeling to improve long-term naturalness). Please only mark 'Not Applicable' if there are no direct or indirect impacts.

Untrammeled – free from modern human control or manipulation, where nature is allowed to “run free”

Yes: ☐ No: ☒ Not Applicable: ☐

Explain: Fire management activities require modern human manipulation on the landscape and would, therefore, impair the untrammeled quality of the Marjory Stoneman Douglas Wilderness. The short-term effects from trammeling of the Wilderness through fire management increase the long term naturalness of the area.

Undeveloped – retains primeval character and influence, essentially without permanent improvement or human occupation, contrasts with areas where humans and their work dominate the landscape

Yes: ☐ No: ☒ Not Applicable: ☐

Explain: Fire management activities utilize motorized vehicles and equipment, which would impair the undeveloped quality of the Marjory Stoneman Douglas Wilderness in the short term. These activities increase the long term natural quality of the Wilderness by applying fire management activities in fire adapted areas and protecting fire sensitive natural resources. Installation of new fire effects monitoring plots may require permanently installing rebar into the ground.

Natural – substantially free from the effects of modern civilization, changed by natural occurrences

Yes: ☒ No: ☐ Not Applicable: ☐

Explain: Fire management activities improve the natural quality of the Marjory Stoneman Douglas wilderness by introducing fire as a natural ecological process to the landscape. Fire as a natural disturbance has been hindered by the surrounding urban and agricultural developments of south Florida. Monitoring activities and fuels management support the implementation of fire as a natural ecological process and allow managers to use fire to enhance and maintain the natural quality of the Wilderness.

Outstanding opportunities for solitude or a primitive and unconfined type of recreation – provides opportunities for people to encounter experiences such as natural sights and sounds, solitude, freedom, risk, and the physical and emotional challenges of self-discovery and self-reliance

Yes: ☒ No: ☐ Not Applicable: ☐

Explain: Fire management activities may impact this quality temporarily during the active fire management operations. The short-term effects through fire management increase the long term naturalness of the area.

Cultural – preserves significant artifacts of prior lifestyles, traditions, or historic events

Yes: ☒ No: ☐ Not Applicable: ☐

Explain: Fire management activities are designed to protect cultural resource values within Wilderness and are expected to have little to no negative impact on cultural resources. Through fire management activities, sites of historical or cultural significance may be protected from the effects of unwanted fire spread.

F. Describe Effects to the Public Purposes of Wilderness

Will the project results help to support one or more of the other public purposes for wilderness (as stated in Section 4(b) of the Wilderness Act) of recreation, scenic, education, conservation, and historical use?

Identify which, if any of the public purposes will be impacted if the proposed project is approved. As in Section E, positive AND negative impacts should be described if present.

Recreation – opportunities to practice primitive, outdoor recreation without interference of modern amenities

Yes: ☒ No: ☐ Not Applicable: ☐

Explain: Fire management activities reduce hazardous fuel accumulation and therefore improve visitor safety.

Scenic – opportunities for spectacular landscape-scale views free from modern alterations

Yes: ☐ No: ☐ Not Applicable: ☒

Explain:

Education – opportunities for immersion in biological, ecological, or other educational themes

Yes: ☒ No: ☐ Not Applicable: ☐

Explain: Fire management activities provide opportunities to gather information about fire effects and fire ecology and contribute to management of Wilderness.

Conservation – opportunities to protect habitat beneficial to the survival of an organism of special interest

Yes: ☒ **No:** ☐ **Not Applicable:** ☐

Explain: Fire management activities restore and maintain globally imperiled habitats and the species that depend upon them. Fire management activities may also protect rare and federally listed species from unwanted effects from fire.

Historic– opportunities to practice historically iconic uses or applications no longer available elsewhere

Yes: ☐ **No:** ☐ **Not Applicable:** ☒

Explain:

Please feel free to provide any additional information that may be relevant at this point in the decision process:

Step 1 Decision: Is the proposed project necessary in wilderness?
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At this step, the Wilderness Committee will use the information you've provided to determine the appropriateness of this project within the Marjory Stoneman Douglas Wilderness. Please continue to complete Step 2, determining the minimum activity.

Step 2: Determine the minimum activity.

Description of Alternatives

For each alternative, describe what methods and techniques will be used, when the activity will take place, where the activity will take place, what mitigation measures are necessary, and the general effects to the Wilderness resource and character.

Please provide at least four alternate methods for conducting this project in Wilderness. Include a “No Action” alternative to allow for a comprehensive comparison of effects. The second alternative should describe your ideal methods for the proposed action. This alternative is to be written as if the land were not designated Wilderness and therefore without legal restrictions. The third, a Wilderness compliant alternative, should not include any prohibited uses and should describe how the proposal would be completed in more primitive times. Lastly, the fourth alternative, the preferred alternative, should be a compromise between the second and third alternatives. Complete a form for each alternative being considered. Be sure to include how the impacts can be mitigated by: employee training; location of work areas, campsites, and travel routes; project timing; temporary closures; or other actions.

Alternative Comparison Criteria

The following are descriptions of the criteria that will be compared between the alternatives.

Wilderness Character – the following five, previously discussed criteria represent wilderness character as described in The Wilderness Act of 1964

Untrammeled – Discuss the degree to which the components or processes of ecological systems are intentionally controlled or manipulated.

Undeveloped – Identify how “the imprint of man’s work will remain substantially unnoticeable.” Include the effects of the use of any motorized equipment, mechanical transport, structures, or installations on maintaining this quality of wilderness character.

Natural – Describe the potential for protection, impairment, or restoration of natural conditions including endangered, threatened, or rare species, natural biological diversity, and self-regulating ecosystems.

Outstanding opportunities for solicitude or primitive and unconfined type of recreation – Describe effects that will be noticeable to visitors and that could affect their experience in Wilderness. Include effects on visitors from the use of motorized equipment, mechanical transport, landing of aircraft, structures, or installations.

Cultural resources – Describe any effects on protection or management of historic or pre-historic artifacts, sites, structures, or landscapes.

Maintaining Traditional Skills – Explain how the alternative helps maintain proficiency in the use of primitive and traditional skills, non-motorized tools, and non-mechanical travel methods.

Economic and Time Constraints – Describe the costs and the amount of time it will take for implementation of the alternative.

Note: While activities should be accomplished with economic efficiency, neither the cost nor the time required for implementation are overriding factors for use of otherwise prohibited activities.

Safety of Visitors, Personnel, or Contractors – Describe any safety concerns associated with implementing the alternative on visitors, agency personnel, volunteers, and/or contractors. Identify which hazards can and cannot be mitigated. Mitigation might be achieved through providing information to the public; or training, the use of protective equipment, or other requirements for workers. Identify any potential public safety hazards resulting from implementation of the alternatives.

ALTERNATIVE # 1 – NO ACTION

Description:

Under this alternative no fire management actions would be taken. This is not a possible alternative due to the requirements to protect life, property and values at risk from the impacts of unwanted fire.

Effects:

Wilderness Character

Untrammeled: Under this alternative naturally occurring fires would spread unimpeded which would have no effect on the untrammeled quality of the WSA, however human ignited fires that spread through the WSA would impact the untrammeled quality through human manipulation of the fire regime.

Undeveloped: Under this alternative no actions would occur therefore there would be no equipment to alter the undeveloped quality of the WSA.

Natural: Under this alternative fires would spread across the landscape, however due to the unnatural fragmentation of the landscape through development and water delivery, unnatural fuel accumulation would exist and fires would have unnatural effects impairing the natural quality of the WSA, unnaturally affecting both the fire adapted and fire sensitive ecosystems in the Wilderness.

Outstanding opportunities for solitude or primitive and unconfined type of recreation: Under this alternative visitors would not be impacted by vehicles and equipment used in fire management operations. The potential for closures and the duration of closures may increase due to the increased risk of large scale unwanted fires in the WSA.

Cultural resources: Under this alternative fires would spread across the landscape creating increased risk to cultural resources surrounded by unnaturally high fuel loads. The potential exists for fires to be more severe, consuming soils in hammocks, tree islands and other areas in the Park and unearthing and damaging cultural resource artifacts.

Maintaining Traditional Skills: N/A

Economic and Time Constraints: Since there are no actions being taken there are no economic or time constraints

Safety of Visitors, Personnel, or Contractors: This alternative puts life, property, Park values and surrounding communities at risk from impacts of wildland fire.

ALTERNATIVE # 2 – DESCRIPTION OF IDEAL METHODS, IF NOT IN WILDERNESS

Description:

Under this alternative, mechanized vehicles (trucks, fire engines, ATVs, UTVs and passenger vehicles), Rotor wing aircraft landings in both unimproved and created improved helispots, specialized vehicles (e.g. bombardiers, rollagons, gyrotracks, marshmasters), airboats, and mechanized equipment and tools would be permitted throughout FMU 4 to conduct prescribed and fuels management operations and monitoring activities. For each fire management activity, Minimum Impact Suppression Tactics will be adhered to as described in the FMP.

The proposed actions of this alternative will maximize the efficiency of Fire Management activities, while minimizing the relative risk associated with frequent intense lightning activity, high heat indexes and provide a safe and effective means of transport and escape during the prescribed fire, fire and fire effects monitoring operations and unplanned ignition response operations.

Fire management activities can occur throughout the year, depending on field conditions and available personnel. Unplanned ignitions requiring response operations can occur at any time of year. Prescribed fire treatment activities occur when environmental conditions and other prescription parameters are met. Prescribed fire treatment preparations fuels management and monitoring activities will occur as needed throughout the year.

Fire management activities occur in all fire adapted ecosystems and in areas adjacent to fire sensitive ecosystems to protect life, property and natural and cultural values at risk and to restore and maintain ecosystem health.

Methods and Techniques

Mechanized Vehicles: Mechanized vehicles (fire engines, ATVs, UTVs and passenger vehicles) may be used to transport personnel and equipment during prescribed and fuels management operations, monitoring activities, and other fire management operations such as required training exercises. During prescribed fire and unplanned ignition response operations, fire engines, ATVs and UTVs may be used for ignition and holding operations and protection of values at risk. These vehicles may operate off road in FMU 4.

Helicopter Landings: Helicopters may be used to transport personnel and equipment during prescribed and fuels management operations, monitoring activities, and other fire management operations such as required training exercises. Helicopters may land in unimproved helispots or improved helispots which may be created using mechanized equipment and/or primitive hand tools. Note: aircraft operations (Single Engine Air Tanker and helicopter) which do not including landings may occur during prescribed fire and unplanned ignition response activities for reconnaissance, fire monitoring, water drops and/or aerial ignitions (helicopter only) which utilizes a Plastic Sphere Dispenser (PLDO) machine, which injects plastic spheres containing potassium permanganate with glycol to ignite fuels on the ground.

Specialized Vehicles (Rubber Tire/Track): Bombardiers, marsh masters (tracked fire engines) and Rolligons (rubber balloon tired fire engines) may be used to transport personnel and equipment and/or ignition and holding operations during prescribed fire operations, fire monitoring, unplanned ignition response, protection of values at risk and other fire management operations such as required training exercises. These vehicles may be used to create fire breaks in areas with continuous fuel during prescribed fire and unplanned ignition response operations. These vehicles will be used to access areas off road and in areas which are impassable for regular wheeled fire engines. These vehicles may operate off road in the prairies in FMU 4.

Motorized Equipment/ Tools: Weed eaters, chainsaws and mowers may be used during prescribed fire and unplanned ignition response operations to create temporary fire containment lines to hold prescribed fire within designated perimeters and protect values at risk. Pumps may be used to provide a pressurized water source during fire operations. Battery operated power tools, such as drills, may be used in fire effects monitoring operations to install new permanent monitoring plots where required and in support of remote automated weather stations for fire and environmental monitoring.

Airboats: Airboats may be used to transport personnel and equipment during prescribed fire, fuels management and unplanned ignition response operations, fire and fire effects monitoring, exotic plant control assistance, protection of values at risk and other fire management operations such as required training exercises. Airboats may be used for ignition and holding operations and protection of values at risk, controlling the fire line and/or to create a wet line to slow or stop fire spread. Access off of airboat trails may occur for all activities in the prairies of FMU 4.

Effects:

Wilderness Character

Untrammeled: Fire is an ecological process that will be controlled and manipulated by fire managers under this alternative. The implementation of prescribed fire and the suppression of naturally ignited fires affect the untrammeled quality of the WSA. Under this alternative the trammeling of fire management actions (which serve to reduce hazardous fuel levels in the Park and around values at risk) will create opportunities to safely and effectively manage naturally occurring wildfires without suppression action. In these cases the untrammeled quality will not be affected due to the efforts of previous fire management actions.

Undeveloped: The actual implementation of fire on the ground would leave little imprint as a man-made effect since fire is a natural process for the ecosystems in question. The creation and maintenance of improved helispots created with motorized equipment and/or hand tools would leave noticeable areas of alteration and imprints of development in the WSA. Trails and fire breaks created by using motorized equipment will recover quickly with rapid vegetation regrowth leaving a very short term imprint. The substrate would remain intact allowing for faster recovery and a shorter-term developed imprint in the WSA. Trails and fire breaks created by using specialized motorized vehicles and airboats would occur throughout the WSA areas and will leave an imprint until the area recovers. This will be a short term imprint, but longer lasting for the specialized equipment than that created with motorized equipment. The presence of equipment, helicopters, vehicles and airboats in the WSA will temporarily affect the undeveloped quality, however for those that do not leave a imprint after they are gone the effects will only last as long as the equipment and vehicles are present in the area. Rebar installed for fire effects monitoring plots may be considered as a man-made structure, but they are of small diameter and difficult to detect through casual observation.

Natural: Fire management activities described in this alternative enhance the natural quality of the WSA through the maintenance and management of natural processes of fire. Restoration and maintenance of natural communities and protection of flora, fauna, and natural habitats at risk from unwanted fire impacts maintains fire-adapted vegetation communities and biological diversity improving the natural quality of the WSA. Monitoring activities and fuels management support the implementation of fire as a natural ecological process and allow managers to use fire to enhance and maintain the natural quality of the WSA.

Outstanding opportunities for solitude or primitive and unconfined type of recreation: Opportunities for solitude or primitive and unconfined type of recreation should be relatively unimpaired, except on a very short-term basis. During prescribed fire operations and unplanned wildfires, for safety reasons visitors may be excluded from certain areas within the

Wilderness until the fire is officially declared out. Other fire management activities, such as treatment preparation, fire effects monitoring and reconnaissance may require the use of motorized vehicles, aircraft, airboats and equipment, which may disturb this Wilderness quality in the short-term, which will last only as long as the equipment is present in the area.

Cultural resources: *The use of prescribed fire treatments and management actions taken on unplanned ignitions protect cultural resource values within the WSA. Prescribed fire operations reduce the amount of hazardous fuel accumulations around cultural values at risk and suppression actions prevent unwanted impacts from further fire spread. The use of motorized equipment mitigates ground disturbance that has the potential to unearth and damage cultural resource artifacts in the WSA. The use of prescribed fire maintains the ethnographic landscapes in the WSA and monitoring activities provide knowledge of resources used in planning and decision making regarding the protection of these resources.*

Maintaining Traditional Skills: N/A

Economic and Time Constraints: This alternative would not be more cost effective than other alternatives; however it would allow fire managers to accomplish the required tasks safely and effectively.

Safety of Visitors, Personnel, or Contractors: This alternative affords the greatest level of safety for fire fighters working on the ground as well as protection of life, property and Park values and surrounding communities however diminishes the Wilderness character through actions used to accomplish the task.

ALTERNATIVE # 3 – DESCRIPTION OF WILDERNESS COMPLIANT METHODS, NO PROHIBITED USES

Description:

Under this alternative, mechanized vehicles (trucks, fire engines, ATVs, UTVs and passenger vehicles), rotor wing aircraft landings and specialized vehicles would be prohibited in FMU 4 WSA. Only primitive hand tools would be authorized for prescribed fire and fuels management operations. Motorized tools would be prohibited within FMU 4 WSA. Fire management activities that do not require personnel on the ground (aerial ignition operations) may still occur in remote areas where natural fire breaks occur and where values at risk requiring on the ground protection are not present. Additionally Minimum Impact Suppression Tactics will be adhered to as described in the FMP.

The proposed actions of this alternative will greatly reduce the acreage of WSA that can be safely and effectively treated with prescribed fire or monitored for fire effects. It is impossible to access remote areas of the WSA without vehicle use along agricultural roads and aircraft landings. Due to the continuous nature of fuels, it will be impossible to treat many areas with prescribed fire where untreated areas exist that must be protected and maintained adjacent to treatment areas in FMU 4 WSA. Primitive hand tools, including digging and cutting tools, are known to be ineffective at creating fire breaks due to the presence of a mixture of tall grass, sedges, woody plants, fuels in solution holes, uneven terrain and rock substrate. Weedeaters provide the precision and versatility necessary to create effective fire breaks, the width of which need to be 1.5x the expected flame lengths. The high heat indexes and limitations of vehicle and aircraft use for safe and effective means of transport during prescribed fire, fuels management and monitoring, will increase risk to fire personnel and prevent management actions from taking place. These restrictions will increase the risk to life, property and natural and cultural values and increase risk to firefighters working on the ground. The restoration and maintenance of fire adapted ecosystems will be affected by limiting the amount of prescribed fire and monitoring activities that can safely occur. Monitoring activities in FMU 4 will be limited to those areas accessible near the boundary of the Park and areas interior will not be monitored. Due to the reduction of acres that can be treated with prescribed fire under this alternative, the frequency and intensity of unplanned ignitions and unwanted fire effects would likely increase, creating incidents where the onsite fire manager is forced to authorize vehicles and equipment to protect life, property and values at risk and safely manage the situation. The impacts of this alternative have the potential to negatively impact Wilderness character to a greater degree by affecting the natural quality of the WSA and creating situations where the use of specialized vehicles is increased and the undeveloped quality of the Wilderness is affected. Additionally, this alternative will limit the ability of the fire management program to adhere to guidelines set forth in NPS management policies 2006 and Directors Order #18 by compromising the ability to proactively protect life and property within and adjacent to the Park and natural and cultural resource values at risk and manage a prescribed fire and fire effects monitoring program in fire adapted areas of the Park.

Fire management activities can occur throughout the year, depending on field conditions and available personnel. Unplanned ignitions requiring response operations can occur at any time of year. Prescribed fire treatment activities occur when environmental conditions and other prescription parameters are met. Prescribed fire treatment preparations, fuels management and monitoring activities will occur as needed throughout the year.

Fire management activities occur in all fire adapted ecosystems and in areas adjacent to fire sensitive ecosystems to protect life, property and natural and cultural values at risk and to restore and maintain ecosystem health.

Effects:

Wilderness Character

Untrammelled: *Fire is an ecological process that will be controlled and manipulated by fire managers under this alternative. The implementation of prescribed fire and the suppression of naturally ignited fires affect the untrammelled quality of the WSA by controlling fire within the area. Under this alternative the use of prescribed fire is severely limited lessening the effect upon the trammelled quality, however preventing the likelihood of monitoring naturally occurring fires with no suppression action due to the risks of fire burning in accumulated fuel loads. This alternative may increase trammeling related to fire suppression actions in unplanned ignition response where a situation is created in which onsite fire managers are required to implement techniques to protect life, property and values at risk and safely manage the situation.*

Undeveloped: *Under this alternative the undeveloped quality of the WSA would only be affected by use of aircraft, vehicles and equipment adjacent to WSA and activities within Wilderness are not expected to impact this quality. As a result of the decrease in prescribed fire activities, this alternative may increase adverse effects to the undeveloped quality of the Wilderness related to fire suppression actions in unplanned ignition response where a situation is created in which onsite fire managers are required to implement techniques to protect life, property and values at risk and safely manage the situation.*

Natural: *As a result of the limited fire management activities permitted under this alternative, the natural quality of the WSA would be affected by unplanned fires on the landscape. Fire adapted areas will be impacted by the lack of fire and fire sensitive areas will experience increased risk resulting from unnatural fuel accumulations and unplanned ignitions. Unplanned fires would have unnatural effects impairing the natural quality of the WSA affecting unnaturally both the fire adapted and fire sensitive ecosystems in the WSA.*

Outstanding opportunities for solitude or primitive and unconfined type of recreation: *Under this alternative, opportunities for solitude or primitive and unconfined type of recreation should be relatively unimpaired, except on a very short-term basis due to the limitations on prescribed fire management activities. Impacts under this alternative would be short-term. Under this alternative visitors would not be impacted by vehicles and equipment used in fire management operations. The potential for closures and the duration of closures may increase due to the increased risk of large scale unwanted fires in the WSA.*

Cultural resources: *Under this alternative cultural resource values would be protected during response to unplanned ignitions, however the use of prescribed fire to pro-actively reduce hazardous fuel loading around cultural resources would be limited. The amount of ground disturbance activities would increase that have the potential to unearth and damage cultural resource artifacts in the WSA.*

Maintaining Traditional Skills: N/A

Economic and Time Constraints: This alternative would be more cost effective than other alternatives. However this alternative increases the likelihood of large scale, expensive fires that would require management over longer periods of time.

Safety of Visitors, Personnel, or Contractors: Under this alternative many prescribed fire and monitoring activities would not occur due to the risk and safety issues as a result of having fire fighters on the ground without certain tools and equipment. There is less reduction in hazardous fuel loading which in turn may increase risk to life, property and Park values and surrounding communities.

ALTERNATIVE # 4 – PREFERRED ALTERNATIVE

Fire Management Unit 4
Wilderness Study Area

Description:

Under this alternative, mechanized vehicles (trucks, fire engines, ATVs, UTVs and passenger vehicles), Rotor wing aircraft landings, airboats, specialized vehicles (bombardiers) and mechanized equipment and tools would be permitted in FMU 4 Wilderness Study Area, to conduct prescribed fire fuels management and fire management monitoring operations and unplanned ignition response operations. For unplanned ignition response, fire managers will adhere to guidance from the approved FMP minimum requirements decision guide for prescribed fire and fuels management operations unless the on-site decision maker determines in his/her professional judgment that the conditions dictate otherwise. Additionally Minimum Impact Suppression Tactics will be adhered to as described in the FMP.

The proposed actions of this alternative will maintain Wilderness character to the maximum degree practicable while protecting values at risk and maintaining a safe working environment for firefighters, minimizing the relative risk associated with fire operations, lightning activity, high heat indexes and provide a safe and effective means of transport and escape during the prescribed fire, fire and fire effects monitoring operations and unplanned ignition response operations.

