



OSCEOLA RANGER DISTRICT
COMPARTMENTS 16 AND 117
ESCAPED FIRE REVIEW



FINAL

MARCH 19, 2004

**Osceola Ranger District, National Forests in Florida
Compartments 16 and 117 Escaped Fire Review
Lake City, Florida
March 19, 2004**

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EXECUTIVE SUMMARY

On March 2, 2004, a prescribed fire was ignited in Compartments 16 and 117 of the Osceola Ranger District, National Forests of Florida. Statements indicate the fire burned outside the parameters of the burn plan within hours of initial ignition. On March 7, 2004, at 8:21 p.m. the fire was declared an escaped burn moving from the prescribed fire area onto Florida Division of Forestry (DOF) lands. The planned 1,500-acre prescribed fire became a wildland fire that grew to approximately 34,200 acres across federal, state, and private lands.

On March 11, 2004, the U. S. Forest Service Regional Forester, Southern Region, assembled an interagency review team to determine the factors that led to escape. This team was comprised of personnel from the U. S. Forest Service (USFS), U. S. Fish and Wildlife Service (USF&WS) and Florida Division of Forestry (DOF). They based their findings on interviews with Forest Service personnel involved in the burning operations, agency personnel for the USF&WS and DOF and the District Manager of an adjacent corporate landowner. Additionally, the team reviewed pertinent documentation, including burn plans, weather forecasts, weather records, maps and photographs, NEPA documents, administrative documents, and other documentation provided by key personnel.

The review team determined that environmental conditions coupled with a series of actions and decisions contributed to escape. Further, the review team concluded that the planning and implementation of the prescribed fire as implemented (combining Compartments 16 and 117 into one prescribed burn) were not in compliance with Forest Service standards and procedures. Specifically:

- Decision Memo (NEPA) documentation for Compartments 16 and 117 is complete and consistent with management and direction, including standards and guides in the Forest Plan, as amended and consistent with direction in the Forest Fire Management Plan.
- Documentation of Compartments 16 and 117 prescribed burn plans failed to meet requirements outlined in policy and guidance.
- Implementation of the combined prescribed burn plans Compartments 16 and 117 failed to meet requirements outlined in policy and guidance.
- There is conflicting information concerning the level of involvement and communication between the District Ranger and prescribed personnel.
- Unqualified personnel served as organizational leaders during prescribed burning operations.
- The prescribed fire was not declared escaped in a timely manner, nor were the appropriate internal and external contacts made.
- While no accidents occurred, a number of safety concerns were identified by the escaped fire review team.

The findings of the review team are documented in the Compartment 16 and 117 Escaped Prescribed Fire Review Final Report, dated March 19, 2004. The review team concluded that National fire policy and the Agency's prescribed fire standards and procedures are sound.

INTRODUCTION

The Forest Service has policies and standards for prescribed burning that have been developed through extensive scientific exploration and practical experience. Personnel, before they are assigned responsibility for any function on a prescribed burn, are trained in the procedures used to safely and effectively apply fire to meet Forest Plan goals and objectives. The prescribed burn that was ignited on March 02, 2004, in Compartments 16 and 117 on the Osceola Ranger District was intended to reduce hazardous fuel around the perimeter of Impassable Bay and private lands. The fire was deemed by personnel on the fire to be out of prescription within the first three hours of the first day. It was hoped the actions, which occurred after that would restrict the fire to the bay swamp. Impassable Bay was not to be burned according to the prescription for this fire; however, the fire became resistant to holding actions and escaped on Sunday March 7, 2004.

The Osceola Ranger District uses prescribed fire on approximately 25-30,000 acres annually. Their prescribed burning program has been in place for many years.

Purpose

The letter of delegation from the Regional Forester to the Team Leader states:

"A team, consisting of experts in fire behavior, fuel management, and prescribed fire operations will review the planning and implementation of the Compartments 16 and 117 prescribed burn. The team will prepare a concise, factual report of their findings."

Objective

The team's objectives are to answer the questions put forth in the March 11, 2004, letter of delegation and to determine the factors and events during the burn that led to its escape.

Process

The escaped fire review team assembled on Friday, March 12, 2004, to begin this review. After a briefing by the Deputy Forest Supervisor, the team developed a strategy for its activities using the aforementioned questions asked by the Regional Forester as its format for inquiry.

- The Team identified, collected, and analyzed the factual data associated with the escape of the prescribed burn.
- Team members completed technical analyses of weather and fire behavior factors.
- Team members conducted interviews with personnel involved with the planning and implementation phase of the prescribed burn project. The interviewees were personnel from the U. S. Forest Service; Florida Division of Forestry; U. S. Fish and Wildlife Service; Okefenokee Wildlife Refuge; and one representative from the forestry industry.
- The Team documented data collected.

The Team Leader submitted a 72-hour briefing to the Regional Forester on Monday, March 15, 2004. A final report was prepared and submitted to the Regional Forester on Thursday, March 19, 2004.

Location

The Osceola Ranger District's 201,363 acres are located in northeast Florida in Baker and Columbia counties. It is 60 miles east of Jacksonville, Florida. Interstate Highway 10 bisects the forest on an east-west orientation. State Highway 90 is the southern boundary. The community of Lake City, Florida is located on the southwestern corner of the forest.

Osceola Ranger District is primarily a longleaf/slash pine forest interspersed with gum, cypress, and mixed hardwood swamps. The swamps occupy about half of the forest. During periods of normal rainfall, the swamps contain water of sufficient quantity to serve as barriers to fire. Reduced spring rains and increased evapotranspiration often result in lower water levels in the spring. Starting with the drought of 1998, the water levels in the swamps have been lower than normal.