Prescribed Fire and Fuels Management Activities

Proposed methods and techniques:

- Aircraft
 - Aircraft will be used to transport personnel and equipment during prescribed fire and fuels management operations and to protect Park and community values, including hammocks, camps, hydro and weather stations, and natural and cultural resource values identified by SFNRC and the Cultural resource branch.
 - Note: Aircraft operations (Single Engine Air Tanker and helicopter) which do not including landings may occur during prescribed fire and unplanned ignition response activities for reconnaissance, fire monitoring, water drops and/or aerial ignitions (helicopter only) which utilizes a Plastic Sphere Dispenser (PLDO) machine, which injects plastic spheres containing potassium permanganate with glycol to ignite fuels on the ground.
- Mechanized vehicles (trucks, fire engines, ATVs, UTVs and passenger vehicles)
 - Mechanized vehicles (Engines, Passenger Vehicles, ATV, UTV) will be used to transport personnel and equipment, conduct ignition and holding operations and protect specific values at risk during prescribed fire and fuels management operations. Values to be protected include hammocks, camps, hydro stations, and natural and cultural resource values identified by SFNRC and the Cultural resource branch.
- Airboats
 - Airboats will be used to create “holding lines” moving along existing airboat trails and off trail connecting airboat trails to other natural fire breaks to create a complete fire break to contain fire spread. This is accomplished by pushing sawgrass into the water to reduce flammability and increase width of fire breaks.
 - Airboats will be used to transport personnel and equipment, conduct ignition and holding operations and protect specific values at risk during prescribed fire operations where airboat use is already occurring in the creation and holding of fire containment

lines (airboats will not be used for transporting personnel and equipment if the operation does not require use of airboats in fire spread containment)

- Specialized vehicles (bombardiers)
 - Bombardiers may be used to transport personnel and equipment and/ or ignition and holding operations during prescribed fire operations and protection of values at risk.
- Motorized equipment (weed eaters, portable pumps, chainsaws)
 - Weed eaters may be used to create safety zones and defensible space and reduce fuel loading around values to be protected (hammocks, camps, hydro and weather stations, and natural and cultural resource values identified by SFNRC and the Cultural resource branch).
 - Weed eaters may be used to create fire containment lines to contain fire spread in areas where natural existing fire breaks do not exist, break up larger units into smaller treatment areas and prevent spread of fire into non-treatment areas.
 - Portable pumps may be used to provide pressurized water delivery in support of prescribed fire operations along holding lines and around values to be protected during prescribed fire operations.
 - Chainsaws may be used along old agriculture roads and fire breaks in FMU 4 when a tree presents a safety hazard and/or may carry fire across a fire break and cannot be removed manually. Chainsaws may also be used to remove exotic, invasive trees for mandatory training exercises.

When:

- Prescribed fire and fuels management activities may occur throughout the year.
- Prescribed fire treatments will occur when environmental conditions are within approved prescription parameters.
- Specific prescribed fire project implementation schedules can be found in the Fire Management Plan (FMP) Multi Year Fuels Plan.
- Airboats will be used when water levels allow safe airboat use.
- Mechanized Vehicles (ATV, UTV) will be used off road when substrate conditions are dry enough to avoid causing ruts or getting stuck.

Where:

- Prescribed fire and Fuels Management Activities will occur throughout FMU 4.
- Specific project unit maps can be found in the FMP Multi Year Fuels Plan
- Aircraft
 - Aircraft landings may occur in all project units in FMU 4 during prescribed fire and fuels management operation where access by other means is prohibitive.
 - Aircraft landings will occur adjacent to values to be protected (structures, hammocks, hydrostations, RAWS weather stations, Cape Sable Seaside Sparrow habitat and natural and cultural resource values identified by SFNRC and the Cultural resource branch).
 - Estimated 0-9 helicopter landings in Wilderness/year to protect known values located within flammable vegetation.
 - The known values at risk currently located within flammable vegetation are 3 Cape Sable Seaside Sparrow subpopulations, 17 hydrostations, 1 RAWS weather station and 10 structures.
 - Additional helicopter landings in the Wilderness Study Area may be necessary to protect as yet unidentified natural and cultural resource values. It cannot be determined at this time the number of landings required due to the fact that the number and location of resources are not currently identified.
- Mechanized Vehicles
 - Trucks, fire engines, ATVs, UTVs and passenger vehicles may operate along old agriculture roads in the East Everglades (FMU 4) WSA during prescribed fire and fuels management operations.
 - ATVs and UTVs may operate off road along fire breaks in the East Everglades (FMU 4) WSA during prescribed fire and fuels management operations.

- On rare occasions ATVs and UTVs may operate off-road within the interior of a burn unit to protect special values identified by SFNRC or Cultural Resources staff.
- Airboats
 - Airboats will travel along existing airboat trails and access off of airboat trails may occur to complete holding lines – connecting airboat trails to other natural fire breaks to create a holding line to contain fire spread.
 - Airboats may be used to transport personnel and equipment along airboat trails and holding lines during prescribed fire operations.
 - A map displaying airboat trails and expected off trail lines is located at the end of the document.
- Specialized vehicles (bombardiers)
 - Bombardiers may operate along old agriculture roads and off road along fire containment lines in burn units EE3, EE5, EE6, EE7, and EE8 along fire breaks.
- Motorized equipment
 - Weed eaters will be used adjacent to and surrounding values to be protected (Hydro stations, Park structures, CSSS habitat boundaries and natural and cultural resources to be identified by SFNRC and the Cultural resource branch)
 - The known values at risk currently located within flammable vegetation are 3 Cape Sable Seaside Sparrow subpopulations, 17 hydrostations, 1 RAWs weather station and 10 structures.
 - Estimated 0-42 weedeater uses in Wilderness/year to protect known values located within flammable vegetation.
 - Weedeaters may be used in all project units in FMU 4 where units need to be broken into smaller burn areas to reduce risk and prevent fire spread into unwanted areas and where natural and/or manmade barriers cannot be utilized as fire break containment lines.
 - Estimated 0-12 miles of fire break containment lines/year in FMU 4 project units.
 - Exact length and location of fire break containment lines cannot be determined at this time due to the fact that until the final planning stages, closer to the time of implementation, the status and effectiveness of intermittent natural fire breaks, the amount of fuel loading (height and continuity), water levels, weather conditions, effective escape routes and safety zones needed to determine length and location are unknown.
 - Estimated 2-32' fire break width based on 1-21' flame lengths. (Effective fire break size is 1.5 x the predicted flame lengths. Flame length will depend on fuel loading and expected weather conditions, estimated flame lengths from 2008-2012 prescribed fire burn plan).
 - Additional weedeater uses in Wilderness may be necessary to protect as yet unidentified natural and cultural resource values. It cannot be determined at this time the number of weedeater uses required due to the fact that the number and location of resources are not currently identified.
 - Portable pumps may be used in all project units in FMU 4 to provide pressurized water delivery in support of prescribed fire operations along holding lines and around values to be protected during prescribed fire operations.

Mitigations:

- Creation of improved helispots is prohibited
- Aircraft will not be used to transport personnel in areas where airboats are present and capable of transporting personnel and equipment
- ATVs and UTVs will only be used off road when conditions are dry enough to avoid getting stuck and creating ruts.
- ATV, UTV travel is restricted to travel along fire containment lines within the burn unit, except in rare cases to protect special values at risk identified by SFNRC or Cultural Resources staff.

- Airboats will not be used for transporting personnel and equipment if the operation does not already require use of airboats in fire spread containment
- Specialized vehicles (bombardiers) will be used along agricultural roads and off road when ATV and UTV are insufficient in prescribed fire operations.
- Motorized equipment is limited to weedeaters, portable pumps and chainsaws.
- Fire breaks for protection of values are limited in size to the area required for successful fuels reduction and protection from unwanted fire spread and effects on the values to be protected.
- Natural and/or existing fire breaks will be used whenever possible.
- Chainsaws will only be used to remove logs that may carry fire across a fire break only when the logs cannot be removed manually. Only invasive, exotic trees will be removed for mandatory chainsaw training exercises.
- Should the need for additional prohibited use arise in the future, Fire Management will return to the Wilderness Committee with project-specific MRDGs to request additional prohibited uses in FMU 4 Wilderness Study Area.

Rational For Use:

- Aircraft
 - The use of aircraft is the only way to access remote areas, inaccessible by airboat, that are targeted for treatment and contain values to be protected and where fuels management is needed.
- Mechanized vehicles
 - ATVs and UTVs enable firefighters to patrol greater distances along the line, respond to spot fires more efficiently and safely and provide water sources where engines are unable to travel. ATV and UTV water sources are necessary to slow and stop fire spread safely and more efficiently than hand tool use alone and in many cases without water, fire spread cannot be stopped.
- Airboats
 - The use of airboats enables managers to utilize existing trails to create and enhance “wet line” fire breaks.
 - Use of existing fire breaks is preferred to creating new man made breaks.
 - Airboats provide a means of transportation for performing precise hand ignition operations along the fire breaks to create a “black line” that enhances the fire break.
- Specialized equipment
 - Bombadiers are fire engines that can access areas that other wheeled vehicles cannot and can transport firefighters and equipment and support of prescribed fire ignition and holding operations.
- Motorized equipment
 - Motorized equipment (weedeaters) are the necessary equipment to create effective fire breaks to contain fire spread in areas where natural existing fire breaks do not exist, break up larger units into smaller treatment areas and prevent spread of fire into non-treatment areas and protect values at risk.
 - Primitive hand tools, including digging and cutting tools, are known to be ineffective at creating fire breaks due to the presence of a mixture of tall grass, sedges, woody plants, fuels in solution holes and uneven terrain. Weedeaters provide the precision and versatility necessary to create effective fire breaks, the width of which need to be 1.5x the expected flame lengths (potential range 1-21ft flame lengths).
 - Portable pumps are necessary for firefighters to have access to pressurized water sources during prescribed fire operations where it is impossible for engines and additional water delivery equipment to reach. A pressurized water source is necessary to slow and stop fire spread safely and more efficiently than hand tool use alone and in many cases without water, fire spread cannot be stopped.

Monitoring Activities

Proposed methods and techniques:

- Aircraft (Helicopters)

- Aircraft will be used to transport personnel and equipment for fire management monitoring activities.
- Mechanized vehicles (trucks, passenger vehicles, UTVs)
 - Vehicles may operate along old agriculture roads in the East Everglades (FMU 4) WSA to access fire effects monitoring plots.
- Motorized Equipment
 - Motorized equipment (power drill) – will be used to maintain the RAWS monitoring station in FMU 4.
 - Motorized equipment (rock drill) may be used to install rebar plot markers where additional fire effects plot installation is required.
- Rebar Installation
 - Rebar installation may occur to mark locations of new fire effects monitoring plots where additional fire effects plot installation is required.
- Additional plot installations may be required to further study the effects of fire on the ridge and slough areas and exotic plant species in FMU 4.

When:

- Throughout the year – the bulk of field work is completed January – June, however can occur throughout the year.

Where:

- Fire management monitoring activities will occur in all project units in FMU 4.
- Map of established fire effects plots can be found in the Fire Management Plan.
- Aircraft
 - There are no existing fire effects plots or RAWS stations in FMU 4 that require helicopter transport.
 - Additional aircraft landings are not scheduled in FMU 4 however additional monitoring may be needed in regards to fire effects throughout FMU 4 as the Multi Year Fuels Plan is implemented.
 - Additional aircraft landings are not scheduled in FMU 4 however additional monitoring may be needed in regards to fire effects to fire effects throughout burn units EE1, EE2, EE3, EE4 and EE7 as the Multi Year Fuels Plan is implemented.
 - Estimated 1 to 10 landings/year for additional monitoring.
- Mechanized vehicles (Trucks, passenger vehicles and UTVs)
 - Vehicles may operate along old agriculture roads in the East Everglades (FMU 4) burn units to access fire effects monitoring plots.
- Motorized equipment (rock drill) and rebar Installation
 - Power drills will be used at the location of the RAWS station in FMU 4.
 - No additional fire effects plots are scheduled for installation in FMU 4, however it is estimated that additional monitoring may be needed in regards to fire effects vegetation in the Shark Slough and regarding fire effects on exotic plant species.
 - It is anticipated that 5-10 additional fire effects plots, consisting of 2 rebar/plot, may need to be installed. Plot design: 30 – 100m belt transect plots with a rebar at each end of the transect.
- Rebar installation
 - Rebar plot marker installation is not scheduled in FMU 4 however additional plot installations may be required in East Everglades project units to study the effects of fire in the ridge and slough and fire effects on exotic species in FMU 4.
 - Estimated 5 to 10 additional fire effects monitoring plots consisting of 2 rebar/plot. Plot design: 30-100m belt transect plots with a rebar on each end of the transect.

Mitigations:

- Creation of improved helispots is prohibited.
- Airboats are prohibited for fire management monitoring
- Motorized equipment is limited to rock drill and power drills.

- Prior to plot installation, number of plots, coordinates and plot design will be presented to the wilderness committee.
- Hand hammering of rebar will be tried prior to using the rock drill. The rock drill will not be used if hand hammering rebar is successful.

Rational for Use:

- Aircraft
 - The use of aircraft is the only way to access remote areas within FMU 4 where monitoring activities are required. Airboat use provides access to limited areas however aircraft landings are the preferred access method for all areas.
- Mechanized vehicles
 - Due to the hazardous terrain and environmental conditions (lightning etc.) hiking to monitoring plots from non-wilderness roads is prohibitive.
- Motorized equipment
 - Motorized equipment (rock drills) are required to effectively install rebar plot markers due to the rock substrate.
 - Motorized equipment (power drill) is necessary to maintain the RAWS station in FMU 4. No primitive tool exists that is capable of removing bolted panels for RAWS station maintenance.
- Rebar installation
 - In order to collect needed fire effects data, additional plots may be installed if existing plots do not provide the necessary information
 - Rebar is required to ensure repeatability of plot measurements and ensure collection of high quality data.

Effects:

Wilderness Character

Untrammelled: Fire is an ecological process that will be controlled and manipulated by fire managers under this alternative. The implementation of prescribed fire and the suppression of naturally ignited fires affect the untrammelled quality of the Wilderness. Under this alternative the trammeling of fire management actions (which serve to reduce hazardous fuel levels in the Park and around values at risk) will create opportunities to safely and effectively manage naturally occurring wildfire without suppression action. In these cases the untrammelled quality will not be affected due to the efforts of previous fire management actions.

Undeveloped: The actual implementation of fire on the ground would leave little imprint as a man-made effect since fire is a natural process for the ecosystems in question. Trails and fire breaks created by using motorized equipment will recover quickly with rapid vegetation regrowth, leaving a very short term imprint. The substrate would remain intact allowing for faster recovery and a shorter-term developed imprint in the Wilderness Study Area. Trails and fire breaks created by using specialized motorized vehicles and airboats would occur throughout the Wilderness Study Area and will leave an imprint until the area recovers. This will be a short term imprint, but longer lasting with specialized vehicles than that created with motorized equipment. In this alternative the type of vehicle, areas in which they are used and options for use are limited, which limits the amount of trails created and areas where the undeveloped quality is affected. The presence of equipment, helicopters, vehicles and airboats in the Wilderness Study Area will temporarily affect the undeveloped quality, however for those that do not leave a imprint after they are gone the effects will only last as long as the equipment and vehicles are present in the area. Rebar installed for fire effects monitoring plots may be considered as a man-made structure, but they are of small diameter and difficult to detect through casual observation.

Natural: Fire management activities described in this alternative enhance the natural quality of the Wilderness Study Area through the maintenance and management of natural processes

of fire. Restoration and maintenance of natural communities and protection of flora, fauna, and natural habitats at risk from unwanted fire impacts maintains fire-adapted vegetation communities and biological diversity, improving the natural quality of the Wilderness Study Area. Monitoring activities and fuels management support the implementation of fire as a natural ecological process and allow managers to use fire to enhance and maintain the natural quality of the Wilderness.

Outstanding opportunities for solitude or primitive and unconfined type of recreation: Opportunities for solitude or primitive and unconfined type of recreation should be relatively unimpaired, except on a very short-term basis. During prescribed fire operations and unplanned wildfires, for safety reasons visitors may be excluded from certain areas within the Wilderness until the fire is officially declared out. Other fire management activities, such as treatment preparation, fire effects monitoring and reconnaissance may require the use of motorized vehicles, aircraft, airboats and equipment, which may disturb this Wilderness quality in the short-term, which will last only as long as the equipment is present in the area.

Cultural resources: The use of prescribed fire treatments and management actions taken on unplanned ignitions protect cultural resource values within the Wilderness Study Area. Prescribed fire operations reduce the amount of hazardous fuel accumulations around cultural values at risk and suppression actions prevent unwanted impacts from further fire spread. The use of motorized equipment mitigates ground disturbance that has the potential to unearth and damage cultural resource artifacts in the Wilderness Study Area. The use of prescribed fire maintains the ethnographic landscapes in the Wilderness Study Area and monitoring activities provide knowledge of resources used in planning and decision making regarding the protection of these resources.

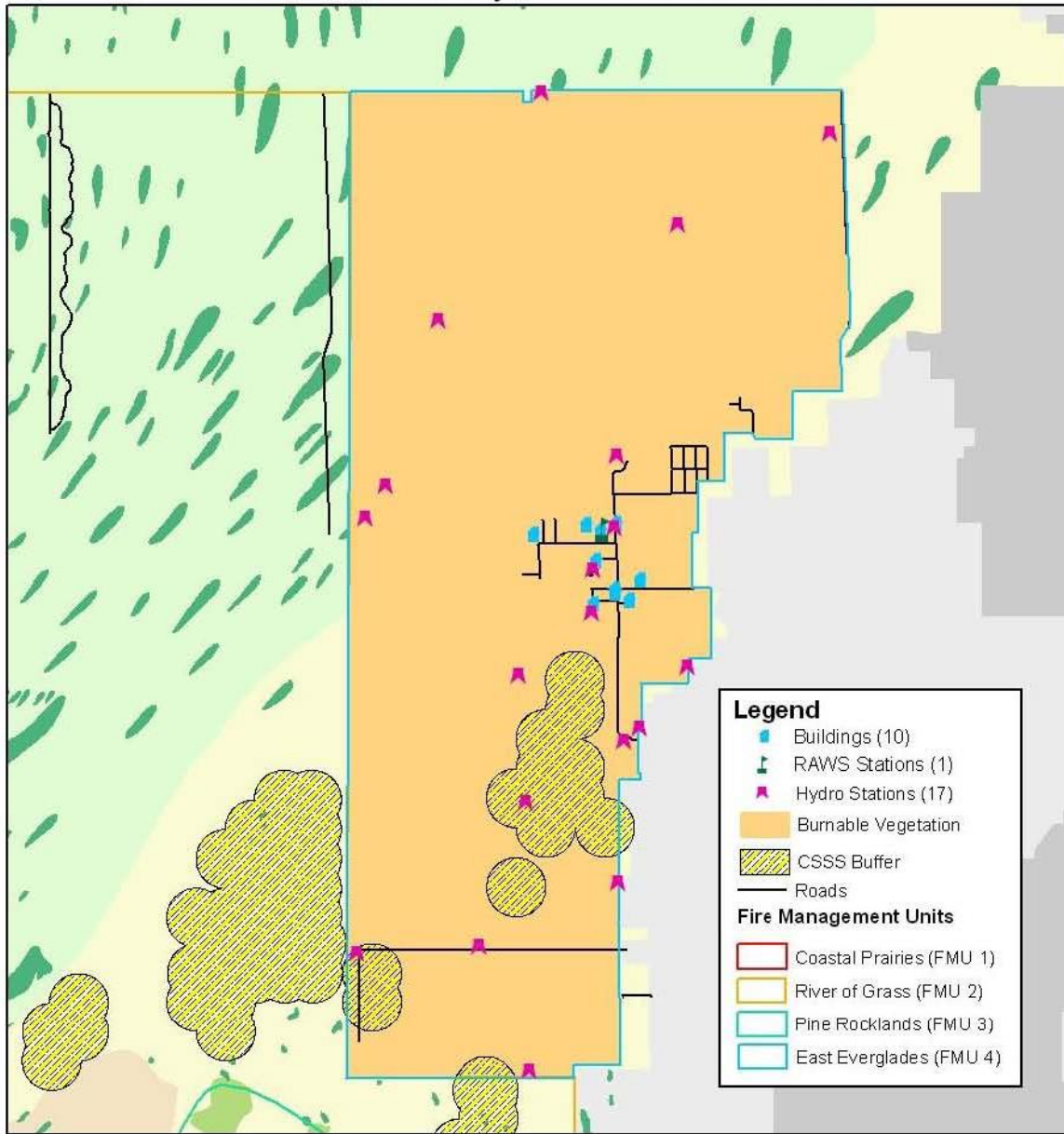
Maintaining Traditional Skills: N/A

Economic and Time Constraints: The preferred alternative would not be more cost effective than other alternatives; however it would allow fire managers to accomplish the required tasks safely and effectively.

Safety of Visitors, Personnel, or Contractors: This alternative affords the greatest level of safety for fire fighters working on the ground as well as protection of life, property and Park values and surrounding communities while maintaining the Wilderness character to the greatest degree possible while accomplishing the task.