FINDINGS

Response to Questions in the Letter Of Delegation

The Delegation of Authority to the escaped fire review team leader identified four specific questions, with subparts, to be answered by the review team. Answers to those questions provide a good summary of the findings of the review process. Following are those findings:

1. **Did personnel planning and implementing the prescribed fire meet the qualifications standards as established in Forest Service Manual (FSM 5109.17)?**

The Burn Plans for these compartments indicated that, if burned separately, they would be of LOW complexity if executed within prescription conditions. Had this occurred, personnel on the fire would have been qualified for the positions held. However, the District FMO made a determination that this prescribed fire would constitute a Type 1 complexity burn and then proceeded to demonstrate this determination through his actions, to all employees involved (see summary below). Under this characterization, several days of execution occurred without qualified personnel in leadership positions, as follows:

- Yes, on 03/02, Burn Boss Type 1, RXB1 trainee with RXB1 coach
- No, on 03/03, RXB1 trainee without coach, through transition at 1512 hours to ADFMO, who had not taken a Work Capacity Test
- No, on 03/04, ADFMO, Burn Boss Type 2 RXB2
- No, on 03/05, ADFMO, RXB2
- No, on 03/06, RXB1 trainee
- No, on 03/07, RXB1 trainee, yes on transition to ICT3

If the prescribed fire is LOW complexity then leadership qualifications would be different, as follows:

- Yes, on 03/02, RXB1 trainee with RXB1 coach
- Yes, on 03/03, RXB1 trainee without coach, through transition at 1512
- No at 1512 hours, ADFMO, who had not taken a Work Capacity Test
- No, on 03/04, ADFMO, RXB2
- No, on 03/05, ADFMO, RXB2
- Yes, on 03/06, RXB1 trainee
- Yes, on 03/07, RXB1 trainee, yes on transition to Incident Commander Type 3

2. Was National and Regional prescribed policy, as outlined in the FSM and Regional Forest Service Supplement 5140 followed?

National and Regional policy was not consistently followed throughout planning and operational implementation. Numerous deficiencies in documentation occurred in the Burn Plans, procedural errors were made and/or required actions were not taken (see below).

- All transitions among leaders were by radio. There is no documentation of transition briefings being conducted.
- The two prescribed burn plans for Compartments 16 and 117 documented that they were both LOW complexity. A Prescribed Fire Burn Boss, Type 2 (RxB2) would be qualified to plan and implement each plan, individually. RXB1 trainee, the District FMO, requested assistance from Forest Prescribed Burn Specialist, because he felt that the two burns combined, use of a helicopter, the mix of implementing resources, and multiple ignitions increased the complexity of the combined Rx burns to a Type 1 MODERATE to HIGH complexity levels.
- The FSM 5142.1, Determining Prescribed Fire Complexity states, "Base the determination of prescribed fire complexity on an assessment of technical difficulty and potential consequences through an initial and final determination." No final complexity analysis was completed prior to implementation of either the prescribed burn plan or any consideration thereafter. No extended attack transition analysis was documented.
- RXB1 trainee, District FMO, is not qualified as a RXB1. To implement the proposed combined Rx burn plans he contacted RXB1 coach to work toward completing his RXB1 task book. On the first day, appropriate actions were taken to assure adequate, qualified personnel to implement the prescribed fire. RXB1 trainee failed to document changes identifying the increased level of complexity. RXB1 trainee did not provide a final complexity determination document for review and approval by the line officer. The RXB1 and training coach did not ensure this was completed.

3. Was the prescribed burn plan properly prepared and implemented?

The following deficiencies were identified in the burn plan and/or implementation operations:

- No documentation of test burn and test results.
- No 'change approval' signature with nature of approval.
- There are no records of firelines being checked prior to ignition.
- Complexity rating changed to high by Burn Boss without line officer approval.
- No public notification – completion date/who.
- No Hazard Analysis attached.
- No aerial ignition organizational chart.
- No prescribed fire report (FS-5100-29) template.
- No fuel model for swamp in fire parameters.
- No signatures from crew on briefing sheet.
- Changed 20-foot wind direction from north, northeast, and northwest to "any."
- Changed mid-flame west/south direction from north, northeast, and northwest to "any."
- Rate of spread only consistent with backing fire 1-1.5 chain/hour.
- No mid-flame wind speed or direction documented throughout day on Rx plan.
- Weather parameter (temperature, RH) not documented from 1400 through 1700, 3 hours.
- Fire behavior and smoke monitoring documented only once during the day.
- Monitoring Plan not signed.
- No debriefing documented.
- Compartment 17 added to Rx Plan (500 acres) with no change approval.
- Organization chart inconsistent with who was actually on burn. Number of personnel, type and amount of equipment varied daily.

a. Did the environmental variables (weather and fuels) on the day of the ignition correspond to what was prescribed in the burn plan?

In the special considerations Section F, page 3 of 6 of the Compartment 117 burn plan, it states that prior to burning "ensure adequate water level in swamp to contain fire." During the interviews some personnel informed the review team they believed there was not adequate water in the swamp.

All forecasted fuel moisture and weather parameters from the prescription were met.

Fire behavior inputs on the prescription seem to be sound and reasonable, except for the low rate of spread (1-1.5 chains/hour), which would be an output. These inputs were based on one fuel model, fm7. The swamp and transition zones would have a much different fire behavior output, but no calculations were shown for these areas.

b. Were the holding, ignition, and contingency plan elements of the prescribed burn plan based on predicted fire weather and fire

behavior?

There was no indication that there were any fire behavior predictions formally done for this burn. Therefore, it cannot be said that the holding, ignition, or contingency plans were based on predicted fire behavior. As stated above, the fire weather parameters were within the prescription constraints.

Also, the "ignition method" on the prescription does not include aerial ignition as was done during the burn operation. The "firing technique" from the plan was followed (flank/back/strip and spot head).

c. Was the prescribed fire declared escaped and the proper notifications made in an appropriate and timely manner?

No, the Rx burn plans for Compartments 16 and 117 defined the Rx fire area as follows: Forest Service Road 272 on the south; Forest Service Road 270 on the west; Forest Service Road 273 on the north, and Impassable Bay on the east.

On the first day, within three hours of beginning firing, the Rx burn was out of the prescription. The tactic to let the fire back into the bay swamp where it would extinguish itself and confine the fire was not working. RXB1 trainee reports at 1400 hours that "swamp running at 30-40' flame lengths." It is out of prescription at this time. During the first day when the burn made its first run to the north, it went further into the swamp than the objectives stated. There is no contingency area identified in the burn plan. RXB2 and Firefighter reconned this run from the helicopter and both felt that the fire was burning more of the swamp than planned. RXB1 trainee called a conference at 1451 hours, and stated that ignition would stop. Also, at 1451 hours the decision was to hold and only take firing action for contingency purposes. RXB1 trainee terminated firing (see his chronology, page 5) because prescription parameters and burn objectives could no longer be met, and implemented contingency planning late on this first day as well as day two (see his chronology, page 6). FSM 5140.3, Policy, R8 Supplement 5100-93-3, page 2 of 11, Item 5 states; "(d)ecclare a prescribed fire escaped when it burns outside the predetermined boundary and has the potential to result in unacceptable consequences or resource damage. The determination of the potential will be made by the approving line officer." The Forest Fire Management Plan, page 134, states; "(w)hen a prescribed fire has escaped or exceeded the existing plan, suppression action should be implemented immediately. This includes preparation of a WFSA if the escape is not promptly controlled." RXB1 trainee did not declare an escape or notify the Line Officer or DOF the fire was out of prescription.

d. Were agency partners notified and involved at the appropriate time?

On March 2, 2004, DOF was contacted to get a burn authorization. On Thursday, March 4, 2004, ADFMO contacted DOF to request that he be allowed to improve some line on DOF lands. ADFMO called again on Friday to tell him that the fire had gone into Impassable Bay. The DOF was contacted again on Sunday, March 7, 2004, by RXB1 trainee when he declared the prescribed fire escaped. There is no indication that adjacent landowners were notified prior to or during burning operations.

4. What were the key fire behavior input variables on the day of ignition?

Findings

Rx Weather Parameters for Units 16 and 117 Dormant Season Burn October 15 through March 15 Burn Conducted 03/02/2004 Osceola Ranger District National Forests in Florida			
	From Prescription	From Forecast	On Site
Fuel Model	7	7 for pine areas, none for swamp	
1 hour fuel moisture	>= 5%	7 from USFS, 10 from tables	No
10 hour fuel moisture	>=7%	9	Record
Live fuel moisture	NA		Of
Temperature	<= 85	81	On-Site
Relative Humidity	>=30%	42	Conditions
20-ft wind speed	<=18 MPH	10	
Wind Direction	Any	South	
Mid-flame wind speed	2-8 MPH	3 estimated	
Mid-flame wind direction	Any	South	
Transport wind speed	>= 3 MPH	10	
Transport wind direction	Any	South	
Mixing Height	>= 500 m/1,640 feet	4,100	
Dispersion Index	> 21	37	
NFDRS Burning Index	<= 85	32	
Probability of Ignition	<= 50%	30% shaded, 50 unshaded	
KBDI	<450	<100 DOF	
Days since Rain	See Chart	Under 250 any is OK	
Amount	See Chart	Any	
Ignition Method	Hand ATV	Hand & Aerial	
Firing Technique	Flank/backing/spot	Flank/backing/spot	
	Spot & strip head	Spot & strip head	
Flame Length	4-6 feet		2-5' in plantations 20+ in Bays
Rate of Spread	1-1.5 chains/hr		1 ch/hr backing no report of other

a. What was the wind speed and direction at time of ignition?

Findings – South at 10 (twenty foot winds), no record of on-site conditions at time of ignition.

b. What was the moisture content of fuels within and adjacent to the prescribed burn?

Findings – 7% from USFS Olustee Station, 10% calculated from tables.

c. Were fire behavior predictions based on wind speed, direction, and fuel moisture content?

Findings – See table below:

Fuel Model 7 Southern Rough, Temperature 81, RH 42, Eye Level Wind 3-5			
Rate of Spread	Head 14-27 chains/hr	Flanking 3 ch/hr	Backing 1.4 ch/hr
Flame Length	Head 4-6 feet	Flanking 2 feet	Backing 1 foot
Probability of Ignition - 30-50% depending on shading and fuel moisture			

The fire behavior predictions that were conducted by the review team, on the conditions present at the time of ignition, indicate the fire should have behaved within the limits of the prescription for Fuel Model 7 (Southern Rough Plantations). There is no one reliable standard fuels model that predicts the fire behavior in the bay swamps. When they do burn, they burn very aggressively consistent with Fuel Model 4. If they are not burning well they burn like Fuel Model 5 (shrub) or Fuel Model 9 (loose timber litter), or if really wet they will not burn at all. Fuel Model 4 would be most useful for contingency planning.