FMU4 Values at Risk within Wilderness Study Area Burnable Area

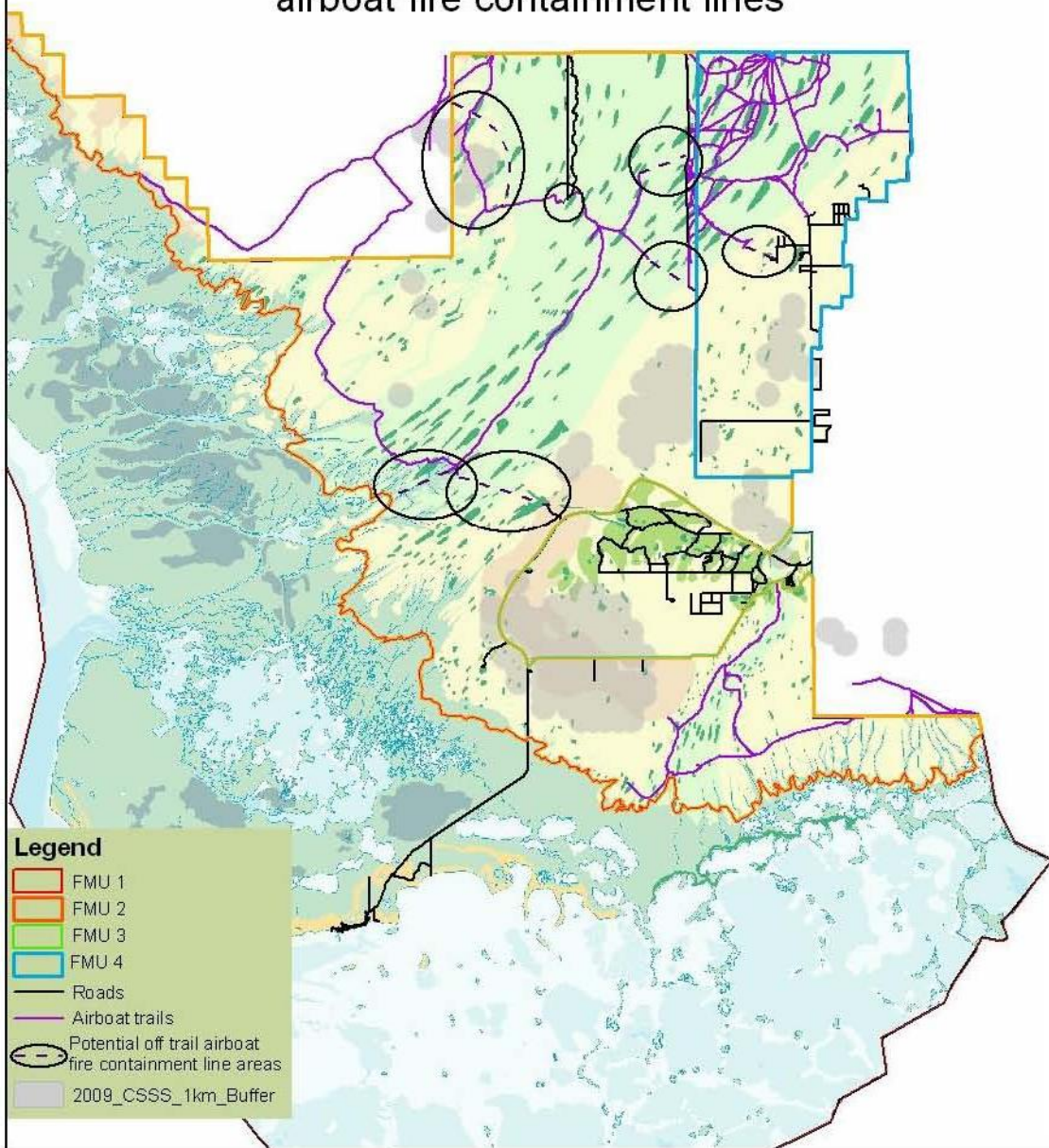


Map Created By: Everglades National Park Fire & Aviation
Location: M:\GIS\Fire\Products\Min_tool\FMU4_min_tool

December 2010



Airboats trails and potential off trail airboat fire containment lines



Everglades Fire and Aviation Management
M:\GIS\Wilderness\Airboats_Wilderness\InTool_2010.mxd

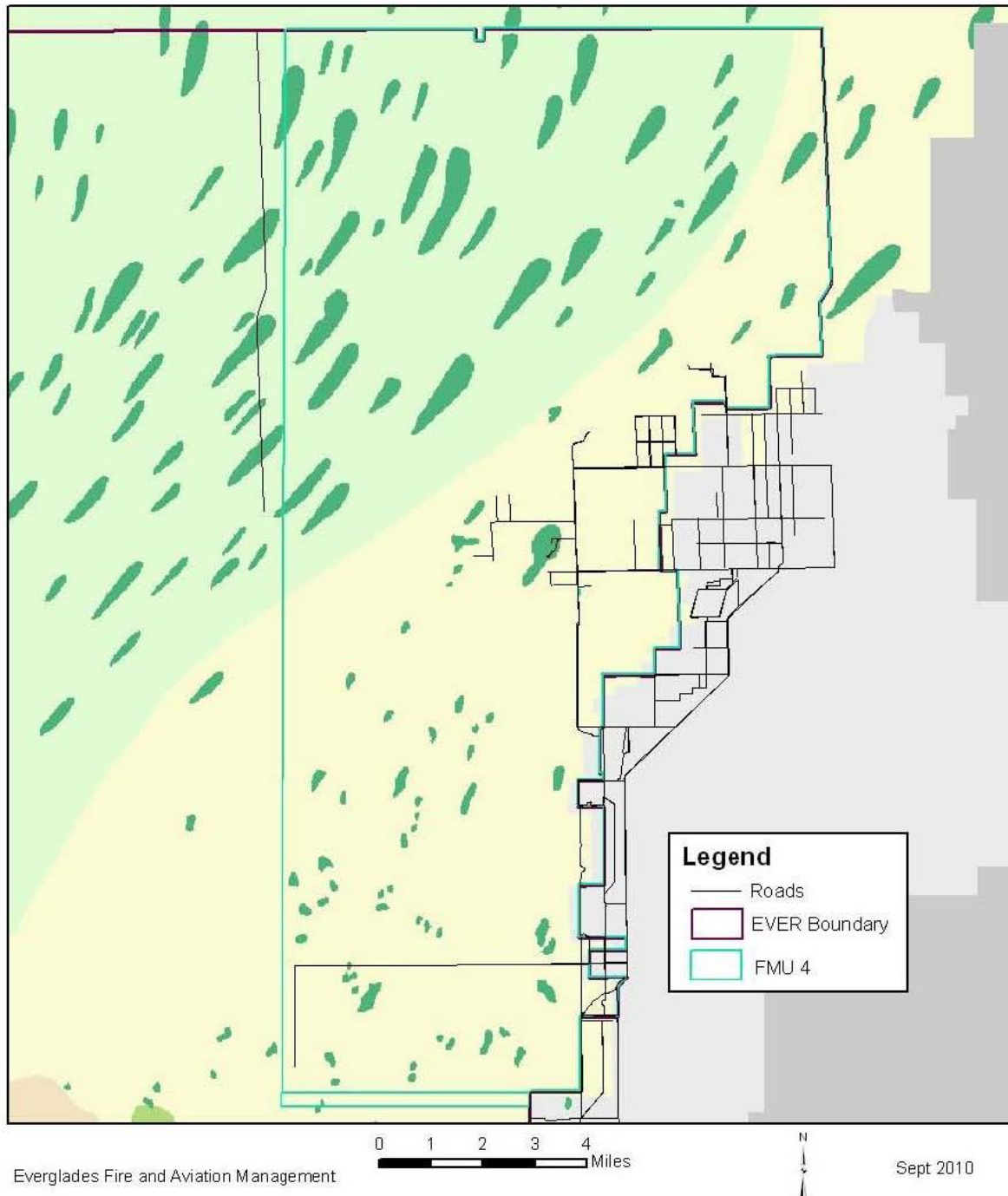
0 1.5 3 6 9 12
Miles



Dec 2010



FMU 4 Wilderness Study Area Roads



Step 2 Decision: What is the Minimum Activity?
To be completed with the Wilderness Committee

Selected alternative:

Alternative #4 – Preferred Alternative:

- Fire Management Unit (FMU) 1
- Fire Management Unit (FMU) 2
- Fire Management Unit (FMU) 3
- Hole in the Donut (HID) Potential Wilderness
- Fire Management Unit (FMU) 4 Wilderness Study Area

Rationale for selecting this alternative:

The Everglades Wilderness Committee determined that the proposed actions of this alternative will maintain Wilderness character to the maximum degree practicable while protecting values at risk and maintaining a safe working environment for firefighters on the ground, minimizing the relative risk associated with fire operations, lightning activity, and high heat indexes, and provide a safe and effective means of transport and escape during the prescribed fire, fuels management, fire and fire effects monitoring operations, and unplanned ignition response operations.

Description of monitoring and reporting results:

This information will be included in the Fire Management Annual Reports and Wildland Fire Reports. Fire Management staff will submit this information to the Wilderness Committee Chair.

Check any Wilderness Act Section 4(c) prohibited uses approved in this alternative:

- | | |
|--|---|
| <input checked="" type="checkbox"/> mechanical transport | <input checked="" type="checkbox"/> landing of aircraft |
| <input checked="" type="checkbox"/> motorized equipment | <input type="checkbox"/> temporary road |
| <input checked="" type="checkbox"/> motor vehicles | <input checked="" type="checkbox"/> structure or installation |
| <input type="checkbox"/> motorboats | <input type="checkbox"/> other: _____ |

Justification:

The Everglades Wilderness Committee determined that these prohibited uses are required to safely carry out fire management activities in the Everglades NP Wilderness, Potential Wilderness, and Wilderness Study Areas.

	Name	Signature	Position	Date
Primary Investigator: Project Leader	Maya Vaidya	<i>Maya Vaidya</i>	Fire Ecologist	1/20/11
Prepared by:	Abby Porter	<i>Abby Porter</i>	Environmental Protection Specialist	1/20/11
Wilderness Committee Chair:	Bonnie Foist	<i>Bonnie Foist</i>	CHIEF RANGER WILDERNESS CHAIR	01/20/11

REVIEW and APPROVAL
Minimum Requirement Analysis

Prior to implementation of the proposed action, the following individuals must review and/or approve the Minimum Requirement Analysis. Signatures indicate review and/or approval.

Prepared by:  Date: 10/27/10

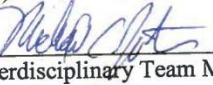
Prepared by:  Date: 10/27/10
Project Lead


Reviewed by:  Date: 10-27-10
Interdisciplinary Team Member

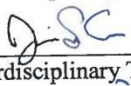
 Date: 10/27/10
Interdisciplinary Team Member

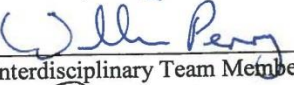
 Date: 10/27/10
Interdisciplinary Team Member

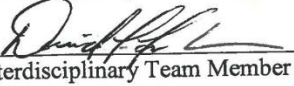
 Date: 10/27/10
Interdisciplinary Team Member

 Date: 10/27/10
Interdisciplinary Team Member

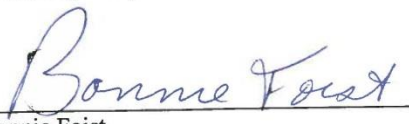
 Date: 10/27/10
Interdisciplinary Team Member

 Date: 10/27/2010
Interdisciplinary Team Member

 Date: 10/27/10
Interdisciplinary Team Member

 Date: 10-27-10
Interdisciplinary Team Member

Date: _____
Interdisciplinary Team Member

Approved by:  Date: 10/27/10
Bonnie Foist
Chief Ranger & Chair of Wilderness Committee

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Appendix G

Minimum Impact Suppression Tactics

The Minimum Impact Suppression Tactics (MIST) are used to minimize the amount of forces necessary to effectively achieve fire management objectives. It applies a greater sensitivity to the impacts of suppression tactics and their long term effects when determining how to manage the fire with the appropriate response and tactics that result in minimum cost and minimum resource damage. MIST is not intended to represent a separate or distinct classification of firefighting tactics but rather a mind set of how to suppress a wildfire while minimizing the long-term effects of the suppression action (RM 18, Chapter 2).

Suppression actions on all wildland fires within Everglades NP will be those having a minimum impact on the physical resources associated with each site. When selecting an appropriate suppression response, firefighter and public safety remain the highest concern.

The intent of MIST is to manage a fire with the least possible impact on the resource being protected. These parameters are considered throughout the incident. It is important to consider probable rehabilitation needs as a part of selecting the appropriate suppression response.

Resources in implementing MIST guidelines for fire managers and resource advisors include the Minimum Impact Suppression Tactics Guidelines (http://www.wildfirelessons.net/documents/GB_Mist_Guidelines.pdf) and the Resource Advisor's Guide for Wildland Fire, PMS313, Jan 2004 (http://www.nwcg.gov/pms/pubs/RAguide_2004.pdf).

Guidelines

I. Incident Management Considerations

Fire managers and firefighters select tactics that have minimal impact on values at risk. These values are identified in the Fire Management Plan. In implementing MIST, firefighters will follow the following recommendations:

- Ensure the health and safety of firefighters, employees, and the public.
- Evaluate suppression tactics to ensure they meet Fire Management Plan objectives and MIST.
- Communicate MIST during briefings and implement during all phases of operations.

II. Responsibilities

Incident Commander Responsibility

The IC's responsibility is to respond to wildfires with a full range of fire management strategies. These should meet objectives of the incident with the least possible impact and cost, managing the fire in conjunction with MIST. The Fire Management Officer or designee will provide direction based on local knowledge and WDFSS analysis for which the IC will be responsible for adhering to during incident response.

III. Implementation

Safety

Operational guidance directs all fire management activities to be conducted to enhance and provide resource benefit and mitigate risk from unwanted wildland fire while providing for firefighter and public safety. All actions will conform to safety policies defined in, but not limited to: *Interagency Standards for Fire and Fire Aviation Operations* guide (Red Book), *NPS Director's Order 18*, and Standards for Operations and Safety chapter in the *NPS Reference Manual 18*.

- Apply Lookouts, Communications, Escape Routes, and Safety Zones (LCES) to all planned actions.
- Review and apply the “18 Watch-Out Situations” and “10 Standard Fire Orders”.
- Be particularly cautious of the following:
 - Burning snags
 - Burning or partially burned live and dead trees
 - Unburned fuel between you and the fire
- Designate Escape Routes and Safety Zones

General Considerations

- The water tanks of air tankers will be rinsed prior to use in the Park to eliminate residual substances being transferred through the water being dropped.
- During fire management operations, funnels and spouts will be used when dispensing fuel and/or oil, spill containment berms will be used during portable pump operations, and containers will be filled to the appropriate level to prevent overflow and spills.
- Class A foam (surfactant) will only be used to protect life and property. Everglades fire management engines will be flushed to eliminate residual foam in pump equipment that will be used in Park fire operations.
- Specialized equipment will be used only when an operation cannot be safely completed and/or impacts to values cannot be mitigated without the use of this equipment.
- Fire retardant will be used only when an operation cannot be safely completed and/or impacts to values cannot be mitigated without the use of retardant. Additional approval from the superintendent will be required prior to the use of retardant.
- Types II and III helicopters are allowed to land in unimproved sites but no improved heli-spots can be created (Type I helicopters cannot land). Any helicopter can be used for water drops within airspace over MSD Wilderness. Types II and III helicopters can also be used for delivering people and equipment for aerial reconnaissance and aerial ignition operations.
- Motorized vehicles (such as trucks, fire engines, and passenger vehicles) are restricted to established roads and essential wilderness roads unless an operation cannot be safely completed and/or impacts to values cannot be mitigated. Wildland fire management operations will conform to the Minimum Tool Analysis unless the onsite fire manager deems it is necessary to utilize additional resources in fire response.
- ATV's/UTV's are authorized on roads and off-road in direct support of wildland fire management operations. Wildland fire management operations will conform to the Minimum Tool Analysis unless the onsite fire manager deems it is necessary to utilize additional resources in fire response.

- Mechanized equipment such as weedeaters, pumps, chainsaws, pushmowers, and mechanized battery operated hand tools such as drills are allowed in support of wildland fire operations. Wildland fire management operations will conform to the Minimum Tool Analysis unless the onsite fire manager deems it is necessary to utilize additional resources in fire response.

GIS Model for Archeological Site Prediction and Survey Planning at EVER

Prepared by Guy Prentice and Jill Halchin
Southeast Archeological Center
April 2014

Introduction

Everglades National Park (EVER) requested that staff members of the Regionwide Archeological Survey Program (RASP) at the Southeast Archeological Center (SEAC), in Tallahassee, Florida prepare a site prediction model to aid the park in assessing the potential for unidentified archeological sites within various park ecosystems and landforms, and to suggest archeological survey strategies to evaluate and refine the model over time. Existing site information recorded in SEAC's archeological site Geographic Information System (GIS) and the NPS's Archeological Site Management Information System (ASMIS) database were used in combination with the most current existing GIS vegetation and elevation data provided by Everglades National Park to characterize various portions of the park as high, medium, low, and very low site probability areas based on the statistical correlation of known sites with specific vegetation types and, to a lesser extent, topographic features. Unfortunately, there are several factors that limit the usefulness of the available GIS data, but, despite the shortcomings, a number of predictive correlations are evident, and they can guide the planning for future survey efforts. The results of that survey effort can then be used to improve and refine the predictive model, which can in turn be used for both general cultural resource management purposes and prioritizing the inventory of all significant archeological sites in the park as required by law.

Prior EVER Archeological Survey

Normally, in the process of developing predictive models for archeological site distributions, one reviews the results of past archeological research and assesses the potential effects or biases that prior archeological surveys may have had on identifying where currently known sites are located. Fortunately, this has essentially been done previously by John W. Griffin (1988) in his synthesis of the archeology of Everglades National Park and augmented by subsequent survey conducted in 2004 by SEAC Archeologist Margo Schwadron (2009). Rather than recount here what Griffin has already thoroughly presented in his overview and assessment of the archeological resources contained within the park, the current document will simply summarize some of the primary highlights abstracted from his synthesis that are most pertinent to the topic at hand, which are the history of prior survey and patterns that have been previously identified concerning the distribution of sites within the park.

Prior to the survey work that was conducted by SEAC archeologists in the early 1980s, the vast majority of sites within Everglades National Park were recorded during archeological investigations for which we have no information regarding where surveys were conducted except in those instances where site locations were recorded. This includes the 50 sites identified during Goggin's survey of the Everglades in the 1950s (Griffin 1988:167), the incidental recording of sites by EVER park staff in the mid-1950s to mid-1960s (Griffin 1988:168), and Griffin's own abbreviated survey involving the visitation of 21 sites in 1964 (Griffin 1988:168).

In 1965, the NPS contracted with Florida Atlantic University (FAU) for the preparation of an archeological base map, which was directed by William H. Sears and was to include aerial photomosaics showing all known site locations within the park, of which there were 74 at the time of the project (Griffin 1988:168). Although the identification of archeological sites on the basis of vegetation patterns was pioneered during this study, the bulk of the project consisted chiefly of compiling the results of previous work with little in the way of site visitation (Griffin 1988:169).

Except for a few serendipitous discoveries by park staff that increased the park's overall site count slightly, the site information that had been compiled by Sears and his FAU colleagues for EVER in 1965 essentially represented the full inventory of known sites in the park until a three-year survey of EVER was conducted from 1982 to 1984, led by a team of SEAC archeologists who had just completed a five year inventory project of sites in Big Cypress National Preserve (BICY). The first phase of the 1982-1984 SEAC survey project involved reconciliation of all the EVER site information previously compiled by the State of Florida's Master Site File (FMSF) staff. Of the 168 sites considered candidates for inclusion in the EVER site inventory, 87 were confirmed to exist within the park, 37 were found to be outside park lands, and 35 were listed as having unknown locations as a result of insufficient data in the FMSF (Taylor 1985:22-23). Nine sites were deemed to be duplicates. Subsequently, over the course of their three-year survey, the SEAC archeological team added an additional 104 sites to the park's inventory, bringing the total site count to 191 (Griffin 1988:169).

Guided by the results from their earlier five-year survey at BICY, the 1982-1984 archeological inventory efforts brought to bear at EVER by the SEAC archeologists were largely guided by the visual examination of false color infra-red aerial photographs (Mark Hurd 1:80,000) that had been obtained for the entire park and the targeting of areas that appeared as magenta colored patches on the aerial photos, which experience at BICY had shown was a reliable signature (Ehrenhard et al. 1982:25) for hardwood hammocks and the most likely places for finding prehistoric and/or Seminole occupations. Their predictive model was based on the premise that these aboriginal sites would be primarily located on higher drier hammock ground, and secondly would be nearest the deepest adjacent water course or slough (Griffin 1988:176). In other words, using the color signatures visually observable on the false color imagery, which typically correlated with hardwood hammocks, the SEAC archeologists focused mainly on identifying and visiting the targeted hardwood hammocks to seek out sites, with the logical result that most of the sites discovered during the three-year survey corresponded with this forest vegetation type. To avoid claims of sample bias in their survey methods, however, the project supervisors expanded their sampling strategy during the first year of the survey to include spot ground checks at 35 loci situated in various other environmental settings, including sawgrass, salt marsh, pinelands, salt prairie, and bay head, all with negative results (Ehrenhard et al 1982: 26; Griffin 1988:175). The project authors assert that their "numerous probes" in most of these environments showed them to be too low and wet to be suitable for habitation, but conceded that excavations had not been undertaken to rule out the possibility of deeply buried cultural remains (Ehrenhard et al 1982: 26). Although there does not appear to have been a deliberate effort to sample more of the low probability environments following this initial year of field investigation, the SEAC archeologists continued to document those locations where their site visits failed to turn up evidence of human occupation. In the final report prepared after the three-year project was completed, Taylor (1985:12) reported that

All ground truthed points and selected helicopter overflights were plotted on the survey's quadrangles. A total of 408 ground truths were conducted during the three field seasons from 1982 to 1984.

Until very recently, the location of the EVER survey quadrangle maps employed during the 1982-1983 SEAC survey to record site visits had gone missing from the accessioned materials (SEAC Acc. 590) curated with the documentation associated with this three-year project, but as a consequence of

undertaking the present study the survey's quadrangle maps have been relocated and the information contained within them added to the Center's GIS data so that it can be used for further analysis and model testing. And while we are still in the process of determining which of the visited sites recorded on the survey's quadrangle maps involved on the ground inspections with subsurface testing and which consisted of less intensive survey methods, among the 433 site locations and site visits that are documented on the quad maps, 123 (28.4 percent) fall within what are currently classified as high probability areas, 36 (8.3 percent) fall within medium probability areas, 124 (28.6 percent) fall within low probability zones, and 150 (34.6 percent) fall within very low probability zones. Also filed among the papers curated with this project is a hand written compilation of negative site visits with each entry on the list generally consisting merely of a UTM grid coordinate, an indication of the kind of visit (ground truth, ride-by, or aerial fly-by), a page number in a field note book, and the date on which the visit occurred. The information contained on this list was also entered into the Center's GIS, resulting in 237 records distributed among the four probability areas as follows: 115 high (48.5 percent), 13 medium (5.5 percent), 79 low (33.3 percent), and 30 very low (12.7 percent), although again we are still in the process of refining the level of investigation conducted in each case.

To summarize, during the 1982-1984 SEAC EVER survey, over 400 areas located in a variety of environmental settings were examined at different levels of intensity, of which 191 proved to be archeological sites. The majority (125 of 191 or 82.2 percent) of these were prehistoric earth middens located within the interior portions of the park where they were generally situated on hardwood hammocks. In terms of acreage, however, these relatively small earth midden sites constituted a small proportion of total site area (Table 1), with shell works and shell middens located in the Ten Thousand Island area comprising nearly 87 percent of the combined total area for all known prehistoric sites, when a few miscellaneous site types such as eroded beaches, relic shell ridges, and the like are excluded.

Following completion of SEAC's EVER survey in the 1980s, it was Griffin's opinion that "Certainly most of the major sites, meaning the larger and more conspicuous ones, are known, but some smaller middens have probably escaped detection" (Griffin 1988:179). He then pointed out the area near the mouth of the Shark River as one that has probably eluded complete inventory due to logistic problems and its "inundated labyrinthic character" as well as several sites reported by Small, Hrdlicka, and Goggin that have not been relocated and subsequently dropped from the official site inventory for the park (Griffin

Table 1. Total Areas for the major site type Groupings Identified during the 1982-1983 SEAC EVER Survey (from Taylor 1985:39).

Location	Site Type	Acres	Percent	No.	Percent
10,000 Islands	Shell Works	231.2	75.5%	12	7.6%
10,000 Islands	Shell Middens	34.94	11.4%	20	12.7%
	Subtotal	266.14	86.9%	32	20.4%
Mangrove	Earth Middens	17.29	5.6%	26	16.6%
Shark Slough	Earth Middens	17.67	5.8%	62	39.5%
West Everglades	Earth Middens	2.15	0.7%	34	21.7%
Taylor Slough	Earth Middens	3.06	1.0%	3	1.9%
	Subtotal	40.17	13.1%	125	79.6%
	Total	306.31	100.0%	157	100.0%

1988:179-180). Admitting that the inventory of archeological sites at EVER “cannot be regarded as absolutely final,” and that the rock ridge area in the eastern part of the park deserved additional attention in light of the late Paleoindian and Early Archaic projectile points that had recently been discovered with human remains and extinct megafauna by Carr (1986) at the dry sinkhole known as the Cutler Fossil Pit (8Da2001), Griffin also pointed out the possibility of the existence of inundated sites in the park interior as suggested by the finds dredged up at the Anhinga Trail site in 1968 (Griffin 1988:180).

In the 25 years that have passed since Griffin prepared his synthesis of the archeological research that had been conducted at EVER up to that point, there has been little substantive revision to his general characterization of the distribution of site types located in the park. To be sure, there has been additional survey and an increase in the park’s archeological site count, particularly as a result of the inventory of sites in the Eastern Everglades Expansion Area (EEEA) that was conducted in 2004 by SEAC (Schwadron 2009), with this work largely reaffirming the high correlation of hardwood hammocks on tree islands as likely prehistoric and Seminole occupations (Schwadron 2009:1). The 2004 fieldwork also demonstrated the efficacy of using the University of Georgia (UGA) Vegetation Classification System for South Florida National Parks GIS coverage to computerize the identification of hardwood hammocks so they can be targeted for archeological survey.