PLANNING

Analysis of Planning and NEPA Documentation

Planning and Prescribed Fire

Findings – Decision Memo documentation (NEPA) for Compartments 16 and 117 is complete and consistent with management direction, including standards and guides in the Forest Plan, as amended, and consistent with direction in the Forest Fire Management Plan.

The Revised Land and Resource Management Plan for National Forests in Florida (signed February 1999) provides guidance and direction for land management activities for the Osceola National Forest. All management activities, including prescribed burning, must comply with the requirement of the revised Forest plan and the Final Environmental Impact Statement.

For prescribed fire management units within National Forests in Florida, there is a Forest Fire Management Plan (signed December 2001) prepared to tier to the Revised Land and Resource Management Plan. Each forest in Florida prepares Prescribed Burn Plans, which tiers to the Forest Fire Management Plan.

Forestwide Standards and Guidelines state, "Eleven requirements for wildland fire are listed in FSM 5142.2. In 1995, the Regional Forester approved the use of management-ignited prescribed fire in these areas when lightning-ignited fire does not occur with the frequency or intensity needed to maintain fire-dependent ecosystems."

Compartments 16 and 117 Prescribed Fire Project - Categorical Exclusion (CE)

Project specific prescribed fire NEPA documents are written to include certain specific compartments.

The Osceola Ranger District has two Decision Memos; one covering Compartment 117, dated 10/24/00, and one covering Compartment 16, dated 02/04/03. The proposed actions for these compartments fell within Category 7 (timber stand and/or wildlife habitat improvement actions) of actions categorically excluded by the chief (FSH 1909.15-92-1, Section 31.2), and no extraordinary circumstances exist that might cause the action to have significant effect; therefore, the action is categorically excluded from documentation in an environmental impact statement or an environmental assessment.

The local agency administrator has final approval authority for all Prescribed Fire Plans, unless special circumstances warrant higher review and concurrence (such as may occur during higher Preparedness Levels or for extremely large, complex projects). Authority for planned ignition may be redelegated from the Forest Supervisor to the District Rangers based on complexity of burns and qualification and expertise of each individual. The District Ranger will not redelegate this authority. (The Forest Supervisor did this in November 2003.)

Prescribed Burn Plan Review

Finding: Documentation of Compartments 16 and 117 prescribed burn plans failed to meet requirements outlined in policy and guidance.

Policy

Forest Service Manual, 5100 – Fire Management
Amendment No. 5100-99-3
Effective date June 18, 1999

Reference – The Wildland and Prescribed Fire Management Policy Implementation Procedures Reference Guide, page 79, paragraph 3,

Prescribed Burn Plans must include the following minimum elements:

1. Description of the Prescribed Fire Area
2. Goals and Objectives
3. Range of acceptable results expected
4. Project Assessment
 - Complexity Assessment
 - Risk Assessment
5. Prescribed Fire Implementation Actions
 - Pre-burn considerations, on and off site
 - Briefing
6. Test Fire
7. Prescribed Fire Prescription
8. Special conditions, Public and Personnel Safety
9. Burn Organization
10. Ignition Plan

11. Holding Plan

Prescribed Burn Plans must include the following minimum elements (continued)

12. Cooperation

13. Contingency Plan

14. Funding

15. Smoke Management and Air Quality

16. Monitoring

The Impassable Bay Burn Unit is a combination of Compartments 16 and 117 Prescribed Burn Plans. As written, each burn plan contained all the required elements except funding. However, a decision was made to implement these burns together and additional changes were made that were not appropriately documented. These inadequacies included: No Job Hazard Analysis, No Risk Assessment, No Organizational Charts, and No Complexity Analysis.

Cost was not addressed in Prescribed Fire Plan as required in the forest Fire Management Plan (3.a.). "The dollar figure placed in this block can be a factor in determining if or when a reburn should be declared a wildfire. Use a reasonable dollar figure that covers most expected scenarios, including expected mop-up. If this figure is exceeded by reburning, yet the burn remains inside the original boundary, the burn can still be declared a wildfire."

Section A. Review, Concurrences, and Changes – Wayne Burns, Fire Operations Technician, Osceola Ranger District, prepared the Rx Burn Plans for both Compartments 16 and 117. Compartment 16 was prepared on December 10, 2002. Compartment 117 was prepared on January 8, 2003. These original burn plans were kept in the office. A package consisting of briefing forms, prescribed fire parameters, on-site observation forms, organizational chart form, monitoring record form, and maps were used as a field copy of the Rx Burn Plan.

Putting the two compartments together to burn as one unit; using aerial ignition, equipment differences and personnel changes, and updates to the complexity ratings, as well as risk assessment would require the change approval line to be signed. This was not done.

The section which documents the date and timelines, was checked; but had not been completed.

Section F. Special Considerations – The Rx Burn Plan states, "Prior to burning, ensure adequate water level in swamp to contain fire." This is a subjective standard. According to the individual who prepared the Plan, this is also the section where he would indicate aerial ignition and he did not, even though aerial ignition was used both on March 02, 2004 and March 03, 2004

Section G. Prescribed Burn Execution – The Rx Burn Plan had an Aerial Ignition Organizational Chart, but it was not filled out. The Organizational Chart that was completed in the field was inconsistent with the resources and equipment listed on the office copy. (See Table 1 - Minimum Required Organization)

Table 1

Minimum Required Organization								
Org Chart Compartment 16 Burn Plan	Org. Chart Compartment 117 Burn Plan	Org. Chart Field Copy (both compartments 03/02/04)	Actual Personnel and Equipment on Compartment 16/117 Rx Burn 03/02 - Tues	Actual Personnel and Equipment on Compartment 16/117 Rx Burn 03/03 - Wed	Actual Personnel and Equipment on Compartment 16/117 Rx Burn 03/04 - Thurs	Actual Personnel and Equipment on Compartment 16/117 Rx Burn 03/05 - Fri	Actual Personnel and Equipment on Compartment 16/117 Rx Burn 03/06 - Sat	Actual Personnel and Equipment on Compartment 16/117 Rx Burn 03/07 - Sun
2 ATV Power Torches	2 ATV Power Torches	1 ATV						
2 Type-6 Engines	4 Type-6 Engines	1 Engine	1 Engine	1 Engine	1 Engine	1 Engine		
1 Type -3 Dozer	2 Type-3 Dozers	2 Dozers	1 Dozer	1 Dozer	2 Dozers	2 Dozers		
6-8 Personnel	15 Personnel	16 Personnel	19 Personnel	15 Personnel	17 Personnel	7 Personnel	2 Personnel	2 Personnel
		2 6-Wheelers	1 6-Wheeler	1 6-Wheeler	1 6-Wheeler	1 6-Wheeler		1 6-Wheeler
			1 Type-3 Helicopter	1 Type-3 1 Type-2 Helicopter	1 Type-3 1 Type-2 Helicopter	1 Type-3 Helicopter	1 Type-3 Helicopter	
			Pick-ups	Pick-ups	Pick-ups	Pick-ups	Pick-ups	Pick-up & LEO Vehicle

Section J. Prescribed Parameters and On-Site Observations – There is no documentation to show that fire behavior predictions were completed prior to this burn. There were no “BEHAVE” runs or other such documentation.

The Prescribed Fire Parameter General Weather Forecast for 03/03/04 is a photocopy of the 03/02/04 weather forecast sheet that was placed as documentation in the field copy in the Rx Burn Plans.

On the field copy of the fire parameters forecast, the prescribed 20-foot wind direction and mid-flame wind direction was north, northeast, and northwest; this was marked out and “any” was written in.

The firing technique was described on the original field copy, as Hand/ATV, whereas the field copy was hand/ATV/PSD. This was done without a Change Approval.

The temperature and relative humidity was documented at 1200 hours, 1330 hours, 1400 hours, and 1700 hours. No wind speeds or direction were documented. Fire Behavior (ROS, flame length and height) was documented once. FSM 5100, Region 8 Supplement, Section 5142.1: “Conduct weather observations periodically or every 2 hours, minimum.”

The following fire prediction outputs were completed by the Review Team and are based on the fuel conditions and forecast weather for March 2, 2004, for Burn Compartments 16 and 117, Impassable Bay.

Fuel Model 7 (Southern Rough) Temperature 81, RH 42, Eye Level Wind 3-5 MPH			
Rate of Spread	Head 14-27 ch/hr	Flanking 3 ch/hr	Backing 1.4 ch/hr
Flame Length	Head 4-6 feet	Flanking 2 feet	Backing 1 foot

Fuel Model 4 (Dry Swamp) Same weather as above			
Rate of Spread	Head 37-73 ch/hr	Flanking 7-8 ch/hr	Backing 4 ch/hr
Flame Length	Head 14-19 feet	Flanking 6-7 feet	Backing 5 feet

Probability of Ignition – 30-50% depending on shading and fuel moisture

The fire behavior predictions run by the Review Team indicate the fire should have behaved within the limits of the prescription for the southern rough pine plantations.

In order to properly prepare for contingency control, fire behavior needs to be predicted for fuels outside the prescribed area. The burn plan calls for burning only the pine plantations and having the swamps extinguish the fire as it moves into them. In this case the swamp was the control line. The fire was not to burn into the swamp. The Fire Management Plan under the Forest Management Unit (FMU) – Osceola General Forest states that “During dry periods the swamps will dry out and fire will burn through these areas where the fire return interval is longer (fuel model 4). When the swamp portion of this FMU burns it burns very hot and there are limited equipment capabilities in these areas.” Fire predictions using Fuel Model 4 should have been done to properly plan for control of fire in the swamp. Had they done the fire prediction for the Fuel Model 4 they could have been better prepared for the 20’ and greater flame lengths they observed on the first day.

Fuels and Weather input were current and within prescription limits.

The burn plan documentation includes the appropriate National Weather Service Fire Weather Forecasts for the afternoon before the burn and the morning of the burn. Additionally, spot weather forecasts were requested and completed on the morning of the burn as well as 03/03, 04, 05, 07, 08, and continuing for the wildfire.

Fuel moisture conditions as indicated on the 10-Day Fire Danger and Fire Weather Record were within the parameters of the prescription. The Forest Service Manual, Section 5142.1 and the National Forests in Florida Supplement No. 5142 states that it will be standard practice to use 10-hour fuel moisture sticks to determine fuel moisture. There is no documentation that fuel sticks were used on this burn.

Fuel and weather conditions were within the prescription parameters (see table on page 6).

The rate of spread listed at 1–1.5 chain/hour is only likely with backing fires. The prescription indicates that flank, backing, and spot and strip head firing is appropriate.

IMPLEMENTATION OF PRESCRIBED BURN PLAN

Findings – Implementation of the combined prescribed burn plans for Compartments 16 and 117 failed to meet requirements outlined in policy and guidance.