In addition to reaffirming the high degree of correspondence between hardwood hammocks and prehistoric occupations, the 2004 SEAC survey also demonstrated that like the tree islands supporting hardwood hammocks, the slightly elevated areas characterized as bay heads and willow tree islands were also likely to have sites as well. The question over whether concentrating exclusively on these few vegetation types for prioritizing site surveys was potentially underrepresenting the potential for sites in other vegetation zones was also moderately addressed when Schwadron expanded her survey sample to include pineland, shrub lands, and marsh areas (Schwadron 2006, 2009:91). This was accomplished by examining six locations within a 1054-acre tract of land located along the periphery of the EEEA that was slated for a proposed land exchange with the South Florida Water Management District. The six targeted areas in the proposed land exchange were classified in the UGA vegetation coverage as hardwood scrub lands, exotics (Brazilian pepper), and marsh/willow islands. Pedestrian walkovers and excavation of a single shovel test at four of the six sampled areas failed to turn up any evidence of past occupation. Access to the other two targeted areas was blocked by canals; however visual inspection of the two areas determined that they were clusters of Brazilian pepper, had no high ground and, therefore, no potential for being site locations (Schwadron 2006:15).

After completion of the EEEA survey, Schwadron (2009:306-307) concluded

High potential archeological site areas include classic hardwood tree islands, willow tree islands in Shark River Slough, and a linear cluster of tropical hammocks along Grossman’s Ridge. Low potential areas include low inundated areas, such as sawgrass prairie and marshes, as well as scrubland, willow islands and exotics located within the dry, low rocky glades.

Schwadron’s research did more than simply reaffirm the site prediction model that had been tested during the 1982-1984 SEAC EVER survey. Coupled with similar recent findings that were being reported somewhat simultaneously elsewhere (e.g., Carr 2002), Schwadron’s research in the EEEA substantially altered archeologists’ perceptions of when prehistoric settlement of the interior Everglades occurred. Prior to undertaking the EEEA project, most archeologists, following the arguments presented by Widmer (1988) had concluded that prehistoric occupation of the Everglades had not occurred until approximately 700 B.C. as a consequence of sea level fluctuations. Prior to the stabilization of sea levels at near modern levels approximately 2700 years ago, Widmer had viewed the interior of the Everglades as largely a desert, incapable of supporting anything other than small groups of wandering hunter-gatherers. But, as a

result of Schwadron's documentation of Middle to Late Archaic period occupations at four sites—Sour Orange Hammock (EVER-203, 8Da2181), Poinciana Hammock (EVER-206, 8Da71), Irongrape Hammock (EVER-208, 8Da72), Heartleaf Hammock (EVER-221, 8Da2192), and Grossmans Hammock Complex (EVER-229, 8Da28)—within the EEEA that dated as much as 3000 B.C., our ideas of when the Everglades were inhabited now need to be adjusted.

Recognition of these much older occupations was accomplished in part by penetrating a buried mineralized carbonate layer present on nearly all of the tested tree islands, and is currently interpreted as a calcrete layer that appears to mark a hiatus in human occupation of the interior Everglades from circa 1800-700 B.C. (Schwadron 2009:107), perhaps as a result of an extended period of higher water levels during this time period or alternatively as a result of human efforts at land modification (or both). The recognition of the existence of these Archaic period sites within the park has also prompted Schwadron (2009:43) to propose that other types of Archaic period sites, such as cypress pond mortuary sites similar to the Bay West site located on the western fringe of Big Cypress Swamp, may potentially be present within the EVER region, as well.

Other South Florida Site Prediction Models

The site distribution patterns that have been previously identified for EVER have also been observed in areas located outside the park boundaries. A study recently prepared by New South Associates (Smith 2008) for the Comprehensive Everglades Restoration Plan (CERP), has identified similar environmental associations with the distribution of known archeological sites within a project area spanning portions of 13 counties in south Florida. In the site distribution analysis offered by the CERP study, the more elevated areas within otherwise wet environments that can be characterized as supporting hardwood hammocks, bay heads, willow heads, and cypress heads, were again identified as containing the majority of post-Archaic period occupations (Smith 2008:35). The CERP archeological study also recognized the correlation between Paleoindian and Early Archaic occupations with former springs or sinkholes now inundated or covered by boggy peats (Smith 2008:33) as well as the presence of Middle and Late Archaic occupations beneath calcrete layers on tree islands.

Based on these observations, New South archeologists recommended that “pond margins, tree islands, hammocks, ridges, sinkholes, and slough margins should be considered to have Medium to High site probability until investigated through intensive subsurface testing” (Smith 2008:35). Conversely, pine flatwoods and low wet areas such as sawgrass prairies were considered to constitute generally low probability areas except potentially in those situations where they constituted a “contrasting biome” by virtue of their having localized higher relative elevation and better drainage compared to an adjacent, distinctly different environmental zone, in which case sites can also sometimes occur (Smith 2008:47).

Modeling EVER Site Distributions

It should be evident at this point that among the predictive models that have been previously developed for EVER and south Florida, the emphasis has been on identifying vegetation, elevation, hydrology, geology, and other environmental or geographical conditions that can be shown to have measurable correlations with the frequency of site occurrence. To a certain extent these approaches imply that past human behavior as reflected in these site distribution patterns are linked to past or present environmental variables that influenced settlement decisions, but precisely what those determinant variables were, whether it was the availability of dry land, botanical resources, terrestrial or aquatic fauna, ease of access, distance from the Gulf coast, or some socio-economic factor is a matter that can be addressed at another time (as per Russo and Anderson 2009). Rather than attempt to explain the reasons why sites occur where they do, for optimizing future site discovery as per Section 110 and for meeting Section 106 compliance requirements, the goal here is simply to determine the likelihood that unidentified sites exist in what are currently believed to be moderate to very low probability areas.

GIS Model Development

Building on the results of the previous studies summarized above, planning for model development for EVER began with examination of the available environmental GIS data sets—elevation, water, vegetation, soils, etc.—with respect to their likely potential for predicting sites. Factors evaluated included content, coverage, accuracy, coordinate system, datum, and format, all of which would affect the data's usefulness for the project and would identify the need for additional data processing to prepare GIS information for later steps in the analysis. As a result of the review, the only suitable data available are vegetation, elevation (from LiDAR), water, and to a minimal degree historical maps; however, issues were identified with each of these.

SEAC staff used ArcGIS 10.1 SP1 for the analysis, with the results stored in two geodatabases, one for the elevation-related analysis and the other for the sites, vegetation, and other data. Also included in the GIS analysis were historic maps that were georeferenced to indicate the approximate locations of potential EVER sites, such as Second Seminole War era camps and forts. The routes of historic roads, trails, and canals represented on a number of such maps were also digitized as a possible means of developing buffer zones around them where it is believed unrecorded historic sites are most likely to be found.

Elevation

This data does not cover the entire park, but its accuracy and resolution warranted further evaluation. The derived bare earth LiDAR data was used to reduce the effects of vegetative overgrowth in modeling the project area topography. Of the datasets provided by the park to SEAC, the highest resolution consists of 5-foot-cell rasters for all of the Collier County and most of the Monroe County portions of the park, and 10-foot cell data for the eastern and southern edges of Dade County. A large gap in the park's interior exists for the Shark River Slough, the prairies, the central pine and cypress zones, and Taylor Slough areas. The coordinate system for the elevation data is Florida State Plane East HARN 1983, with elevations expressed in feet. The horizontal accuracy of the source (LiDAR) data for Dade County was estimated as 3.8 ft at the 95 percent confidence level. The vertical accuracy varied, but was estimated to be, in general, 1.19 ft at the 95 percent confidence level. The Collier and Monroe data horizontal accuracy is described as 3.8-feet and the vertical was estimated at 0.6-foot for unobscured areas.

Water

Water-related data is available from several sources, although all are based largely on the National Hydrography Dataset. For purposes of this project, the simplified versions that were used as breaklines during LiDAR processing and data provided with the ArcGIS license from ESRI proved most useful. The breaklines were in Florida State Plane coordinates and the ESRI data were in degrees WGS1984. These datasets were merged to create a single GIS source for most of the streams and lakes and many of the ponds in the park. The data played a peripheral role in initial development of the prediction model, but may prove useful in refining the model.

Vegetation

The Vegetation Classification System for South Florida National Parks data set was originally created by the University of Georgia (UGA) in 1999. That portion pertaining to EVER was provided to SEAC by EVER GIS staff in UTM zone 17 NAD 1983 (original). During the examination of this data, it was discovered that the vegetation polygons did not align well with other data layers, such as the elevation and high resolution aerial imagery. Numerous measurements throughout the dataset showed that discrepancies ranged from less than 10 meters to more than 50 meters, with many areas in the 20-30-meter range. In general, discrepancies increased from northeast to southwest, but were inconsistent in both direction and distance. It was not a simple shift, scale, or rotation problem. Because many prehistoric sites are quite small, a prediction model with errors of this magnitude would be of very limited use. Examination of

coordinate systems, datum points, and map transformations did not reveal any one of those alone to be the source of the problem.

Because the vegetation data that the park provided for this project had been merged into datasets coterminous with the fire management units, a copy of the data as created by UGA was also checked and found to have the same errors. UGA produced the data broken into areas that are more or less coterminous with USGS quadrangles. An internet search for more information located a journal article (Welch, Madden and Doren 1999), which described the steps undertaken to produce the vegetation data. They began with georeferencing satellite imagery for south Florida using 23 GPS positions for roads and bridges as registration points. The digitizing was based on color infrared imagery (CIR) that had been enlarged from 1:40,000 to 1:10,000 scale. The CIR images were georeferenced to the satellite images, providing an estimated accuracy of ± 5 to ± 9 meters, similar to that of 1:24,000 scale quads. While this procedure was adequate for its day, especially given the large area to be mapped, errors could have been introduced in any or all of the steps in the process.

Historic Maps

A concerted effort was made within the time allowed to locate historic maps that could identify the approximate locations of heretofore unidentified historic sites located in the park. The most obvious avenue to begin the search was for maps dating to the early nineteenth century showing sites related to the U.S. military's campaigns against the Seminole groups occupying the Everglades and Big Cypress Swamp. Among those most readily available were various versions of the "Military Map of the Peninsula of Florida" prepared by Joseph C. Ives in 1856, a portion of which is reproduced for the reader as Figure 2. The 1856 map was georectified in the Center's GIS based on the lines of latitude and longitude drawn on it, to produce Figure 3, which puts Fort Henry close to the eastern boundary of the park and also shows

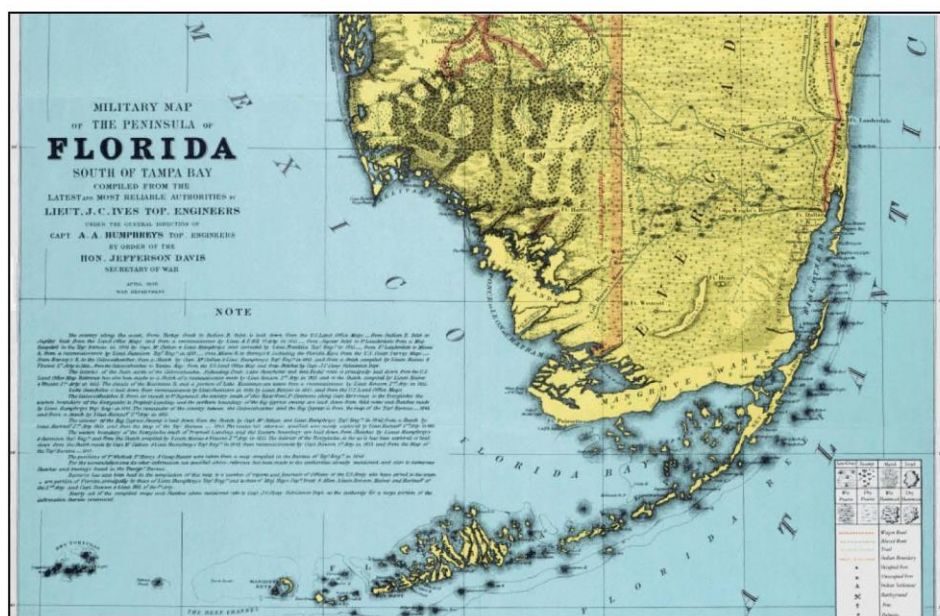


Figure 2. Select portion of the "Military Map of the Peninsula of Florida South of Tampa Bay" prepared by Lt. Joseph C. Ives in 1856.

two military posts—Camp Hunter and Fort Westcott (a.k.a. Ft. Wescott)—located west of what is called Long Key and within the Shark River Slough area of EVER. As Greg (2008:57) has previously noted, under this projection, the 1856 Ives map cannot be viewed as particularly reliable for pinpointing exactly where these sites were located, but it does appear to provide a reasonable approximation given the map’s relatively good correspondence with Florida as a whole.

Fort Henry, Camp Hunter, and Fort Westcott are all shown on a map prepared ten years earlier by Joseph Goldsborough Bruff and engraved by D. McClelland entitled *The State of Florida Compiled in the Bureau of Topographical Engineers from the best authorities*. When scaled and georectified using the latitude and longitude indicated along the edges of the map and displayed against the EVER park boundary in a manner similar to that done for the 1856 Ives map in Figure 3, the result is the badly plotted map shown in Figure 4, where there is clearly an error in the assigning of latitude and longitude on the 1846 Bruff map.



Figure 3. Select portion of the 1856 Ives map georectified on the basis of longitude and latitude and displayed with the EVER park boundary (magenta line).

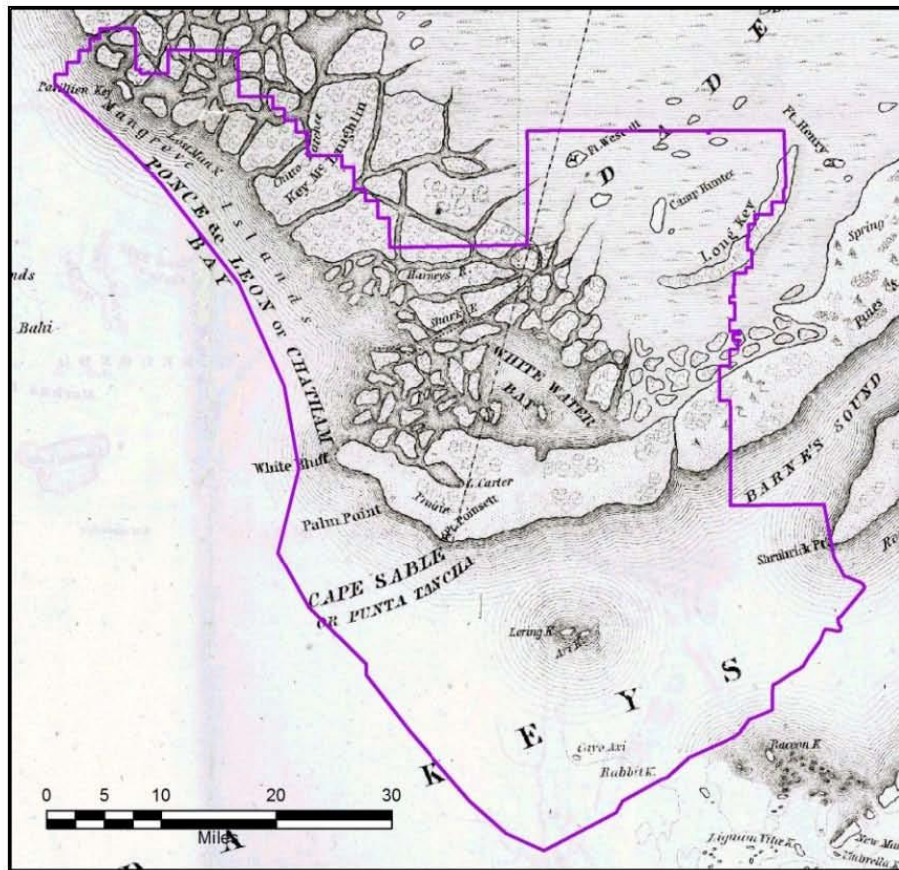


Figure 4. Select portion of the 1846 Bruff map georectified on the basis of longitude and latitude and displayed with the EVER park boundary (magenta line) (from <http://lcweb2.loc.gov/gmd/gmd393/g3930/g3930/ct000140.jp2>).

If, however, the same scale is retained and the map is simply shifted southwestward to align the southern end of Long Key with what today is the southwestern end of Long Pine Key (as shown in Figure 5), the result places Fort Westcott along the western edge of Shark River Slough toward the head of the Broad River, and Camp Hunter falls in the approximate location of Papaya Hammock and Pa-hay-okee Bayhead. With this projection, Camp Henry is plotted outside the eastern edge of the park boundary.

According to an article appearing on page 2-D in the Saturday, Dec. 10, 1983, issue of the *Sarasota Herald Tribune* (Figure 6), the location of Fort Henry was discovered in 1983 by Bill Steele after the star-shaped feature was pointed out to him on an aerial photograph by Florida archaeologist Robert Carr. Also, according to the 1983 article, the relocated fort was said to be found in the Everglades on a tree island among agricultural fields roughly 5 miles southeast of Chekika State Park where it “overlooked a crucial canoe waterway.”

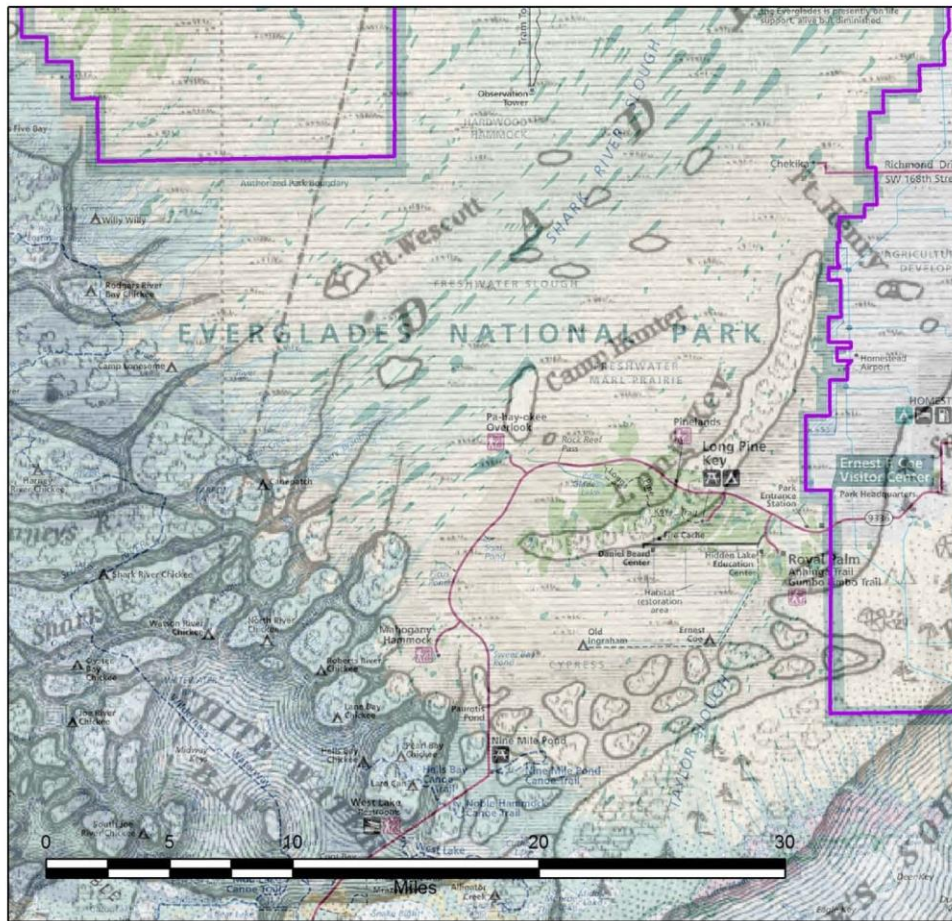


Figure 5. Repositioned semi-transparent copy of the 1846 Bruff map overlaid onto the EVER park brochure map.

Interestingly, prior to the initiation of this study in 2013, the FMSF had no record of the discovery of Fort Henry among the site files kept by the state. But, when contacted directly to provide more information on the fort's discovery, Carr provided both SEAC and the FMSF with newly prepared state site forms along with a map showing the location of Fort Henry (8DA3223) situated approximately 4.5 miles southeast of the Chekika day use area (formerly Chekika State Park) and outside the park.

According to the hypothetical projection provided in Figure 5, the distance from the Chekika day use area to Fort Henry is around 6 miles and Fort Henry is likewise located outside the park. In the projection of the 1856 Ives map shown in Figure 3, the distance between Chekika day use area and Fort Henry is only 3.5 miles and Fort Henry falls along the park boundary, suggesting that the georeferencing of the 1846

Historic Fort In Everglades Finally Found

MIAMI (AP) - A local historian has discovered the site of a fort built in 1842 as a major naval base in the Everglades during the Second Seminole War, ending what experts call a century-old mystery.

Bill Steele recently pinpointed Fort Henry, southwest of Miami, on a small island in the Everglades after months of detective work that included digging for information in the National Archives in Washington.

The fort, named for Lt. John C. Henry, commander of the USS Wave, which operated off the South Florida coast during the Seminole Wars, was part of a chain of military depots crisscrossing the peninsula. It has since been destroyed by crop plowing.

Over the years, archeologists looked for Fort Henry, but made little progress because military maps incorrectly showed the base near Long Key, a major tree island in the Glades west of Homestead, said Dade County Archeologist Robert Carr.

Steele remained absorbed in the mystery.

"I was looking at the 1856 Ives military map of Florida and saw that Fort Henry was close to Miami," he said. "I wanted to see it."

The hunt led Steele through letters and reports of military

men who had served at Fort Henry. He said their descriptions of the area differed greatly from the concept of mapmakers and even more from what is there today.

Steele said he found a set of Navy map coordinates that put Fort Henry in an area of agricultural fields about five miles southeast of Chekika State Park.

"A friend of mine and I went out there with a metal detector. We gave it a kind of thorough going over. But we didn't find anything," he said.

Then Steele showed his evidence to Carr, who obtained six aerial photos by the U.S. Geological Survey.

"There was nothing there but this little island about a hundred yards from where we had been looking," Steele said. "But then Carr pointed to the star-shaped area on the island and we realized it was the site of the fort."

Steele said an outline of the fort's walls could be spotted in the aerial photo.

The tiny fort had overlooked a crucial canoe waterway through the sawgrass used by the Seminoles to travel between their Everglades camps north of Miami and the Shark River in the heart of the Everglades.

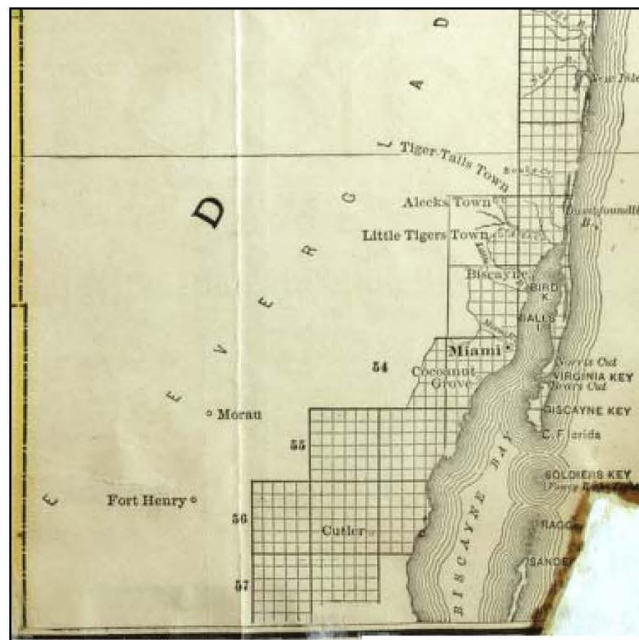
Figure 6. Portion of page 2-D of the Saturday, Dec. 10, 1983, issue of the *Sarasota Herald Tribune* (from Google News Archives <http://news.google.com/newspapers?nid=1755&dat=19831210&id=hPQcAAAAIAAJ&sjid=yWgEAAAIAAJ&pg=2799,9902333>).