Historical Fire Occurrence: Fire is a natural component of the ecosystems found on the Osceola Ranger District. Unlike most of the United States where most of the wildfires occur in the summer, Florida's wildfire season normally runs from December to June. A dry period occurs in the spring. In late spring more frequent thunderstorms begin to develop. The frequent ignition source combined with the dry conditions leads to a peak in the number of acres burned due to wildfire in May. Lightning-caused fires continue to occur throughout the summer but as the summer progresses; most of these fires receive some rain and are relatively easy to control.

Most large fires have been associated with droughts. Large fires occurred during the drought in 1955 and 1956. The Buckhead fire of 1956 burned a total of 175,000 acres of which 25,000 acres were on the Fire Management Unit (FMU). In 2000, the Benton Tower Fire burned approximately half of this FMU.

Fuel Conditions: During dry periods the swamps will dry out and fire will burn through these areas where the fire return interval is longer (Fuel Model 4). High mid-story fuel build-up occurs in these areas where the fire return interval is long. When the swamp portion of this FMU #31 burns it burns very hot and there are limited equipment capabilities in these areas. Fires that get established often burn into a duff layer, which can smolder for months until sufficient rains inundate the swamps.

The vast majority of this FMU #31 is a high brush swamp. When this area dries out fires are extremely difficult to control. The area is remote with limited access with limited on-the-ground equipment capabilities, a dense midstory tends to reduce the effectiveness of air attack and deep duff layers can smolder for months.

This FMU #31 is bordered to the west by timber company lands, to the north and east by State of Florida lands and private non-industrial owners. Cooperation and coordination during wildland fires and prescribed fire operations is essential in these remote areas where boundaries are not recognizable on the ground.

The FSM 5142.1 - Determining Prescribed Fire Complexity, states, "Base the determination of prescribed fire complexity on an assessment of technical difficulty and potential consequences through an initial and final determination."

The two prescribed (Rx) burn plans for Compartments 16 and 117 were both initially completed for hand ignition and documented as low complexity. A Prescribed Fire Burn Boss, Type 2 (RxB2) would be qualified to plan and implement each plan, individually.

RXB1 trainee, the District FMO, briefed the Escaped Prescribed Fire Review Team on 03/12/04. He described the Rx burn as a Type I complexity burn because it was in the swamp, included a complex organization with a 10 person Type 1 crew, assorted district personnel, one helicopter, and planned two simultaneous ignitions. RXB1 trainee's chronology of the escaped Rx burn (provided to the Escaped Fire Review Team) included his rationale for designating the Rx burn at the Type 1 level. RXB1 trainee is not qualified as a RxB1. RXB1 trainee requested assistance from the Forest Prescribed Fire Specialist, because he felt that the two compartments combined with the mix of implementing resources increased the complexity of the combined Rx burns to a Type I with moderate to high complexity levels. The Forest Prescribed Fire Specialist had scheduling conflicts and was not able to assist as a training coach. They discussed alternative coaches and RXB1 coach, the Forest Prescribed Fire Planning Specialist and qualified RxB1 located on the Lake George Ranger District, Ocala National was suggested. RXB1 trainee contacted RXB1 coach and they agreed he would provide qualified training presence and coaching for the combined Rx burn (see pages 2-3 of RXB1 trainee's chronology).

The FSM 5142.2, Determining Prescribed Fire Complexity, states "The detail of the Rx burn plan must be commensurate with project complexity. Use the NWCG Prescribed Fire Complexity Rating System Guide (NFES 2474) (FSM 5108) to identify and document the level of complexity. On high complexity Rx burn plans; the Prescribed Fire Planning Specialist develops the plan (FSM 5145.21). On less complex fires, a Prescribed Fire Burn Boss, Type 2 (RxB2) may develop the Rx burn plan. Each Rx burn plan should be reviewed and recommended for line officer approval by a qualified and experienced fire manager."

RXB1 trainee did not complete a final complexity analysis document or get the complexity change approved by the line officer prior to implementation of this prescribed burn. The RXB1 and training evaluator/coach, did not complete a complexity analysis.

The review team completed two independent complexity analyses of a prescribed fire combining compartments into one burn operation. Each of these analyses determined the complexity to be LOW. The preparers of these analyses then conferred and confirmed each other's findings. It is recognized that complexity analyses are subjective.

FSM 5142.1 (effective 06/18/99), Management Ignited Prescribed Fire, R8 Supplement 5100-93-3, page 4 of 11, Item 15 states, "Test Fires. The burn boss shall conduct a test fire for all complex and intermediate level burn units. Document the results of the test fire in smoke management and fire behavior terms in Sections M and O of the Prescribe Burn plan (R8-FS-5100-6)."

A test burn was conducted but not documented.

There were no signatures on the initial briefing document by those attending the briefing on 03/02/04. On 03/03/04, no briefing documentation was completed. Subsequent briefings and documentation were inconsistent in the record failing to define clear daily objectives or who was in charge during the Rx burn. Aviation briefings were completed. A debriefing document was included in the Rx Burn Plan, but no information was documented.

There are conflicting statements regarding transition briefings.

FSM 5142.3, Smoke Management, R8 Supplement 5100-93-3, page 5 of 11, Item 5 states, "Use test fire on intermediate and complex level burns to confirm smoke dispersion and record observation in burn plan on day of burn." A test burn was conducted but not documented.

The FSM 5140.31, General Fire Use Policies, Item 3 states, "No less than the organization described in the approved Rx burn plan may be used to implement the project."

The Rx burn area was originally intended to be two separate burn blocks (Compartments 16 and 117) with two individual burn plans. The area was burned as one unit combining resources. If the resources were combined they would consist of the resources identified in Table 1 on page 10. A change approval would be needed for this. Since the decision was made to combine both compartments, a change approval for equipment assigned was needed. No change approval was initiated by FMO or approved by the line officer. The burn plan was inadequate with the lack of required resources before it was ignited. The organizational chart was inconsistent with the original office copy, field copy, and resources actually on the burn.

The FSM 5142.2 states "...if aerial ignition devices are used include an aerial ignition operation hazard analysis." No ignition operation hazard analysis was completed. Because aerial ignition was added to the plan this would constitute a change approval by the line officer.

Finding – There is conflicting information concerning the level of involvement and communication between the District Ranger and prescribed fire personnel.

The FSM 5140.31, General Fire Use Policies, Item 7, states in part, "A decision to amend a Rx burn plan requires approval at the same or higher level of authority as required to approve the initial plan (5140.42, paragraph 2). The FSM 5140.31, General Fire Use Policies, Item 8, states, in part, Approval of an Rx burn plan constitutes firm limits on the prescription to be applied and the objectives to be achieved. Deviation from these limits requires prior written approval by a line officer at the same or higher level of authority as approved the initial plan (FSM 5140.42, paragraphs 2 and 3).

The District Ranger only signed the burn plan for compartment 16 on March 2, 2004. The plan for Compartment 117 was signed by a former District Ranger on January 9, 2003.

There were changes made to the burn plans that were not signed as a change approval by the District Ranger.

Finding – Unqualified personnel served as organizational leaders during burning operations.

National and Regional prescribed fire policy, as outlined in the FSM and Regional Forest Service Supplement 5140 was not followed consistently throughout operational implementation. Under classification as a Type 1 burn, the first day of implementation was the only day with adequate qualified leadership personnel. As noted below:

The FSM 5140.31, General Fire Use Policies, Item 3 states, "a fire use project may be implemented only with trained and qualified personnel" (FSM 5145.1).

- Yes, on 03/02, RXB1 with RXB1 coach
- No, on 03/03, RXB1 trainee without coach, through transition at 1512 hrs to ADFMO, who had not taken a Work Capacity Test
- No, on 03/04, ADFMO, RXB2

- No, on 03/05, ADFMO, RXB2
- No, on 03/06, RXB1 trainee
- No, on 03/07, RXB1 trainee, yes on transition to ICT3

If the prescribed fire is LOW complexity then leadership qualifications would be different, as follows:

- Yes, on 03/02, RXB1 trainee with RXB1 coach
- Yes, on 03/03, RXB1 trainee, through transition at 1512
- No, on 03/03 at 1512 ADFMO, who had not taken a Work Capacity Test
- No, on 03/04, ADFMO, RXB2
- No, on 03/05, ADFMO, RXB2
- Yes, on 03/06, RXB1 trainee
- Yes, on 03/07, RXB1 trainee, yes on transition to ICT3

After review of the Fire and Aviation Management Training and Qualification Master Record and Work Capacity Test (WCT) Records, for the employees involved in the prescribed burn, the ADFMO was the only employee not qualified as established in Forest Service Manual FSM 5109.17. His WCT currency lapsed on January 8, 2004. The FMO assigned an unqualified organizational leader to the burn on March 3, 4 and 5. The AFMO, an unqualified person, accepted the duties of RXB1.

On Wednesday afternoon RXB1 trainee left for Atlanta for training, delegating ADFMO as burn boss.

Findings – The prescribed fire was not declared escaped in a timely manner, nor were the appropriate internal and external notifications made.

FSM 5140.3, Policy, R8 Supplement 5100-93-3, page 2 of 11, Item 5, states to “Declare a prescribed fire escaped when it burns outside the predetermined boundary and has the potential to result in unacceptable consequences or resource damage. The determination of the potential will be made by the approving line officer. The Florida Fire Management Plan guides decision making leading to declaring an escape fire in that it is no longer in prescription, and cannot be returned to prescription with the forces currently on hand (FMP, page 134, paragraph 4).”

The Revised Florida Forest Plan, as amended, forestwide standards and guidelines address a escape RX burn as follows: FI-3-A prescribed fire that exceeds, or is anticipated to exceed, one or more prescription parameters or line holding capability and cannot be returned to prescription with project funds is a wildfire. Once an escaped Rx fire had been declared a wildland fire, it cannot be redesignated a prescribed fire. (Forest Plan, page 3-3).

The burn plan calls for burning only the pine plantations and having the swamps extinguish the fire as it moves into them. The bay swamps with tall mature cypress and gum trees on the southern end of Compartment 16 did keep fire out of them. However, the swamp areas in Compartment 117 are more open, shrubby and some have pine trees scattered in them.

The fire that was set in the northwest corner of compartment 117 and made runs into the swamp fuels. These runs produced significant fire activity. Crewmembers on the scene

reported flame length of over 20 feet. These runs occurred while wind gusts would pick up. The Florida Automated Weather Network station at MacClenny (20 miles east) reported winds up to 15 miles per hour. These increased flame lengths and extended runs into the swamp fuels put this burn out of prescription. On the first day, at 1400, fire behavior was observed that included 30-40 foot flame lengths in the swamps. The burn plan says flame lengths were to be 4-6 feet and rate of spread 1-1.5 chains per hour.

Florida DOF was contacted for burning permits on March 2, 2004. DOF was contacted for use of helicopter Forestry 30 on March 3 and 4 and was utilized for bucket drops. DOF was contacted for permission to plow roads on their lands. DOF flew a fixed-wing recon on March 5.