Bruff map as shown in Figure 5 may be closer to reality than the projection of the 1856 Ives map as shown in Figure 3.

Although not illustrated here, another attempt to georeference the 1856 Ives map was made by matching Fort Henry and Cape Sable's Fort Poinsette on the 1856 Ives map, respectively, with the locations of 8DA3223 and Cape Sable in the SEAC GIS. In this case the plotting of Chekika Island on the Ives map fell 1.7 miles (2800 m) west of the true location of Chekika Island. This projection also placed Camp Hunter within 1 mile (1700 m) of Papaya Hammock and Fort Wescott within 0.5 mile (650 m) of Mosquito Island where EVER-66 is reported to exhibit "a prolific scatter of historic debris" (Taylor 1985:348).

In addition to the military maps associated with the U.S. campaigns carried out against the Seminoles during the Second (1835-1842) and Third Seminole (1855-1858) Wars, a number of other maps of a historical nature were found that showed the location of Fort Henry southwest of Chekika instead of southeast as previously shown on the 1846 Bruff and 1856 Ives maps. These include a map of Florida included in the 1875 publication of *Gray's Atlas* (Figure 7) and a map published in 1888 entitled *A New Sectional Map of Florida* (Figure 8).

The 1875 *Gray's Atlas* map is also different from the Seminole War era maps previously illustrated in that it shows Fort Henry located northwest of Long Key's northern tip rather than northeast. It also shows the fort slightly south of the east-west oriented line separating Township 55S from 56S, but has erred in numbering the townships such that what is numbered Township 55 on the map is actually Township 56, 54 is actually 55, etc. Except for its error in numbering the townships, the placement of Fort Henry on the *Gray's Atlas* map is not unlike that shown on the 1888 sectional map in terms of its placement relative to the township lines, but the 1888 map also includes a place labeled "Morau" that falls within the boundaries of EVER. A search of the internet for the term Morau failed to turn up anything related to the history of the Everglades.



A map drafted by William J. Krome while surveying a potential railroad route from Miami to Cape Sable for Flagler's Florida East Coast Railway Company in 1903 (Figure 9) is potentially useful in that it shows an early twentieth century perspective of what constituted Long Key, or Long Pine Key, as it has since become known. It also shows the approximate routes that had been taken through the Everglades by earlier Everglades explorers such as Lt. Hugh Willoughby in 1897.

Unfortunately the 1903 Krome map fails to provide much information regarding the historic cultural landscape, although it does show the locations of Krome's base camps, which he established at various points along the route of the planned rail line. These may have some archeological potential.

The route for the railroad from Miami to Cape Sable that had been proposed on the basis of Krome's 1903 survey was never built, but it would not be too many years before plans for connecting Miami to Cape Sable by road and canal would come to pass. A digital copy of a map entitled *Special Road and Bridge District No. 1* was found that shows the Old Ingraham Highway extending from Royal Palm State Park to the community of Flamingo (Figure 10), but once again the digital image was of very poor quality making other features on the map open to question. The map appears to show a second road paralleling the Homestead Canal along its easterly route from Lake Ingraham near Cape Sable until it intersected with Old Ingraham Road approximately 1.5 miles east of Bear Lake, but it could be the route way shown to Cape Sable was simply the Homestead Canal itself. According to Paige (1986:147), however, "construction of the Homestead Canal" was "along the Ingraham Highway" and that "the Cape Sable Road" to Royal Palm State Park was constructed to coincide with the dedication ceremonies held for the newly established park in 1916 (1986:181), which suggests that a roadway of sorts was created atop the berm paralleling the canal.

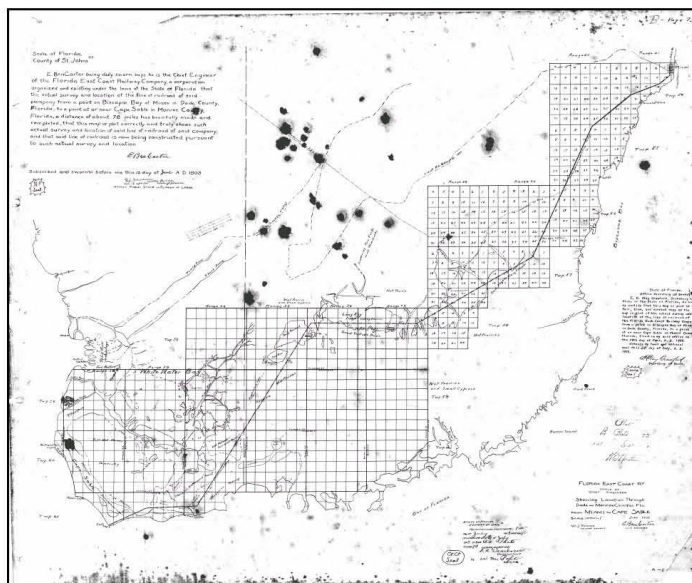


Figure 9. Krome's 1903 survey map (courtesy of Jerry Wilkinson).

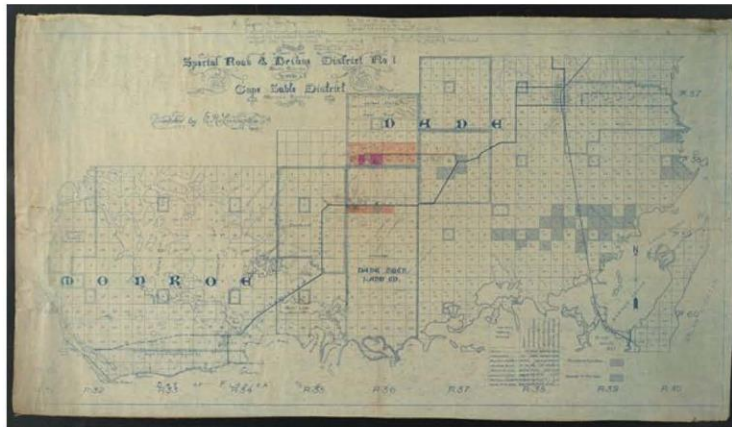


Figure 10. Map dated 1920 and entitled *Special Road and Bridge District No. 1*" (from <http://purl.fcla.edu/fcla/dl/RTAM00990001.jpg>).

The last map to be introduced here is a map included in Nash's (1931) *Survey of the Seminole Indians of Florida*. Drafted in 1930, the Nash map (Figure 11) shows the Willie Jim camp (numbered "1" in blue) located near the northern margin of Long Pine Key in the vicinity of Pine Glades Lake, although the lake did not exist in 1930. What did exist, and perhaps explains the presence of the Willie Jim camp in this approximate location, is the eastern end of Rock Reef Pass, which is a natural elevated ridge that extends from the margin of Long Pine Key towards the hardwood hammock/bayhead island where Pa-hay-okee Lookout Tower now stands. From here it is only a short distance northwest to Shark River Slough.

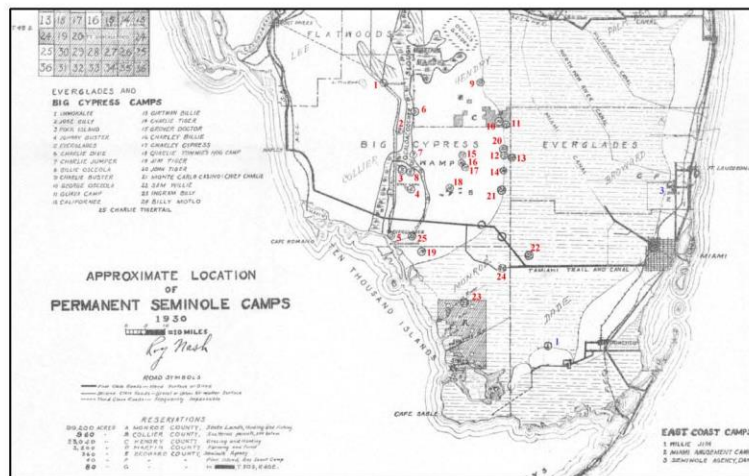


Figure 11. Portion of 1930 Nash map with colored numbers added to aid legibility. Big Cypress Camps are labeled in red while East Coast Camps are labeled in blue.

Historic Survey Plats

A search of the early survey plats posted at the Florida Land Boundary Information System (LABINS) web site (<http://data.labins.org/2003/SurveyData/LandRecords/GLO/index.cfm>) based on township and range values coinciding with areas of the park identified 45 historic plats available for download. Of all the plats downloaded, six showed possible features or anomalies which bore further investigation. After comparing those six plats with their associated U.S.G.S. quadrangle maps it was found that all of the “anomalies” were non-cultural and provided no additional potential archeological information. The downloaded digitized plats were retained, however, for the historic vegetation information they contain.

1940s Imagery

These files were obtained through download from the South Florida Information Access (SOFIA) website <http://sofia.usgs.gov/exchange/aerial-photos/index.html>. They had been georeferenced. The photographs are dark and, compared to modern imagery, low resolution. Nevertheless, apparent buildings are occasionally discernible and well-travelled roads readily identifiable, so the files were examined for evidence of changes that would indicate the presence of such human activity. Other than changes along the Tamiami Trail, only a handful of possible historic structure locations were observed in the general area of what is now the Hidden Lake Education Center. This was also an area where a number of dirt roads were visible on the 1940 aerial photos, roads that are currently followed in some sections by fire roads that crisscross the same area today. These have been digitized along with the routes of Old Ingraham Road and Old Tamiami Trail Road, which were added to the historic road geodatabase by comparing the 1920 road map provided previously as Figure 10, the georeferenced 1940s aerial photos, and modern aerial imagery.

Modern Imagery

During the course of working on the various GIS layers, a number of features that appear to be cultural in origin were noted in the imagery and in the elevation data. The features appear to be canals in the 10,000 Islands and Cape Sable area. Some are likely related to early twentieth century farming and plantations, but some may be prehistoric. None of them have been added to the ASMIS database.

Data Preparation

Vegetation

Because prior archeological surveys in the park have shown a high correlation between human occupation and certain vegetation types, several attempts were made to improve the alignment of the vegetation data with the elevation data and thereby assure greater reliability for analysis.

Spatial Adjustment tools (included with ArcMap) were used to place adjustment links evenly over the entire park. The first adjustment used more than 50 links, and each of the two subsequent rounds employed about half the number of links in the preceding proceeding round. Random checks of the final results showed alignment with recent imagery and the elevation data was within 10 meters in most areas, and not more than 15 meters anywhere. A fourth attempt with the Spatial Adjustment tools, adding another 100+ points, actually began to degrade alignment in some areas, while providing only minimal improvements near the links.

The vegetation data was originally created by UGA in shapefiles that were intended to match the USGS quadrangles, so the possibility that the quads were misaligned was examined. First, the corners of one of the quad-sized vegetation datasets was aligned to a georeferenced quad obtained from USGS’s website. This resulted in a misalignment of the digitized UGA vegetation and the vegetation depicted on the quad by over 50 meters in some areas. As a further test, Spatial Adjustment tools were used to align the

vegetation polygon data to the quad using vegetation features that were visible in both. While this improved the data near the corners, other portions were misaligned.

Topology editing was attempted, although not expected to be especially productive. These tools are used to shift borders shared by adjacent polygons. The results of this brief test, including overlapping polygons and jagged lines, were unusable.

The final attempt to improve on the first series of Spatial Adjustment steps employed the Limited Spatial Adjustment Area option. Adjustments were performed on the UGA vegetation data within arbitrary 1500x1500-meter grid units. The grid approach kept the modifications to a scale suitable for smaller areas of misalignment while leaving areas that were better aligned untouched. This approach also provided the basis for estimating the time it would take to make the same adjustments over the full extent of the data. The outcome was very limited improvements over the first series of spatial adjustments and an estimate that it would take a couple of months or more to complete the Limited Spatial Adjustment Area process for the entire park.

Given the scope of the problem and pending deadlines, it was decided that the results from the first adjustments would be used for analysis.

Elevation

Topography and the availability of higher drier ground to provide habitable land is often an important variable for predicting archeological sites, and in the Everglades that means elevational differences of as little as 2-3 feet can be a significant factor. Consequently, the GIS analysis required a means of delineating areas that are discernibly higher than the surrounding terrain. GIS tools that were designed for modeling water flow are often used to generate models of higher ground. But in south Florida, the results, as might be expected, show that water flows everywhere and in all directions. Conversely, using absolute elevations across the entire park would not provide the appropriate data because there is an overall slope trending downward to the southwest from the Miami area. Another factor that exacerbates the problem is that the elevation data suffers from interference from the vegetation, despite the fact that the LiDAR data had been filtered to simulate bare earth. The original rasters and output from various geoprocessing tools all have a salt-and-pepper or stippled appearance due to the low relief and the fine-grained remnants of the trees.

To compensate for the overall slope in South Florida, in other words, to reveal relative elevation differences, a coarser (100-foot) version of the elevation data was subtracted from the higher resolution data. It was hoped that the resulting relative elevation data could then be used to delineate areas of higher ground compared to the local topography. The results were promising, but the areas of high ground were often very small and fragmented. To the human eye, with a brain processing the image, these areas are apparent, but the challenge was convincing the GIS software to recognize these areas on a computational basis.

Trials with several ArcGIS geoprocessing tools, such as reversing Sinks, Flow Accumulation, Slopes, and Focal Flow did not produce helpful results. However, examination of the output of the various trials revealed that areas of higher ground, which can be detected visually on hillshades, showed more variation in elevation, so a method for extracting those areas was developed.

The Focal Statistics tool was then used to generate a model of the elevation variability with the output expressed in terms of standard deviations. Due to the differences in the cell sizes used in the different original LiDAR datasets, the settings were slightly different. For the Dade County data, a search radius of 13 cells or about 130 ft was used. For Collier and Monroe counties, the radius was 25 cells or about 135 ft.

The output was then examined to ascertain the range of variability most common on known sites versus surrounding terrain. The next step would depend on the break point values chosen. A number of the site areas were checked on the Focal Statistics output, and the colors of the rasters were changed to test various break points, with different colors representing areas above and below the break. The goal was to choose break points that would show higher ground, but would not include too many small areas that are unlikely to be large enough for human occupation. The breaks also differed between datasets due to differences in overall variability. In the end, a standard deviation of 0.7 was chosen for Monroe County and 1.0 for Dade and Collier counties. Other break points can be tested in later revisions of this model, if deemed appropriate.

To produce the polygon data needed for later stages of analysis, the rasters obtained from the Focal Statistics tool were reclassified so that all cells were either above or below the break. The output was then converted to polygon data and combined to create a single dataset showing higher ground in the park.

Analysis

GIS was used to characterize the known sites in terms of vegetation and to examine how well the combination of vegetation and derived higher ground data actually correlate with or “predict” the occurrences of known sites. Because the majority of the sites classified as purely historic in ASMIS are large and often poorly defined, the statistical analysis considered only the sites that are listed as prehistoric, protohistoric or unknown (unknown typically means the site is American Indian, but the time period is uncertain). This restriction reduced the sample of sites used from 253 to 229.

Vegetation

As shown in Table 2 below, the park’s 229 non-historic sites are found in only 21 of the 93 vegetation categories in the park. The vegetation categories containing the largest number of sites were Subtropical Hardwood Forest (80, or 34.93% of sites) and Bayhead (64, or 27.95%). These two groups, which account for 62.9% of all non-historic sites, can be considered the high probability vegetation zones. Far below the high probability group were Mixed Mangrove (20, or 8.73%) and Mud (19, or 8.30%). The vegetation zone called Mud mostly comprises beaches and shorelines of rivers and large ponds (but has also been applied to paved and unpaved roadways). The mud and mixed mangrove groups were considered to be medium probability zones. Each of the remaining 17 vegetation categories correlate with 3% or fewer of the sites, and these have been grouped together as constituting low probability zones. The remaining vegetation zones with no correlations with known sites have been classified as very low probability zones.

Elevation

The potential for elevation to predict sites was evaluated. Of the sample of 229 sites, 141 lack elevation data. Most of these 141 sites are located in the central part of the park, but a few are on small keys which were excluded from LiDAR processing. Of the 88 sites with elevation data, 56 (63.6 percent) were successfully predicted by the derived higher ground layer. Visual examination of the standard deviations for elevation variations and the hillshade showed that a few of the 32 sites that fell outside the higher ground polygons were in areas where the elevation variability was moderate, but still below the chosen break point. Others are poorly documented sites which may be mapped in the wrong locations, while some show no notable elevation characteristics at all. Different break points could be evaluated in the future, but given the current lack of data for the entire park, doing so was not considered to be vital at this point.

Table 2. Numbers of sites found in Everglades vegetation groups.

Vegetation Name	# Sites	% of Sites	Probability
Subtropical Hardwood Forest	80	34.9%	High
Bayhead Forest	64	27.9%	High
Mixed Mangrove Forest	20	8.7%	Medium
Mud	19	8.3%	Medium
Buttonwood Forest	7	3.1%	Low
Sawgrass	5	2.2%	Low
Bay-Hardwood Scrub	4	1.7%	Low
Black Mangrove Forest	4	1.7%	Low
Brazilian Pepper (Exotic)	4	1.7%	Low
Red Mangrove Forest	4	1.7%	Low
Cabbage Palm Forest	3	1.3%	Low
Cajeput (Exotic)	2	0.9%	Low
Halophytic Herbaceous Prairie	2	0.9%	Low
Hardwood Scrub	2	0.9%	Low
Succulent	2	0.9%	Low
Willow	2	0.9%	Low
Buttonwood Scrub	1	0.4%	Low
Mixed Scrub	1	0.4%	Low
Palm Savanna	1	0.4%	Low
Red Mangrove Scrub	1	0.4%	Low
Tall Sawgrass	1	0.4%	Low
Total	229	100.0%	

Multiple Factors

Considering the vegetation data alone, 46 (20 percent) of the 229 sites are not predicted by either high or medium probability vegetation types alone. So, would elevation data predict them? Of the 46, 12 lack elevation data, leaving only 34 sites to evaluate this question. Of these 34, 18 (53 percent) were classified as being on high ground, but 16 (47 percent) were not. However, visual examination of each of these 16 sites against the elevation data in hillshade mode reveals that a number of these sites are located on more elevated ground surfaces than their surrounding areas, but fell below the high ground break point, meaning that developing a more refined means of separating out areas of higher ground will likely increase the predictability of the elevation layer.

Of the 16 sites occurring in high or medium vegetation zones but not showing on high ground, 4 are on rivers, 1 on a small Gulf key, and 8 are on tree islands along the western edge of the prairies near the wide Gulf coast mangrove zone. Others are poorly known sites with unverified coordinates. It should also be noted that of these 16 sites 5 were located in Red or Black Mangroves, 1 was in Mixed Scrub surrounded by mangroves, 4 were in Buttonwood Forest, 3 were in Bay-Hardwood Scrub, 1 was in Cabbage Palm Forest, and 1 was in Willows.

Looking more closely at the 18 sites that coincide with the higher ground layer but not with the high or medium vegetation zones, 4 are larger sites situated alongside rivers in the 10,000 Islands district. All 4 were farmed historically and are now dominated by Brazilian Pepper, an exotic species. The 3 sites in the Flamingo-Cape Sable area are in Buttonwood Forest. The remaining sites fall in Cabbage Palm Forest, Black Mangrove, Red Mangrove, Halophytic Herbaceous Prairie, Succulents, Buttonwood Scrub, and Bay-Hardwood Scrub. This would suggest that future phases of this study might approach prediction models for specific districts within the park. For example, models might include Brazilian Pepper zones along the Gulf coast and Buttonwood zones closer to Florida Bay.

Considering the fact that elevation data is lacking for more than half of the sites in the sample, perhaps the most prudent question for this first attempt to model site distributions for this study is “How well does vegetation alone predict the 141 sites that lack elevation data?” Most of these sites are situated on tree islands in the grass marshes and prairies. In fact, 122, or 86.5 percent, are in the high probability vegetation zones and another 7 are in the medium category, for a total of 91.4 percent. Because surveys in this area have focused largely on tree islands, mostly in the Shark River Slough, this result is not surprising. But, because there is an fundamental correlation between vegetation and relative elevation, it is very likely an accurate predictor of what to expect during future surveys of the many more acres in Shark River Slough now classified as Subtropical Hardwood Hammock and Bayhead that have yet to be searched for sites, as well as those same zones found in the prairies to its west, in the central pinelands, and in Taylor Slough.

Survey Methods and Sampling Strategy

Survey Methods

In 2004, the Florida Division of Historical Resources (FDHR) issued its current *Guidelines for Use by Historic Preservation Professionals*, wherein the State of Florida’s standards for conducting Phase I cultural resource assessment surveys are outlined. The survey methodology prescribed within the FDHR *Guidelines* calls for systematic shovel testing at 25 m intervals within high probability zones, 50 m intervals in moderate probability zones, and 100 m intervals in low probability zones (FDHR 2004:16). By excavating shovel tests at 100 m intervals, EVER can fulfill Florida state standards for Phase I inventories for most areas of the park, by virtue of their categorization as low to very low site probability areas. But in doing so, the likelihood of missing subsurface archeological sites smaller than 50 m across, should they be present, is extremely high (Nance and Ball 1986; Lightfoot 1986; Shott 1989).

Regionwide Archeological Survey Program (RASP) survey standards for Section 110 inventory projects (Prentice 2007), which will be followed by SEAC personnel under the currently proposed survey strategy, will consist of shovel testing at 20 m intervals in all zones, thereby exceeding all FDHR requirements and providing a more rigorous means of evaluating the veracity of current site prediction models for areas categorized as having lower site probability. In all other aspects the standard RASP shovel testing methodology duplicates that required by the state in that shovel tests will be dug 50 cm in diameter and will cease at a depth of 1 m or upon reaching bedrock. Each shovel test will be documented on a shovel test excavation form and its location recorded with a GPS unit capable of submeter accuracy. Excavated soils will be screened using quarter inch mesh, and all recovered artifacts will be retained for analysis. The selection of areas for shovel test survey under the proposed survey methodology will be addressed below under the heading “Sampling Strategy.”

In addition to conducting systematic shovel testing as per the sampling procedures discussed below, metal detector surveys will be conducted in areas where historic sites are considered most likely to occur and where ground surface conditions permit relatively unimpeded pedestrian movement. During metal detector surveys, detector operators will traverse survey areas along roughly parallel transects spaced approximately 20 m apart. Each metal detector operator will carry a GPS unit capable of 5 m accuracy to track the path taken by each operator during the survey to ensure relatively uniform survey coverage within the survey area. A GPS unit capable of submeter accuracy will be used to record the locations of all metallic artifacts encountered. Those deemed likely to represent historic objects will be retained for analysis while those considered to be modern refuse will be left at the point of discovery.

With respect to using the existing vegetation data to prioritize archeological surveys for prehistoric sites in the park, particularly those surveys tied to Section 106 compliance, it is recommended that in the unlikely event that any prescribed fires or ground modification activities are planned within the high

(Subtropical Hardwood Hammocks and Bayheads) or medium (Mixed Mangroves and Mud) probability zones that they be systematically shovel test surveyed at 20 m intervals for the presence of archeological sites prior to the undertaking. This is a recommendation only, however, as meeting state standards requires only shovel testing at 25 m intervals in high probability zones and 50 m intervals in moderate or medium probability zones.