Public notification requirements were not documented in the Rx Burn Plan.

Overall, a number of knowledgeable district personnel in leadership positions failed to recognize the need to address the Rx burn that is out of prescription in terms of the escape fire forest standards. There was an unexplained reluctance at all levels to raise this issue to the District Ranger. The ADFMO called the DOF and not the District Ranger. The District TMA and ORA Assistant Rangers did not notify the District Ranger.

It was the RXB1 trainee's understanding that the ADFMO had inquired about having the Augusta Hot Shot Crew stay, but they could not. Neither ADFMO nor RXB1 trainee requested extra help after the crew was demobed. RXB1 trainee decided to release helicopter 868 to Ocala on Saturday night. RXB1 trainee released helicopter 868 without having a confirmed replacement. The forecast was identified as a fire weather watch.

The RXB1 coach did not take over the fire on the first day when it went out of prescription. He was providing qualified training evaluation/coaching presence for the Type I complexity burn. The RXB1 coach did not return the next operational period to coach his trainee or make any further contact to determine the fire status.

SAFETY

Finding: While no accidents occurred, a number of safety concerns were identified by the escaped fire review team.

Firefighter and public safety is the first priority on prescribed fires. The Forest Service Manual and Handbook System provide guidance and direction to be taken during the planning and implementation of prescribed fire activities. A commitment to safety must be demonstrated through documentation and implementation of all phases of operations.

During the Burn Plan preparation process, as well as procedures, training, certifications and personal protective equipment necessary to mitigate those hazards are to be documented in a Job Hazard Analysis (JHA) attached to the Burn Plan.

The FSM 5142.3, Pre-Ignition Briefing and Forecast Requirements, states, Assigned personnel must be briefed prior to ignition to ensure personnel safety considerations are clearly understood and prescribed burn objectives are clearly defined. During the briefing, discuss elements of the Job Hazard Analysis (JHA) specific to each individual job task.

Job Hazard Analyses were not attached to either of the Burn Plans. On request by this review team, the Osceola Ranger District personnel provided a JHA addressing Prescribed Burning. The JHA was prepared in December 2002 with an electronic signature by the Forest Supervisor on 12/18/02. There is nothing to indicate that the Forest Supervisor or District Ranger validated this JHA as accurate or appropriate since that time.

The only indication that safety was addressed during this operation is a checkmark on a standardized briefing form in Item I. - Safety. This briefing form is signed by the District FMO and is dated 03/02/04. There is nothing to indicate that a JHA was used or addressed during this briefing.

Some of the employees present for the first day of operations indicated that they received a "good briefing." However, no one indicated that issues related to safety were covered. There is no record of any briefing after the first 2 days.

Even though this was a prescribed fire and not an emergency, it is still important that employees receive enough rest to function in a safe manner. The district was doing a good job of monitoring the hours per day on project. There were five times during this period where hours worked exceeded twelve hours, and these were fourteen hours or less per day.

The unit was not monitoring the number of days worked without having a day off. Employees that worked on the prescribed fire had taken at least two days off, per day period, with the exception of one employee who had worked since 02/15/04, with no days off.

The ability to maintain communications between all personnel on prescribed fires is critical for safe operations. This is addressed in the JHA, which requires that portable radios are assigned to all personnel and that all crewmembers are briefed on designated radio frequencies. This is also addressed in the Fire Orders and Watch Out Situations.

There is no indication that a communications plan was developed or shared with crewmembers prior to ignition. There is no indication that communications were tested prior to ignition. Indications are that communications were poor and that it was not possible to talk to one another across the prescribed fire area.

Other safety issues that relate to leadership and control of operations include:

Some individuals indicated that they would come to the prescribed fire, after completion of their normal work duties, without authorization from the burn boss and not accounted for on the organization chart. Some indicated that this is normal procedure on the district. Interviews indicated that crewmembers had different understandings regarding strategies and tactics, and at times confused about who was in charge. There is no documentation of any of the leadership transitions to indicate conveyance of strategy, tactics or safety concerns. There is no indication that the Fire Danger Pocket Card was referenced in planning the burn, during the briefing or supplied to off forest personnel on this burn. The Burning Index values for the February 28th through March 1st were 43, 31, and 36. The interpretation of these values is rated at caution. The 90th percentile is approximately 50 for this Forest Management Unit.

APPENDICES

List of Project Record Items

- A. Delegation of Authority to Team
- B. Delegation of Authority to Approve Prescribed Burn Plans
- C. IBA Report
- D. Job Hazard Analysis
- E. Burn Plans
- F. Fire Pocket Card
- G. Personnel Qualifications
- H. Spot Weather Forecasts
- I. Daily Weather Forecasts
- J. Weather Observation (Fann & Olustee)
- K. Weather Summary
- L. Behave Runs
- M. Incident Summary Status (03/08/04 – Horn Fire)
- N. RXB1 trainee’s Task Book
- O. FS Manuals, Handbooks, R8 Supplements, Florida Supplements
- P. Forest Management Plan
- Q. Interview Questions/Schedule
- R. Interview Cover Letter
- S. Employee & Cooperator’s Statements
- T. RXB1 trainee’s Chronology
- U. Forest Prescribed Fire Specialist’s Chronology
- V. RXB1 coach’s Chronology
- W. IC Type 3 Logs & RXB1 trainee’s Notes
- X. 72-Hour Brief
- Y. Ranger District Organization Chart