In terms of inventorying the potentially most significant prehistoric sites that have yet to be identified within the park from a purely Section 110 inventory perspective, priority should be given to shovel testing the high probability zones, particularly the Subtropical Mangrove Hammocks located in the coastal mangrove areas where hurricanes and coastal erosion threaten their preservation. Again, testing at 20 m intervals is recommended to meet RASP survey standards, but shovel testing at 25 m intervals will meet state requirements.

Sampling Strategy

The EVER survey sampling strategy proposed here will implement three approaches. The first approach will be to conduct metal detector surveys in those areas where two as-yet-unidentified nineteenth century military forts and encampments have been predicted as having the highest probability of occurring within the park based on current GIS projections of historic maps. Both sites are most likely to occur in areas that have been categorized as high probability hardwood hammock areas. In the case of Fort Westcott (see Figure 5), the hardwood hammock tree islands located in Shark River Slough within a 3000 m radius of Mosquito Island (EVER-66) are considered the highest probability locations for containing this site with EVER-66 being a very likely candidate for being Fort Westcott. With respect to Camp Hunter, Papaya Hammock is the most likely location for its future discovery. These predictions are based on the various GIS projections that have been made of the 1846 Bruff and 1856 Ives maps, particularly a projection of the 1856 Ives map where Fort Poinsette has been aligned with Cape Sable and Fort Henry has been aligned with the 8DA3223 site.

The second proposed approach will consist of metal detector survey followed by shovel testing at 20 m intervals in 100-by-100 m blocks in both specifically targeted and randomly chosen areas bordering roadways with an emphasis on surveying areas adjacent to fire roads in the Pinelands Fire Unit near Long Pine Key. The Rock Reef Pass/Pine Glades Lake area will be specifically targeted using this approach in the attempt to identify the location of the Willie Jim East Coast Seminole camp shown on the 1930 Nash map in this general vicinity (see Figure 11). This approach will simultaneously sample vegetation zones categorized as low to very low probability areas and will allow for the evaluation of proximity to historic roads as a factor in predicting the presence of historic sites, which *a priori* logic would suggest is a reasonable expectation. It will also allow the potential for sampling of a variety of vegetation zones at all times of the year without subjecting survey crews to long, unbearable work conditions or harsh environmental situations that would make extrication and seeking of relief or medical treatment difficult.

The third survey approach will consist of a combination of both metal detector survey and 20 m interval shovel testing in either randomly chosen or opportunistically available 100-by-100 m survey blocks located within remote, lower probability areas where access by all-terrain vehicle, air boat, or helicopter is required. These surveys will be undertaken when ground surfaces are not inundated and ground visibility is at least 50 percent (i.e., the vegetation does not obscure more than 50 percent of the ground surface); and, drawing on the lessons enumerated by the SEAC archeologists who conducted surveys at the park in the past, archeological inventories under this approach will be conducted during the winter season when cooler temperatures, infrequent storms, and low mosquito numbers are most conducive to conducting such field work. Given the difficulty of working in these environments under even the best of conditions, this third survey approach is offered as a reasonable effort to ensure proper consideration is given to the possibility that current predictive models have somehow underestimated the potential for sites in these environs.

Effectively implementing the third survey approach will require that EVER staff provide SEAC with timely and accurate reports of recently burned or otherwise cleared areas so these can be cross-referenced with the vegetation and high ground models currently available. EVER staff will also need to provide estimates of how long the improved visibility or window of opportunity is expected to last before vegetation regrowth or changing hydrological conditions makes survey efforts too difficult to undertake. Based on this information, the park's ability to provide logistical support for the field work within the estimated window of opportunity, and SEAC's ability to conduct the survey (i.e., survey funding is available, travel restrictions are not in place, and the timing doesn't conflict with SEAC's other project scheduling), then field work will be undertaken when deemed feasible. In the event these conditions cannot be met, the park's in-house cultural resource staff and archeologist can conduct the field work and share the results with SEAC to ensure incorporation of their survey data into subsequent assessments of the predictive model.

Conclusions

Until such time that higher resolution LiDAR data is available for the entire park, the only well-tested park-wide data set that is currently available for modeling EVER prehistoric site distribution is the UGA vegetation data, which is not as accurate as one would wish. Improvement in the accuracy of the existing UGA's vegetation zone classifications for the park may enhance and refine the use of this GIS data set as a highly predictive data set, but it will nonetheless remain only a proxy for inferring changes in elevation between zones and cannot provide the means of evaluating subtle changes in relative elevation within or across vegetation zones. At this juncture, it cannot be stressed enough how important it is for the park to obtain high resolution LiDAR-based elevation data for the entire park in order to provide a better means of delineating areas of higher ground, which is likely to be shown to be the single best predictor of site locations, with vegetation likely being a close second.

Based on the results of the initial surveys carried out under this survey strategy and the acquisition of better environmental data, the GIS model as it currently stands can be reevaluated and potentially refined. And, as modifications are made in the site prediction model, new or adjusted survey approaches and mitigation measures can be developed for Section 110 inventory and Section 106 compliance actions within the park. Most likely, this will mean developing more distinct GIS models for different physiographic zones because the relative importance of elevation and vegetation type will probably vary between them. This variation is likely to reflect not only suitable living areas, i.e., dry ground, but the available resources that were sought by the Everglade's American Indian inhabitants at different times in the past. For example, with further analysis the break points used to classify higher and lower ground might be shifted to include more areas under one category or another. Field observations may also provide suggestions for adding a certain type of water bodies such as ponds as a possible predictive factor. And, of course, should other GIS data become available, that can also be included in the analytical mix.

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Appendix I Monitoring Plan

INTRODUCTION

Everglades National Park is a unique ecosystem and therefore provides unique challenges in implementing a monitoring program. Everglades National Park, along with cooperators, is working to understand the effects of fire upon the ecosystem.

Reference Manual # 18 states “The primary intent of the NPS Fire Ecology Program is to support fuels and fire management by using monitoring data, in conjunction with professional knowledge and judgment, to provide scientific guidance and feedback that supports adaptive management and the assessment of treatment effectiveness.”

This plan describes current monitoring parameters. This plan is a work in progress using adaptive management techniques to refine objectives and monitoring methods. Environmental monitoring began in 1975 and has since expanded in scope. In 1999 the first FMH plots were installed using protocols established by the National Park Service Fire Monitoring Handbook. Protocols for all levels of monitoring have been refined overtime to better capture the effects of fire in the Everglades ecosystem. In the future, we expect that innovations in protocols will continue to refine our monitoring program. This plan reflects our current efforts.

ECOLOGY AND LANDSCAPE MANAGEMENT

Ecological Model

The environment of Everglades National Park is shaped by physical geography and disturbance factors such as frost, fire, flood, tropical storms and hurricanes. The interplay of fire and hydrology is an important factor in determining community type and vegetation succession. Figure 1 demonstrates the dynamic interactions of hydrology, fire and vegetation in the Everglades.

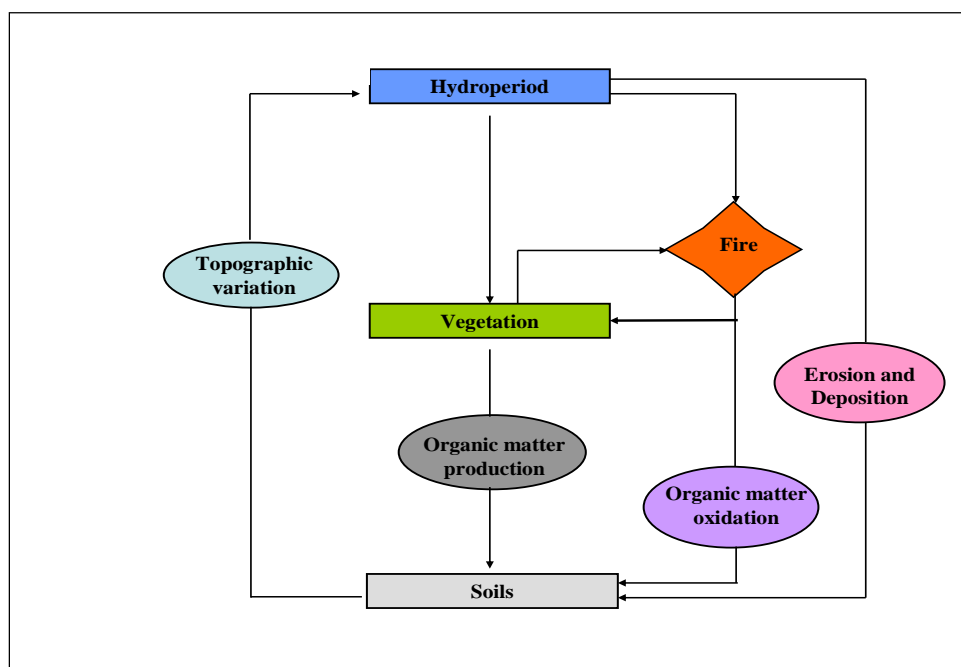


Figure1. Model showing the relationships of fire, hydrology and topography on the biotic communities of the Everglades. (Adapted from Lockwood et al. (2003)).

The vegetation of Everglades National Park can be separated into seven major freshwater plant communities. Figure 2 is an ecological and successional model of vegetation communities in the everglades based on hydroperiod and fire frequency. In the absence of fire, plant communities will eventually convert to more broad leaved communities. This change will occur more rapidly as hydroperiod is decreased (Lockwood et al 2003). This model however does not address the influence of exotic vegetation altering fire regimes as well as fire's role in maintaining the Everglades ecosystem.

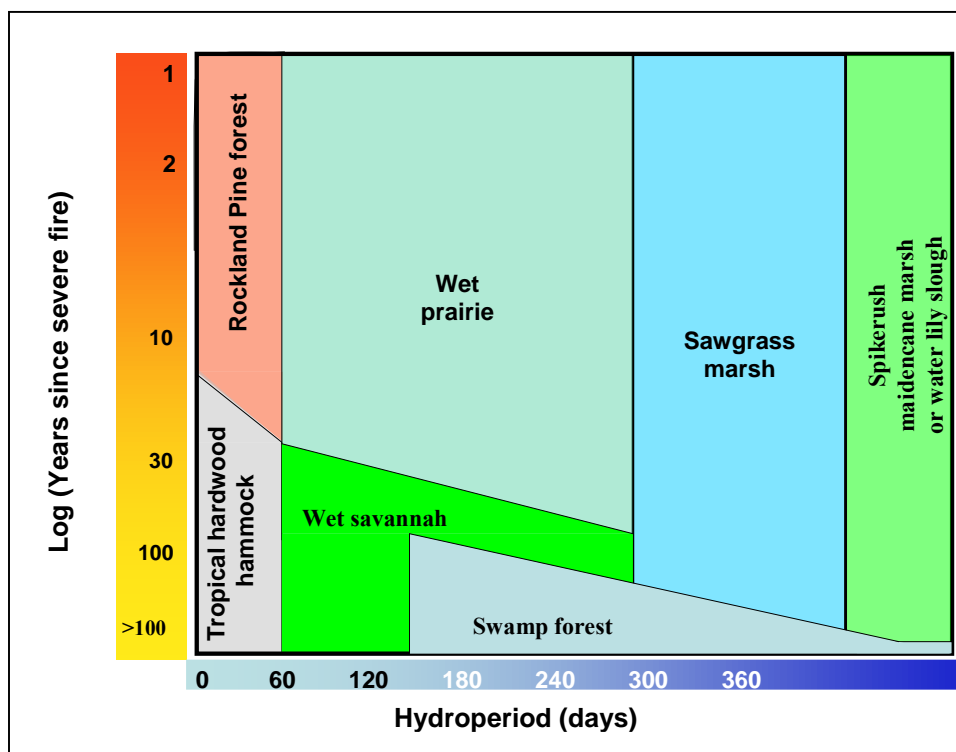


Figure 2. Ecological model showing distribution of major freshwater along hydroperiod and fire return interval. (Lockwood et al 2003).

Vegetation Communities

Monitoring occurs in the four fire adapted vegetation communities in Everglades National Park. These communities have been classified into four monitoring units by community type; Pine Rocklands monitoring unit, Short Hydroperiod Prairies monitoring unit (Marl Prairie), Long Hydroperiod Prairies monitoring unit (Sawgrass prairie), and Coastal Prairies monitoring unit. Section 3.1.2.1 of the FMP describes the fire adapted vegetation communities in the Park.

The monitoring units are located within Fire Management Units (FMU) described in the Fire Management Plan. Section 3.3 of the Fire Management Plan describes FMU, vegetation characteristics, values, management considerations and objectives for each FMU. Table 1 illustrates the distribution of the monitoring units within the Fire Management Units.

Monitoring Unit (Community type)	Fire Management Unit (FMU)
Pine Rockland	FMU 3 Pine rocklands
Short Hydroperiod Prairie	FMU 2 River of Grass FMU 3 Pine rocklands FMU 4 East Everglades
Long Hydroperiod Prairie	FMU 2 River of Grass FMU 4 East Everglades
Coastal Prairies	FMU 1 Coastal Prairies

Table 1. Fire Management Unit (FMU) and Vegetation Community Types in Everglades National Park

Management Goals and Objectives

Landscape management

Landscape management considerations, goals and objectives have been developed for each fire management unit within Everglades National Park. Monitoring unit goals and objectives are defined by the fire management unit in which they occur. Specific management goals and objectives for each FMU can be found in section 3.3 of the fire management plan.

Species of special concern

There are several species of special concern that have the potential to be affected by wildland fire and fire management activities. Mitigations, goals and objectives have been developed for certain listed species as recommended by the USFWS.

Blodgett's silverbush

Blodgett's silverbush (*Argythamnia blodgettii*), a candidate for listing under the 1973 Endangered Species Act (ESA), occurs in the pine rockland habitat of ENP. It primarily occurs in open sunny areas in pine rocklands and along edges of hammocks. Disruption of historical fire regimes and exotic plant invasions in pine rocklands threaten the survival of Blodgett's silverbush (USFWS 2010 c). The pine rockland habitat requires periodic fire to maintain an open sunny understory with a minimum amount of hardwoods and can also limit exotic plant invasions (Stevens and Beckage 2009). Wildland fires are necessary to maintain the pine rockland community and suitable habitat for blodgett's silverbush populations in ENP.

Mitigations and Objectives:

- Planned ignition treatments will be implemented to restore and maintain the pine rockland habitat for Blodgett's silverbush.
- Everglades Fire management uses prescribed fire treatments to reduce the effects of unwanted fire, to maintain natural fire regimes, reduce hazardous fuel loading, prevent woody plant succession and limit exotic plant invasions within and adjacent to pine rockland habitat.
- All available measures will be taken to avoid placement of fire breaks or staging areas for planned ignition treatment through known Blodgett's silverbush populations.

- If fire breaks or staging areas are required where Blodgett's silverbush populations occur, temporary fire breaks or staging areas will be created to allow plants to seed into the area. Once the plant population has successfully moved the original planned fire break or staging area may be constructed.
- Unplanned ignition activities and emergency situations may arise. In these situations the above mitigations will be adhered to unless the on-site decision maker determines in his/her professional judgment that the conditions require activities that may supersede the above mitigations.
- Planned ignition treatments will be implemented with the objective of creating mosaic patterned burns leaving unburned refugia within burn units. It is expected that this will prevent the burning of entire populations of Blodgett's silverbush during a prescribed fire.
- In addition to within unit refugia, landscape scale mosaic patterns and unburned refugia will be created by prescribed fire in adjacent LPK pine rockland management blocks being separated by a minimum of at least one year.
- Everglades Fire Management uses objective-dependent fire effects plots, environmental sampling, fire behavior monitoring and detailed mapping protocols to evaluate mitigations and objectives as part of an adaptive management strategy.

Pineland sandmat

Pineland sandmat (*Chamaesyce deltoidea* var. *pinetorum*), a candidate for listing under the 1973 Endangered Species Act (ESA), occurs in higher elevation pine rocklands of the Everglades National Park (NPS 2009). It is threatened by habitat degradation due to fire suppression and invasion of exotic plants. Fire is an important element in maintaining the pine rockland habitat (USFWS 2010d). Periodic fires eliminate the shrub subcanopy and remove litter from the ground. Pineland sandmat is shade intolerant and requires periodic burning to reduce competition from woody vegetation. Use of prescribed fire in ENP has prevented hardwood succession and limited exotic plant invasions which threaten the continued existence of pineland sandmat (USFWS 2010d).

Mitigations and Objectives:

- Planned ignition treatments will be implemented to restore and maintain the pine rockland habitat for pineland sandmat.
- Everglades Fire management uses prescribed fire treatments to reduce the effects of unwanted fire, to maintain natural fire regimes, reduce hazardous fuel loading, prevent woody plant succession and limit exotic plant invasions within and adjacent to pine rockland habitat.
- All available measures will be taken to avoid placement of fire breaks or staging areas for planned ignition treatment through known Pineland sandmat populations.
- If fire breaks or staging areas are required where Pineland sandmat populations occur, temporary fire breaks or staging areas will be created to allow plants to seed into the area. Once the plant population has successfully moved the original planned fire break or staging area may be constructed.
- Unplanned ignition activities and emergency situations may arise. In these situations the above mitigations will be adhered to unless the on-site decision maker determines in his/her

professional judgment that the conditions require activities that may supersede the above mitigations.

- Planned ignition treatments will be implemented with the objective of creating mosaic patterned burns leaving unburned refugia within burn units. It is expected that this will prevent the burning of entire populations of Pineland sandmat during a prescribed fire.
- In addition to within unit refugia, landscape scale mosaic patterns and unburned refugia will be created by prescribed fire in adjacent LPK pine rockland management blocks being separated by a minimum of at least one year.
- Everglades Fire Management uses objective-dependent fire effects plots, environmental sampling, fire behavior monitoring and detailed mapping protocols to evaluate mitigations and objectives as part of an adaptive management strategy.

Garber's spurge

Garber's spurge (*Chamaesyce garberi*) was listed as threatened in 1985 due to habitat loss. Garber's spurge requires open sunny areas to grow (USFWS 1999). In ENP Garber's spurge occurs in soil pockets of exposed limestone and in marl prairies in the pine rockland habitat (NPS 2009) and on Cape Sable in hammock edges, open grassy prairies, and backdune swales (USFWS 1999). Threats to Garber's spurge include fire suppression and exotic plant invasions which can result in over-shading of the understory, thereby reducing the quality of the habitat and over time leading to extirpation (USFWS 1999). In the pine rocklands, fire is necessary to maintain a low shrub understory and can limit exotic plant invasions (Stevens and Beckage 2009). It is believed that Garber's spurge requires periodic fires to maintain habitat suitability (USFWS 1999) and the large population size in Long Pine Key suggests that previous prescribed fire practices are effective in controlling exotic species and shrub encroachment, both of which would otherwise threaten the continued existence of this species (NPS 2009).

Mitigations and Objectives:

- Planned ignition treatments will be implemented to restore and maintain the pine rockland habitat for Garber's spurge.
- Everglades Fire management uses prescribed fire treatments to reduce the effects of unwanted fire, to maintain natural fire regimes, reduce hazardous fuel loading, prevent woody plant succession and limit exotic plant invasions within and adjacent to pine rockland habitat and beach dune communities.
- All available measures will be taken to avoid placement of fire breaks or staging areas for planned ignition treatment through known Garber's spurge populations.
- If fire breaks or staging areas are required where Garber's spurge populations occur, temporary fire breaks or staging areas will be created to allow plants to seed into the area. Once the plant population has successfully moved the original planned fire break or staging area may be constructed.
- Unplanned ignition activities and emergency situations may arise. In these situations the above mitigations will be adhered to unless the on-site decision maker determines in his/her professional judgment that the conditions require activities that may supersede the above mitigations.

- Planned ignition treatments will be implemented with the objective of creating mosaic patterned burns leaving unburned refugia within burn units. It is expected that this will prevent the burning of entire populations of Garber's spurge during a prescribed fire.
- In addition to within unit refugia, landscape scale mosaic patterns and unburned refugia will be created by prescribed fire in adjacent LPK pine rockland management blocks being separated by a minimum of at least one year.
- Everglades Fire Management uses objective-dependent fire effects plots, environmental sampling, fire behavior monitoring and detailed mapping protocols to evaluate mitigations and objectives as part of an adaptive management strategy.

Florida pineland crabgrass

Florida pineland crabgrass (*Digitaria pauciflora*) is currently classified as a candidate for listing under the 1973 Endangered Species Act (ESA). In ENP Florida pineland crabgrass occurs in pine rockland finger glades and the pineland-prairie ecotone and may overlap into the pine rockland habitat. It is threatened by habitat degradation due to fire suppression and invasion of exotic plants. Periodic fires are extremely important in maintaining both marl prairie and pine rockland habitat. In the absence of fire, litter accumulates and hardwood invasions shade out Florida pineland crabgrass (USFWS 2010e). Fire can also limit exotic plant invasions in the pine rocklands (Stevens and Beckage 2009). Prescribed fire use in ENP has been effective in maintaining populations of Florida pineland crabgrass (USFWS 2010e). It has been observed that fire followed by flooding resulting from tropical systems, may have adverse impacts on Florida pineland crabgrass populations (USFWS 2010e). This is a rare event and projects are planned and implement under weather and atmospheric conditions that generally prevent adverse fire-flood interactions following prescribed fire operations.

Mitigations and Objectives:

- Planned ignition treatments will be implemented to restore and maintain the pine rockland and marl prairie finger glade habitat and the pineland-prairie ecotone for Florida pineland crabgrass.
- Weather patterns and hydrologic trends will be used to determine appropriate timing of prescribed fire treatment implementation to avoid possible fire-flood interactions.
- Everglades Fire management uses prescribed fire treatments to reduce the effects of unwanted fire, to maintain natural fire regimes, reduce hazardous fuel loading, prevent woody plant succession and limit exotic plant invasions within and adjacent to pine rockland habitat.
- All available measures will be taken to avoid placement of fire breaks or staging areas for planned ignition treatment through known Florida pineland crabgrass populations.
- If fire breaks or staging areas are required where Florida pineland crabgrass populations occur, temporary fire breaks or staging areas will be created to allow plants to seed into the area. Once the plant population has successfully moved the original planned fire break or staging area may be constructed.
- Unplanned ignition activities and emergency situations may arise. In these situations the above mitigations will be adhered to unless the on-site decision maker determines in his/her professional judgment that the conditions require activities that may supersede the above mitigations.

- Planned ignition treatments will be implemented with the objective of creating mosaic patterned burns leaving unburned refugia within burn units. It is expected that this will prevent the burning of entire populations of Florida pineland crabgrass during a prescribed fire.
- In addition to within unit refugia, landscape scale mosaic patterns and unburned refugia will be created by prescribed fire in adjacent LPK pine rockland management blocks being separated by a minimum of at least one year.
- Everglades Fire Management uses objective-dependent fire effects plots, environmental sampling, fire behavior monitoring and detailed mapping protocols to evaluate mitigations and objectives as part of an adaptive management strategy.

Everglades bully

Everglades bully (*Sideroxylon reclinatum ssp. austrofloridense*) is currently classified as a candidate for listing under the 1973 Endangered Species Act (ESA). In ENP, Everglades bully is restricted to pine rockland and associated habitats. It is found in the pine rocklands, marl prairie finger glades and in the pineland-prairie ecotone. Habitat degradation due to fire suppression and invasion of exotic plants threaten populations of Everglades bully (USFWS 2010f). Wildland fire is required in the pine rocklands to prevent succession to hardwood hammock and can also limit exotic plant invasions in the pine rocklands (Stevens and Beckage 2009); both of which maintain suitable habitat for the Everglades bully.

Mitigations and Objectives:

- Planned ignition treatments will be implemented to restore and maintain the pine rockland habitat for Everglades bully.
- Weather patterns and hydrologic trends will be used to determine appropriate timing of prescribed fire treatment implementation to avoid possible fire-flood interactions.
- Everglades Fire management uses prescribed fire treatments to reduce the effects of unwanted fire, to maintain natural fire regimes, reduce hazardous fuel loading, prevent woody plant succession and limit exotic plant invasions within and adjacent to pine rockland habitat.
- All available measures will be taken to avoid placement of fire breaks or staging areas for planned ignition treatment through known Everglades bully populations.
- If fire breaks or staging areas are required where Everglades bully populations occur, temporary fire breaks or staging areas will be created to allow plants to seed into the area. Once the plant population has successfully moved the original planned fire break or staging area may be constructed.
- Unplanned ignition activities and emergency situations may arise. In these situations the above mitigations will be adhered to unless the on-site decision maker determines in his/her professional judgment that the conditions require activities that may supersede the above mitigations.
- Planned ignition treatments will be implemented with the objective of creating mosaic patterned burns leaving unburned refugia within burn units. It is expected that this will prevent the burning of entire populations of Everglades bully during a prescribed fire.

- In addition to within unit refugia, landscape scale mosaic patterns and unburned refugia will be created by prescribed fire in adjacent LPK pine rockland management blocks being separated by a minimum of at least one year.
- Everglades Fire Management uses objective-dependent fire effects plots, environmental sampling, fire behavior monitoring and detailed mapping protocols to evaluate mitigations and objectives as part of an adaptive management strategy.

Cape Sable seaside sparrow

The Cape Sable seaside sparrow (*Ammodramus maritimus mirabilis*), listed as an endangered species in 1967, is currently restricted to wet prairies of the southern Everglades (Lockwood et al. 2003). Fire can influence habitat suitability for the Cape Sable seaside sparrow. The preferred short hydroperiod marl prairie is a fire adapted habitat that is characterized by moderately dense clumped grasses, often including muhly grass (USFWS 1999). Open space at the base of the vegetation allows for ground movements and foraging by the sparrow (USFWS 2003). Fires prevent hardwood species from invading these communities and prevent the accretion of dead plant material, which decrease habitat suitability for the Cape Sable seaside sparrow (USFWS 1999). Although they forage and nest in fire adapted habitats, sparrow nests are vulnerable to the effects of fire spread (Lockwood et al. 2003). Fire management strategies relating to unplanned and planned prescribed fires within and adjacent to occupied or designated critical habitat will be developed and reviewed during annual Cape Sable seaside sparrow fire management meetings with Everglades National Park, U.S. FWS and other appropriate partners. These meetings will be used to develop and refine annual fire management strategies based on available information regarding population and subpopulation status, burn severity and recovery rates of vegetation in previously burned areas and data on reoccupation of previously burned habitat. For prescribed fire planning, exact locations and percent of habitat to be burned and optimal frequency of return will be determined and unplanned fire response procedures and previous fire events will be discussed.

Mitigations and Objectives:

- Everglades National Park will continue to work with the U.S. Fish and Wildlife Service to improve the Cape Sable seaside sparrow fire management strategy (Appendix E).
- Fire management activities will adhere to the Cape Sable seaside sparrow fire management strategy.
- Everglades Fire management uses prescribed fire treatments to reduce the effects of unwanted fire, to maintain natural fire regimes, reduce hazardous fuel loading, prevent woody plant encroachment and limit exotic plant invasions adjacent to occupied Cape Sable seaside sparrow habitat.
- Everglades Fire Management uses objective-dependent fire effects plots, environmental sampling, fire behavior monitoring and detailed mapping protocols to evaluate mitigations and objectives as part of an adaptive management strategy.

Wood stork and wading birds

The wood stork (*Mycteria Americana*) was listed as endangered in 1984, after a drastic decline in nesting pairs between the 1930's and 1970's (SCDNR 2005). Wood storks are associated with freshwater and estuarine habitats. Wood storks typically construct their nests in medium to tall trees in swamps or on islands surrounded by open water. The species is known to forage in freshwater marshes and tidal

creeks and flooded tidal pools (USFWS 1999). Fire is a natural occurrence within much of wood stork habitat in ENP. Prescribed fire is used to maintain natural fire regimes, reduce hazardous fuel vegetation build up, prevent woody plant encroachment, limit exotic plant invasions, protect Park and community values at risk and protect Wood Storks and their habitat. Smoke from prescribed fire activities within Everglades National Park is typically of short duration. Projects are planned and implement under weather and atmospheric conditions that generally prevent smoke impacts to wood stork nesting colonies during prescribed fire operations.

Wading Birds are one of the iconic groups of species associated with the Everglades. There are several species in this group that make up this group, and they vary in terms of size and coloration, habitat preference and foraging patterns, and other behavioral characteristics. However, as a group, they also share many common characteristics. Mitigations for wood storks will extend to other wading birds.

Mitigations and Objectives:

- South Florida Natural Resources Center will provide to Fire Management the most current wood stork and wading bird nesting colony locations.
- Everglades Fire management will avoid operational activities during nesting season within a 1,300ft buffer around exposed known active wood stork and other wading bird nesting colony sites and within a 700ft buffer around colonies protected by vegetative cover or where no birds are observed to prevent disturbance of active nests.
- When possible, ENP will avoid burning in close proximity to active wood stork and wading bird colonies, and under some circumstances this may not be practicable. Operational activities implemented to exclude fire from reaching close proximity would result in disturbance and the potential benefits to wood storks and wading birds, including reduced nesting colony substrate susceptibility to damage by fire and improved forage conditions would not be realized in the areas immediately surrounding the colonies.
- Planned ignition treatments will use smoke dispersal data from weather forecast and smoke modeling tools to reduce impacts from smoke to active nests.
- Everglades Fire management uses prescribed fire treatments to reduce the effects of unwanted fire, to maintain natural fire regimes, reduce hazardous fuel loading, prevent woody plant encroachment and limit exotic plant invasions within and adjacent to wood stork and other wading bird habitat.
- Everglades Fire Management uses objective-dependent fire effects plots, environmental sampling, fire behavior monitoring and detailed mapping protocols to evaluate mitigations and objectives as part of an adaptive management strategy.

Everglade Snail Kite

The Everglade snail kite (*Rostrhamus sociabilis plumbeus*) was listed as an endangered species in 1967. In ENP, snail kites utilize fresh water long hydro-period prairie habitat of Shark River Slough and Taylor Slough (USFWS 1999). Nesting occurs in small trees of a variety of species, almost always over open water (USFWS 2011). Snail kites forage in areas that are relatively clear and open which facilitates visual searches for apple snails, the snail kites primary prey. Dense herbaceous or woody vegetation is not conducive to efficient foraging (USFWS 1999) and exotic plant invasions decrease foraging habitat suitability even further. Fire, a natural component of long hydro-period marsh, reduces vegetation build

up and prevents woody plant encroachment. In ENP, prescribed fire is used to maintain natural fire regimes, reduce hazardous fuel vegetation build up, prevent woody plant encroachment, limit exotic plant invasions, protect Park and community values at risk and protect snail kites and their habitat. Smoke from prescribed fire activities within ENP is typically of short duration. Projects are planned and implement under weather and atmospheric conditions that generally prevent smoke impacts to snail kite nesting colonies during prescribed fire operations.

Mitigations and Objectives:

- USFWS, University of Florida, South Florida Natural Resources Center will provide to Fire Management the most current snail kite nest locations.
- Everglades Fire management will avoid operational activities within a 500 ft buffer around known active snail kite nests to prevent disturbance of active nests.
- Planned ignition treatments will use smoke dispersal data from weather forecast and smoke modeling tools to reduce impacts from smoke to active nests.
- Everglades Fire management uses prescribed fire treatments to reduce the effects of unwanted fire, to maintain natural fire regimes, reduce hazardous fuel loading, prevent woody plant encroachment and limit exotic plant invasions within and adjacent to snail kite habitat.
- Everglades Fire Management uses objective-dependent fire effects plots, environmental sampling, fire behavior monitoring and detailed mapping protocols to evaluate mitigations and objectives as part of an adaptive management strategy.

Eastern Indigo Snake

Historically, eastern indigo snakes (*Drymarchon corais couperi*) occurred throughout Florida and in the coastal plain of Georgia, Alabama and Mississippi. In 1978, the eastern indigo snake was listed as threatened, and Georgia and Florida currently support the remaining, endemic populations (FWS 2007). Eastern indigo snakes require a mosaic of habitats and large home ranges. Eastern indigo snakes frequents several habitat types, including pine flatwoods, scrubby flatwoods, high pine, dry prairie, tropical hardwood hammocks, edges of freshwater marshes, agricultural fields, coastal dunes, and human-altered habitats (FWS 2007).

In Everglades National Park, eastern indigo snakes are found in pine forests, tropical hardwood hammocks, freshwater marshes, coastal prairies, mangrove forests, abandoned farmland and developed urban interface areas. It was believed that the preferred habitat was the pine rocklands and hammocks of Long Pine Key due to frequent sightings (Steiner et al. 1983), however, the majority of recent sightings have been in the coastal mangroves. This may currently be the snakes primary area in the Park (S. Snow, ENP, personal communication 2011).

The coastal mangrove zones where the majority of snakes in ENP are sighted are generally not fire prone and planned ignition treatments rarely impact these areas. Mangroves rarely burn, thus there is little potential for adverse impacts from wildland fire to indigo snakes in this habitat. Within ENP natural or human caused fires may occur in any month. Planned ignition treatments may occur throughout the year. Although indigo snakes are seen to occur with the most regularity in the coastal mangroves where direct impacts from prescribed fire treatments are unlikely, they have the potential to inhabit a wide

range of habitats and areas within ENP. With a potential for indigo snakes to be present in fire adapted habitats, fire managers mitigate unintended impacts by conducting mosaic patterned burns, leaving unburned refugia and vegetative cover that may be utilized by adult and hatchling indigo snakes and using ignition techniques that prevent wildlife entrapment. No ring firing is allowed during planned ignition treatment implementation.

Mitigations and Objectives:

- ENP will conduct planned ignition treatments in fire adapted prairies adjacent to mangrove areas to prevent impacts to primary indigo snake mangrove habitat.
- Planned ignition treatments will be implemented with the objective of creating mosaic patterned burns leaving unburned refugia and vegetative cover for use by adult and hatchling indigo snakes that may potentially be present.
- In addition to within unit refugia, landscape scale mosaic patterns and unburned refugia will be created by prescribed fire in adjacent LPK pine rockland management blocks being separated by a minimum of at least one year.
- Ignition techniques will be used that lessen the likelihood of wildlife entrapment, ring fires will not be used.
- Everglades Fire management uses prescribed fire treatments to reduce the effects of unwanted fire, to maintain natural fire regimes, reduce hazardous fuel loading, prevent woody plant encroachment and limit exotic plant invasions within and adjacent to indigo snake habitat.
- Soils moisture levels are monitored and considered in the planning and implementation of prescribed fire treatments to ensure conditions are within the prescription parameters to prevent fire spread into hammocks where indigo snakes may occur.
- In the event vehicle access to uplands for planned fire management activities is required, surveys for burrows will occur concurrently with these activities. If a burrow is encountered, operations will either continue in a way that avoids disturbing the burrow or operations will stop.
- Fire Management staff will be instructed to not harm or kill snakes unless the snake is definitively identified as a Burmese python or other nonnative species.
- Eastern indigo snakes will not be handled or moved.
- Where snakes bearing a resemblance to indigo snakes are encountered, all operations will be ceased and the snake allowed to move away.
- Debris piles created from exotic plant management prescribed fire activities will be removed promptly to prevent eastern indigo snakes from inhabiting those temporary piles and thereby reduce the potential for burning dens.
- Fire management personnel will record and report any sightings of Eastern indigo snakes. If an eastern indigo snake is encountered during fire management operations, observations will be reported to the ENP wildlife biologist (observation log figure 3).
- Everglades Fire Management will contact the South Florida Ecological Service Office and the ENP Biological Resources Branch Chief if a dead eastern indigo snake were discovered.
- If large snake skins are found that may have been shed by an eastern indigo snake, they will be collected and sent to the ENP Wildlife biologist.
- Everglades Fire Management uses objective-dependent fire effects plots, environmental sampling, fire behavior monitoring and detailed mapping protocols to evaluate mitigations and objectives as part of an adaptive management strategy.

Eastern Indigo Snake Observation Log

It is understood that with each indigo snake sighting, a separate log would be filled out for each event.

Project Name:	
Date of Sighting:	
Time of Sighting:	
Temperature:	
Wind (mph):	
Weather Conditions: (i.e., raining, humid, cloudy, sunny, cool, hot, etc)	
Condition of Indigo Snake: (i.e., injured, unharmed, etc)	
Behavior of Indigo Snake: (i.e., disoriented, aggressive, etc)	
Actions Taken After Sighting:	
Size of Indigo Snake:	
GPS Coordination/Specific Location:	
Pictures Taken: (Attach Pictures)	
Date this form was Completed:	
Observers/Collector Name:	
Observers/Collector Contact Info: (Address/Telephone/Cell)	

Figure 3

Florida Panther

The Florida panther (*Puma concolor coryi*) is a federally endangered species, first included on the list of threatened and endangered species in 1967. In Everglades National Park (ENP) panthers utilize pine rocklands, tropical hardwood hammocks, restored agricultural lands and wet prairies (Robertson and Bass 1986). Panthers primarily den in non-fire adapted tropical hardwood hammocks. The tropical hardwood hammocks in the Park are less flammable than denning areas identified in the big cypress region where the pine/saw palmetto habitat used is very susceptible to fire. In ENP, the palmetto cover is sparse and scattered therefore panthers prefer the tropical hardwood hammocks because they provide the dense cover preferred for denning (S. Bass, ENP, personal communication 2011).

Planned ignition treatments (prescribed burning) are important to panther ecology. Studies have demonstrated that the greatest temporal response by panthers to prescribed burning was seen within one year following treatment. This is likely due to white-tailed deer response to vegetation and structural changes resulting from prescribed fire treatments (Dees et al. 2001). ENP uses planned ignition treatments to protect and enhance panther habitats. Planned ignition treatments produce an abundance of green browse and other improved forage conditions that greatly benefit whitetail deer, the primary prey species of the panther (S. Bass, ENP, personal communication 2011).

Historically, lightning caused fires occur May through September. Planned ignition treatments are conducted during this season to mimic the natural fire regime in the pine rockland community. Environmental conditions that occur during this time of year are required to safely implement planned ignition treatments and achieve desired fire effects. Tropical hardwood hammocks are a valuable natural, cultural and visitor use resource. Protection of tropical hardwood hammocks during planned ignition treatments and wildfire events is a top priority for Everglades National Park.

Several strategies are employed to prevent the spread of fire into tropical hardwood hammock communities, serving to mitigate unintended impacts to juvenile panthers and panther dens from prescribed burning. Planned ignition treatments are used to reduce hazardous fuel loads adjacent to tropical hardwood hammocks in ENP pine rocklands. Reduced fuel loads provide protection from impacts of unwanted fire spread. Lower rates of spread in the pine rocklands increase the window of opportunity for fire managers to implement suppression and containment strategies for protecting fire sensitive hammocks during wildfire events. Additionally, planned ignition treatments are conducted when soil moistures are elevated, greatly reducing the likelihood of fire spread into tropical hardwood hammocks in the pine rocklands. Throughout the year and before every burn, soil samples are collected to determine soil moisture levels within tropical hardwood hammocks. Percent soil moisture, fuel characteristics and environmental variables are evaluated to determine if prescribed fire treatments will achieve desired fire effects in the pine rocklands while preventing impacts to fire sensitive hardwood hammocks.

Mitigations and objectives:

- ENP will conduct planned ignition treatments to reduce fuel loading adjacent to hardwood hammocks to provide protection from unwanted fire spread.
- Everglades Fire management uses prescribed fire treatments to reduce the effects of unwanted fire, to maintain natural fire regimes, reduce hazardous fuel loading, prevent woody plant encroachment and limit exotic plant invasions within and adjacent to Florida panther habitat.
- Soils moisture levels are monitored and considered in the planning and implementation of prescribed fire treatments to ensure conditions are within the prescription parameters to prevent fire spread into tropical hardwood hammocks.
- Planned ignition treatments will be used to improve forage for white tailed deer.
- Everglades Fire Management uses objective-dependent fire effects plots, environmental sampling, fire behavior monitoring and detailed mapping protocols to evaluate mitigations and objectives as part of an adaptive management strategy.

Florida bonneted bat

The Florida bonneted bat (*Eumops floridanus*) was listed as endangered under the 1973 Endangered

Species Act (ESA). The Florida bonneted bat is a rare species with a limited range and a low abundance within its range. Endemic to Florida, the Florida bonneted bat has one of the most restricted distributions of any species of bat in the New World (Endangered and Threatened Wildlife and Plants; Endangered Species Status for the Florida Bonneted Bat; Final Rule, 2013). In general, open, fresh water and wetlands provide prime foraging areas for bats. Bats will forage over ponds, streams, and wetlands and drink when flying over open water. During dry seasons, bats become more dependent on remaining ponds, streams, and wetland areas for foraging purposes. Little is known about the current natural roost sites of the Florida bonneted bat. This species may roost in rocky crevices and outcrops on the ground. It is not known to what extent such roost sites are suitable. Some have suggested that Florida bonneted bats are closely associated with forested areas because of their tree roosting habits (Endangered and Threatened Wildlife and Plants; Endangered Species Status for the Florida Bonneted Bat; Final Rule, 2013). Habitats in which the bats have been detected in ENP include pine rocklands, wet prairie and tropical hardwood hammocks. Fire is a natural component of the pine rockland and wet prairie ecosystems. In the pine rocklands fire is required to prevent succession to hardwood hammock and can also limit exotic plant invasions in the pine rocklands (Stevens and Beckage 2009) and in wet prairie, fire reduces vegetation build up and prevents woody plant encroachment. Planned ignition treatments are used to maintain these fire adapted ecosystems and reduce hazardous fuel loads adjacent to tropical hardwood hammocks in ENP pine rocklands to protect from impacts of unwanted fire spread.

- Planned ignition treatments will be implemented with the objective of creating mosaic patterned burns leaving unburned refugia and vegetative cover for use by Florida bonneted bats that may potentially be present.
- Refugia would be provided by retaining stumps, snags, large cavity trees with hollows or cavities, and woody debris during activities. Snags and woody debris would be retained if they do not burn to provide habitat and escape cover.
- Where bonneted bats are known to occur, cavity trees, old or large trees, and snags will be retained. If these trees must be removed, because of firebreak integrity or for human safety concerns, they would be examined before removal to make sure they are not being used by roosting bats.
- Any known or suspected Florida bonneted bat roosts will be marked and avoided.
- Old trees and snags with hollows or cavities where bonneted bats are known to occur will be protected from fire. Vegetation around the base of known or suspected roost sites would be raked and/or cleared to remove fuel load before conducting prescribed burns.
- Prescribed burns would be conducted carefully in known or suspected occupied areas for bonneted bats, especially during the Florida bonneted bat breeding season (Jan-Mar; June-Oct). Where prescribed fire is to be used near known active or suspected roosts, consideration would be given to avoiding these areas if there are high fuel loads, to reduce the risk of losing roosts during intense fires.
- Everglades Fire Management uses objective-dependent fire effects plots, environmental sampling, fire behavior monitoring and detailed mapping protocols to evaluate mitigations and objectives as part of an adaptive management strategy.

Florida Leafwing

The Florida leafwing (*Anaea troglodyta floralis*) butterfly is listed as endangered under the 1973 Endangered Species Act (ESA). Pineland croton (*Croton linearis*) is the only known hostplant (USFWS 2010a). Within Everglades National Park, the Florida leafwing is known to inhabit Long Pine Key (LPK) pine rockland areas that contain pineland croton. Studies have indicated that the Florida leafwing is able to quickly re-colonize following fire and ENP fire effects monitoring data support this showing Florida leafwing butterflies are able to recolonize ENP pine rockland areas within two months after mosaic-patterned prescribed fire treatments. Fire is important in maintaining the herbaceous layer of pine rocklands of which pineland croton is a part and fire suppression or inability to conduct prescribed fire may result in loss of habitat for the Florida leafwing (USFWS 2010a). To mitigate unintended impacts, fire managers have developed specific prescribed fire planning strategies and treatment goals and objectives. Planned ignition treatments in adjacent LPK pine rockland management blocks will be separated by a minimum of at least one year. Fires in all habitats within LPK that contain pineland croton will be carried out with the goal of creating mosaic patterned burns leaving unburned refugia and vegetative cover within each fire management block. It is anticipated that this strategy will reduce direct mortality to immature stages of both butterfly species and allow sufficient time for host plant populations while providing unburned refugia within and adjacent to treatment units. Permanent fire effects plots are monitored to study the effects of fire on pineland croton and immature and adult Florida leafwing butterflies.

Mitigations and Objectives:

- Planned ignition treatments will be used to maintain croton host plant populations and pine rockland habitat for the Florida leafwing butterfly.
- In addition to within unit refugia, landscape scale mosaic patterns and unburned refugia will be created by prescribed fire in adjacent LPK pine rockland management blocks being separated by a minimum of at least one year.
- Planned ignition treatments will be implemented with the objective of creating mosaic patterned burns leaving unburned refugia for use by adult and larvae Florida leafwing butterflies that may potentially be present.
- A mosaic pattern burn of 50-75% burned, 25-50% unburned, of pine rockland habitat within a unit, is a goal for planned ignition treatments in non-WUI pine rockland burn units. Achieving a specific percentage of burned vs unburned is impossible to assure and this numerical value is considered a goal, not an objective.
- Everglades Fire management uses prescribed fire treatments to reduce the effects of unwanted fire, to maintain natural fire regimes, reduce hazardous fuel loading, prevent woody plant succession and limit exotic plant invasions within and adjacent to pine rockland habitat.
- Fire management and the South Florida Natural Resources Center will monitor fire effects monitoring plots to ascertain the effects of fire on croton and post fire larval presence. Pre- and post-fire monitoring would be conducted.
- NPS will, in coordination with the U.S. Fish and Wildlife Service, continue to implement monitoring protocols to evaluate the seasonal and annual abundance of the Florida leafwing populations and assess the abundance and distribution of the Florida leafwing within FMU 3 annually prior to conducting burn activities.
- Everglades Fire Management uses objective-dependent fire effects plots, environmental sampling, fire behavior monitoring and detailed mapping protocols to evaluate mitigations and

objectives as part of an adaptive management strategy.

Bartram's scrub-hairstreak

The Bartram's scrub-hairstreak (*Strymon acis bartrami*) butterfly is listed as endangered under the 1973 Endangered Species Act (ESA). Pineland croton (*Croton linearis*) is the only known hostplant (USFWS 2010b). Within Everglades National Park, the Bartram's scrub-hairstreak is known to inhabit Long Pine Key (LPK) pine rockland areas that contain pineland croton. Lower densities of the Bartram's scrub-hairstreak observed in LPK have been attributed to a lack of prescribed fire necessary to maintain host plants (USFWS 2010b). Bartram's scrub-hairstreak recolonization following fire has been observed from three to four months in areas outside ENP (USFWS 2010b). Fire is important in maintaining the herbaceous layer of pine rocklands of which pineland croton is a part. Fire suppression or inability to conduct prescribed fire may result in loss of habitat for the Bartram's scrub-hairstreak (USFWS 2010b). Fire managers have developed specific prescribed fire planning strategies and treatment goals and objectives to mitigate unintended impacts to the Bartram's scrub-hairstreak. Planned ignition treatments in adjacent LPK pine rockland management blocks will be separated by a minimum of at least one year. Fires in all habitats within LPK that contain pineland croton will be carried out with the goal of creating mosaic patterned burns leaving unburned refugia and vegetative cover within each fire management block. It is anticipated that this strategy will reduce direct mortality to immature stages of both butterfly species and allow sufficient time for host plant populations while providing unburned refugia within and adjacent to treatment units. Permanent fire effects plots are monitored to study the effects of fire on pineland croton and immature and adult Bartram's scrub-hairstreak butterflies.

Mitigations and Objectives:

- Planned ignition treatments will be used to maintain croton host plant populations and pine rockland habitat for the Bartram's scrub-hairstreak butterfly.
- In addition to within unit refugia, landscape scale mosaic patterns and unburned refugia will be created by prescribed fire in adjacent LPK pine rockland management blocks being separated by a minimum of at least one year.
- Planned ignition treatments will be implemented with the objective of creating mosaic patterned burns leaving unburned refugia for use by adult and larvae Bartram's scrub-hairstreak butterflies that may potentially be present.
- A mosaic pattern burn of 50-75% burned, 25-50% unburned, of pine rockland habitat within a unit, is a goal for planned ignition treatments in non-WUI pine rockland burn units. Achieving a specific percentage of burned vs unburned is impossible to assure and this numerical value is considered a goal, not an objective.
- Everglades Fire management uses prescribed fire treatments to reduce the effects of unwanted fire, to maintain natural fire regimes, reduce hazardous fuel loading, prevent woody plant succession and limit exotic plant invasions within and adjacent to pine rockland habitat.
- Fire management and the South Florida Natural Resources Center will monitor fire effects monitoring plots to ascertain the effects of fire on croton and post fire larval presence and re-colonization. Pre- and post-fire monitoring would be conducted.
- NPS will, in coordination with the U.S. Fish and Wildlife Service, continue to implement monitoring protocols to evaluate the seasonal and annual abundance of the Bartram's scrub-hairstreak populations and assess the abundance and distribution of the Bartram's scrub-hairstreak within FMU 3 annually prior to conducting burn activities.

- Everglades Fire Management uses objective-dependent fire effects plots, environmental sampling, fire behavior monitoring and detailed mapping protocols to evaluate mitigations and objectives as part of an adaptive management strategy.

Monitoring Design

Everglades National Park conducts fire monitoring following the guidelines set forth in the NPS Fire Monitoring Handbook. The handbook identifies four levels of monitoring for planned and unplanned ignitions.

The goal of the monitoring program is to provide managers with information necessary in the decision making process regarding fire management activities to achieve the goals set by the Fire Management Plan. This includes strategies and tactics employed in unplanned ignition response and planned ignition treatment planning and implementation.

Level 1 Environmental Monitoring

Weather and hydrology affect fuel availability and fire behavior in Everglades NP and are monitored on a daily basis. Fuel and soil moisture data is collected on a monthly basis and additionally as needed throughout the year.

Weather

The Park maintains 2 Remote Automated Weather Stations (RAWS) which are compliant with National Fire Danger Rating System (NFDRS) standards. These stations collect year round data that includes; air temperature, relative humidity, wind speed and direction, rainfall, and solar radiation. This data is used to calculate the minimum fine fuel moisture and fire behavior indices. Current and recent weather activities are monitored on a custom Doppler radar website and other public websites including the National Weather Service. Lightning strike data is accessed through national NPS contract with the Bureau of Land Management.

Hydrology

Surface water level readings are monitored daily at hydrology station NP-44 and as needed basis at additional hydrology stations.

Fuel and Soil moisture

Live fuel and organic soil moisture monitoring occurs monthly and additionally on an as needed basis when conditions are dry. Fuel and soil moisture data is used in planning and decision making and to monitor conditions that may affect fire behavior and spread. Organic soil samples are collected at three local hammock sites within ENP. Live fuel samples are collected from one prairie site and one pine rockland site within ENP. Soil and fuel samples are dried and weighed at the Fire cache. Percent live fuel and soil moistures are calculated and this information is distributed to all fire management personnel.

Environmental Parameters Monitored	Frequency
Weather	
Morning Fire Weather Forecast	Daily

Maximum Temperature	Daily
Minimum Relative Humidity	Daily
Night's Relative Humidity	Daily
Maximum Wind Speed and Direction	Daily
Days Since Last Rain	Daily
Chance of Precipitation	Daily
Lightning Activity Level	Daily
Dispersion Index	Daily
Hydrology	
Water Levels	Daily
Rainfall	Daily
Expected Fire Behavior Indices	
Ignition Component	Daily
Spread Component	Daily
Burning Index	Daily
Fuel Moisture	
Minimum Fine Fuel Moisture	Daily
Live Fuel Samples	monthly
Organic Fuel Moisture – Local Sites	monthly
Organic Fuel Moisture – Remote Sites	as needed

Table 2. Environmental fire monitoring parameters by occurrence.

Level 2 Fire Observation

Fire Monitoring

Fire monitoring occurs on all fires. Fire monitoring carried out by a Fire Effects Monitor (FEMO) is conducted on all planned ignition treatments and FEMO reports are part of the final fire report record. For planned ignition treatments fire monitoring is used to assess whether fire behavior and effects are as expected and will achieve objectives. Monitoring data collected during planned ignition treatments can be used to adjust prescription parameters, ignition patterns and implementation techniques to achieve desired objectives. Fire monitoring information is used to adjust operational plans and fine tune fire behavior predictions. Monitoring of fire conditions is required to select the appropriate management strategy for all fires. Table 3 outlines the fire observations collected by Everglades Fire Management staff.

Fire Observation Monitoring	Fire Type (Wildland, WFU, Prescribed)
Reconnaissance Monitoring	
Fire Size	Planned and unplanned ignitions
Fire Location	Planned and unplanned ignitions
Fuel and Vegetation Type	Planned and unplanned ignitions
Local Weather Conditions	Planned and unplanned ignitions
Smoke Characteristics- Volume and Movement	Planned and unplanned ignitions
Values at Risk	Planned and unplanned ignitions
Area Burned / Fire Perimeter Maps	Planned and unplanned ignitions

Fire Behavior Monitoring	Planned and unplanned ignitions
Flame Lengths	Planned ignition treatments
Rate of Spread	Planned ignition treatments
Spot Weather Forecasts	Planned ignition treatments
Pre/Post Burn Photos	Planned ignition treatments
Fuel Model	Planned and unplanned ignitions

Table 3. Fire observations by fire type and occurrence

Fire Mapping

Fire perimeters are mapped for fires within ENP. Maps of fire perimeters are located in the fire report for each fire and shape files of the fire perimeters are entered into the fire perimeter GIS database. This database contains fire perimeter shape files and associated fire information for all fires occurring within the Park from 1948 to the present. After completion of planned ignition treatments, mosaic fire spread patterns are mapped.

Level 3 and 4 Short and Long-term Change

Short term changes are monitored at permanent plots within the treatment area. This is conducted within the first two years post treatment to assess immediate goals of the treatment. Long-term changes are monitored at the same permanent plots. The repeated sampling can identify trends or changes associated with planned ignition treatments.

All four fire monitoring levels are included in Everglades Fire Management monitoring programs. The information gathered is incorporated in the adaptive management process. See section 5.3 of the Fire Management plan for further information on the adaptive management process.

Fire Effects Monitoring

The goal of the current Fire Effects monitoring program is to monitor and assess changes over time within the four fire adapted community types resulting from fire management activities.

Sampling Design

The Fire Effects monitoring program has permanent monitoring plots in the four fire adapted communities located within Everglades National Park (Coastal Prairie, Short and Long Hydro-period prairie and Pine Rocklands). The fire effects monitoring sampling design at Everglades National Park is based off of Fire Monitoring Handbook (FMH) protocols. This handbook provides detailed descriptions for fire monitoring; however, with the unique qualities of the Everglades, many methods have been altered to evaluate trends and answer questions specific to this environment. The protocols are flexible, and designed to assess objectives set forth in the Fire Management Plan and effects from fire management activities. Data collected from plots within these vegetation community types are used to assess short and long term changes in vegetation within the fire adapted ecosystems. To meet a confidence interval of 80%, there are 27 forest plots in pine rocklands, 28 brush plots in short hydroperiod prairies, 11 brush plots in long hydroperiod prairies, and 18 brush plots in coastal prairies. No control plots have been established. Plots were installed and marked with rebar according to National Park Service Fire Monitoring Handbook protocols to ensure repeatability of measurements.

Monitoring Unit/ Vegetation Type	Dominant Species	Plot Label	Plot Type	Plot Size	Number of Plots
Pine Rocklands	Slash Pine (<i>Pinus elliottii</i>)	PIEL1G07	Forest	20m x 50m	27
Short Hydroperiod Prairies	Muhly grass (<i>Muhlenbergia filipes</i>)	MUFI1G03	Brush	30m transect	28
Long Hydroperiod Prairies	Sawgrass (<i>Cladium jamaicense</i>)	CLJA1G03	Brush	30m transect	11
Coastal Prairies	Cordgrass (<i>Spartina spartinae</i> , <i>S. bakeri</i>) / Sawgrass (<i>Cladium jamaicense</i>)	COPR1G03	Brush	30m transect	18

Table 4. Fire Effects plot information, type, number and description by monitoring unit. The plot label is based on dominant species in the monitoring unit and fuel model record.

Plot locations were selected from random points within monitoring types. Plots were accepted or rejected based on the identified criteria within each monitoring type. Plots were installed in areas with a minimum of two years without fire treatment. When plot areas do not burn within five years following plot installation, another pre-burn visit is conducted. Scheduled post-burn visits to FMH plots include an immediate post burn, one year, two year, five year and if need be, ten year post burn sampling regime. Directions to the plots are written in the plot folders, and all GPS points are loaded on the fire effects GPS units and are available on the fire management share drive.

Sampling Methods and Schedule

Prairie Brush Plots (Short Hydro-period, Long Hydroperiod and Coastal Prairie)

Following the FMH guidelines for sampling, brush plots were installed in each of the short hydroperiod, long hydroperiod and coastal prairie monitoring types. Primary access to plots in short and long hydroperiod prairies is by vehicle and foot, and plots in coastal prairies are reached by helicopter. Each plot is 30m in length, and marked at both ends with rebar.

The current protocols being implemented in the the long and short hydroperiod prairies are photo-monitoring and post burn severity (Table 2). This is the same in the coastal prairies with the addition of exotics monitoring protocols which are described below.

Post-burn severity is assessed by assigning a rating to vegetation and substrate and is recorded every 5m along the 30m transect (FMH-22 Brush and grassland plot burn severity data sheet). The severity rating is based on the amount the fire impacted vegetation and substrate and is based on standards from the FMH Handbook. To increase accuracy and consistency, specific descriptions of fire severity ratings for saw grass have been developed based on the field experience of fire effects staff (Table 5). Photo monitoring is conducted at every visit in all brush plots. Photos are taken from each end of the transect,

according to the 2007 Everglades Fire Effects Photo Monitoring Protocols located on the fire management share drive.

	Unburned (5)	Scorched (4)	Lightly Burned (3)	Moderately Burned (2)	Heavily Burned (1)	N/A (0)
Saw Grass	No impact from fire	Dead grass visible above new growth	No dead grass visible above new growth.	Several caudexes in area burned down or to ground.	All caudexes in area burned, white ash left behind.	no vegetation

Table 5: Saw grass post burn severity ratings for Everglades NP prairie ecosystems

Pre-burn sampling was conducted at plot installation prior to the first burn treatment for the plot. Post-burn severity is recorded within one month of the fire being declared out, with a goal of reading the plot as soon as possible after plot is burned. One year, two year and five year post-burn monitoring is conducted based on the calendar year the plot was burned. There are no two year reads in the coastal prairies. The plot read schedule is restarted with each burn.

	PRE	POST	YR 01	YR 02	YR 05
Photo Monitoring	X	X	X	X*	X
Coastal Prairie Exotics Monitoring	X	X	X		X
Post burn severity		X			

Table 6: Monitoring variables and schedule in Prairie Plots

* No YR02 reads in the Coastal Prairies, exotics monitoring exclusive to Coastal Prairies

In 2010, a simplified point-intercept transect was added to the Coastal Prairie plots, to capture the presence and spread of exotic plant species. Exotic plants are identified to species (*Lygodium microphyllum* and *Schinus terebinthifolius*) and life form of all other plants (Grass, Forb, Fern, Shrub) that intersect the line are recorded, along with the substrate directly under the sampling pole.

Pilot studies are being developed by the South Florida Natural Resources Center (SFNRC) and Fire Effects to assess landscape scale changes in *Lygodium* cover after fire in the coastal prairies. Methodology for this pilot study can be found on the fire management share drive.

Pine Rockland Forest Plots

Following FMH guidelines for sampling, forest plots were installed in the pine rocklands monitoring type. Access to plots in pine rocklands is by vehicle and foot. Eighteen rebars were installed to identify primary points in the 20m x 50m plots (Figure 1). The final four rebar not shown are the ends of the Browns transect, located at a random azimuth 50 ft from each A point in the plot.

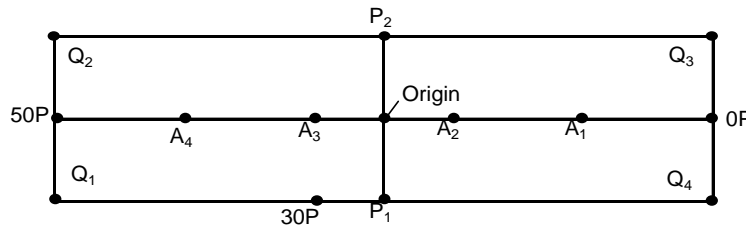


Figure 4: Forest Plot set-up, rebar placement

Vegetation is recorded on a 30m transect (between Q4 and 30P) using a point intercept method. Along this transect, 100 points are sampled (FMH-16 30m Transect Data Sheet) using a 0.6mm diameter rod. All vascular plants touching the rod are identified to species, and the height of each plant and substrate are recorded. If a species touches more than once at a time, only the highest point of intersection is recorded. Species observed but not intersected along the transect line are recorded 5m on either side of the line, in a 10m x 30m area.

A 50m shrub/palm cover line continues from 30P to Q₁. Only shrubs and palms are recorded at the highest point they intersect the rod, substrate is not collected on this part of the transect. The shrubs from the 30m line are exported at the office. The combined data is entered into a single 50m shrub data set.

The only tree species measured in the plots is slash pine, *Pinus elliottii* var. *densa*. Seedling, pole and overstory pine trees have various characteristics monitored. In Q₁, a 10m x 25m area, live and dead seedlings (DBH < 2.5cm) are counted and recorded by height classes. Pole and overstory sized tree data is collected within the entire 20m x 50m plot. Individual pole sized (DBH 2.5cm-15.0cm) trees and overstory trees (DBH > 15.0cm) are tagged and DBH is measured. Additionally, height is measured for pole trees and the damage and crown positions are recorded for overstory trees. New trees that grow to pole size are tagged and incorporated into the data set. Characteristics monitored for snags (DBH > 8cm) are height, DBH, crown class, condition class, percent bark and percent sapwood, along with the presence or absence of cavities. These protocols were developed with input from Gary Slater, research director of the Ecotudies Institute. All snags under 8cm DBH are considered dead poles. The height, crown class and DBH are collected for each dead pole and recorded on the pole datasheet.

Post burn severity is sampled on the four 50ft fuels transect lines (the A-B transects). It is also sampled along the 50m point intercept line to correlate burn severity with herbaceous and shrub regeneration. Severity is assessed by assigning a rating to vegetation and substrate (FMH-21 Forest plot burn severity data sheet), similar to the brush plots. Preliminary analysis has indicated that percent scorch directly relates to tree mortality and percent scorch is recorded for poles/overstory trees (see FMH-20 Tree post-burn assessment data sheet). Snags are included during post burn monitoring (height, DBH, crown class, condition class, percent bark and percent sapwood) to correlate snag conditions with fire.

Photo monitoring occurs at four points along the perimeter of the plot (0P, 50P, P1 and P2). Photos are taken according to the 2007 Everglades Fire Effects Photo Monitoring Protocols located on the fire management share drive.

Pre-burn sampling was conducted at plot installation prior to the first burn treatment for each plot.

Post-burn severity is recorded within one month of the fire being declared out, with a goal of reading the plot as soon as possible after plot is burned. One year, two year and five year post-burn monitoring is conducted based on the calendar year the plot was burned. The plot read schedule is restarted with each burn. Table 7 shows the sampling schedule in the forest plots.

	PRE	POST	Monthly	YR 01	YR 02	YR 05
Photo Monitoring	X	X		X	X	X
Herbaceous Transect						
Herbaceous cover	X			X	X	X
Height intercepted plants	X			X	X	X
Substrate on every intercept	X			X	X	X
Observed species	X			X	X	X
Shrub Line						
Species/height at intercept	X			X	X	X
Post Burn severity		X				
Tree Seedlings						
Live/dead	X			X	X	X
Height class	X			X	X	X
Pole Trees						
Live/dead	X	X		X	X	X
DBH	X			X	X	X
Height class	X			X	X	X
Map	X	X		X	X	X
Percent crown scorch		X				
Overstory Trees						
Live/dead	X	X		X	X	X
DBH	X			X	X	X
Crown position	X			X	X	X
Damage code on live trees	X			X	X	X
Map	X	X		X	X	X
Percent crown scorch		X				
Snags						
DBH (greater than 8 cm)	X	X		X	X	X
Height	X	X		X	X	X
Condition Class	X	X		X	X	X
Percent Bark	X	X		X	X	X
Percent Sapwood	X	X		X	X	X
Presence/Absence of cavities	X	X		X	X	X
Browns Transect						
Post burn severity		X				
Butterfly host plants						
Presence of larvae/eggs			X			

Evidence of larval herbivory			X			
Number fruit/flowers			X			
Condition of plant			X			
Height/Crown area			X*			

Table 7: Monitoring variables and schedule in Pine Rockland Forest Plots

*Height and crown area are measured monthly for one year post-fire and then every six months after the first year.

In addition to FMH monitoring protocols, fire effects staff have developed a monitoring project to address specific concerns within the Everglades pine rocklands ecosystem. In the summer of 2005, Everglades Fire staff initiated fire effects monitoring of pineland croton (*Croton linearis* Jacq.), the host plant of the federally endangered butterfly species Bartram's scrub-hairstreak (*Strymon acis bartrami*) and Florida leafwing (*Anaea troglodyta floridaalis*). This monitoring effort was started to provide preliminary information on response of pineland croton and endangered butterfly species response to fire management activities.

Two plots within the pine rockland monitoring type were initially selected for pineland croton monitoring. Selection criteria were for plots with existing fire effects data in areas with a history of Bartram's scrub-hairstreak and Florida leafwing observations. One plot was an existing fire effects FMP plot and the second selected plot was a Louisiana State University (LSU) permanent vegetation study plot with the same dimensions as the FMP monitoring plots. Two additional LSU vegetation plots have been added for pineland croton monitoring. Plots are visited monthly to record presence of eggs, larvae and larval herbivory and the number of flowers and fruits on pineland croton. Notes are taken on the condition of the plants and the presence/absence of galls. Height and crown area are measured monthly for one year following plot installation or fire treatment and then every six months after the first year. The presence of adult Bartram's scrub-hairstreak and/or Florida leafwing is recorded if observed within the plot.

Data Management and Analysis

Field data is collected and recorded on modified FMH data sheets. Original data sheets are filed in plots folders identified by plot number and kept in a fire proof cabinet in the Robertson Building Fire Effects office. Copies are kept in identical folders for field reference.

The NPS Fire Effects data management program has converted to FFI (FEAT-FIREMON INTEGRATION). This program has been created to be more universally applicable to fire effects monitoring across the US and different land management agencies. A check-list is created each field season to record when each step of the data management process is completed. Data entry and quality control is the shared responsibility of the Fire Effects staff. The FFI database is backed up by the Fire Effects staff once a week on the SQL computer hard drive and a share drive that is backed up by Everglades IT staff.

Digital fire effects monitoring plot photos are processed from RAW format to TIFF's and JPEG's using the program ZoomBrowser EX. Fire Effects plot photos are downloaded and kept on external harddrives in the Fire Effects office. This includes digital copies of select slide photopoints.

Data in FFI can be analyzed within the program; however, it can also be exported to Excel. The majority

of current analysis is completed through Excel. Jay Sah, Florida International University, has begun a more complex statistical analysis for data collected from 1999-2006. His preliminary findings have been reported in a draft document available with the fire effects staff.

Annual work plan

Annual work plans are created by the lead monitor, with oversight from the fire ecologist. Plot visits are the priority in the work plan. Installation of additional plots is determined based on treatment area needs and available personnel. A spreadsheet and calendar of planned activities is maintained by the lead monitor. The spreadsheet includes dates of treatment and scheduled pre-burn and post-burn visits to all plots. A calendar is maintained that includes dates for plot visits, training, anticipated burns and other personnel requirements. Participation in prescribed fire treatments, suppression fires, and other assigned priorities will not significantly delay sampling schedules.

Roles and Responsibilities

The Lead Biological Science Technician (Fire Effects) is responsible for ensuring fire effects plots are monitored according to established protocols, field data collection is complete and accurate, and data is entered and quality checked. The Lead Biological Science Technician provides leadership and guidance to three Biological Science Technicians (Fire Effects) and Fire Effects Interns. The Fire Ecologist supervises the fire effects staff.

Work plans are developed around the schedule for plot revisits. This schedule is maintained in an Excel workbook located on the fire management share drive. The schedule shows both completed and scheduled work to be done by plot and year. This schedule is maintained by the Lead and Assistant Lead Biological Science Technicians. During periods where plot visits are not needed, other work is prioritized and scheduled. Responsibilities are delegated among the Fire Effects staff regarding specific project work.

The Fire Ecologist and the Lead Biological Science Technician are responsible for analysis and interpretation of data collected with input from subject matter experts and other fire ecologists. They are responsible for adapting the existing monitoring program as appropriate based on the adaptive management approach.

Reporting and Adaptive Management

Annual reports are created by the Fire Ecologist and/or Lead Biological Science Technician summarizing accomplishments and data collected by the Fire Effects staff and new protocols developed for the coming year. Fire Effects annually presents data and program summaries internally at the Fire Management After Action Review and throughout the year at local meetings with Park staff. Fire Effects data summaries provide information used in updating and adapting as needed the outlined schedule of work for the prescribed fire program. Fire Effects participates in additional meetings regarding Everglades specific issues and environmental concerns, including the Cape Sable Seaside Sparrow Symposium, the Pine Rockland Working Group and the Imperiled Butterflies of Florida Working Group meetings.

These data collected are incorporated into the adaptive management process, allowing fire managers to assess the quality of the objectives set forth for the unit. The adaptive management approach is outlined in the fire management plan section 5.3 Adaptive Management.

RESPONSIBLE PARTIES

This plan was developed by Maya Vaidya Tupaj (Fire Ecologist) Aerin Land (Lead Biological Science Technician – Fire Effects), and Colleen Holland (Assistant Lead Biological Science Technician – Fire Effects), Everglades National Park Fire Management.

This plan was reviewed by Jennifer Adams (Prescribed Fire Specialist), Everglades National Park Fire Management and Hillary Cooley (Botanist), Everglades National Park South Florida Natural Resources Center (SFNRC).

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