

CHAPTER 11

HOLDING AND CONTINGENCIES

OBJECTIVES

- 1) Demonstrate and describe how to maintain a fire within an authorized area.
- 2) List the four operational phases of a prescribed fire.
- 3) Describe what to do when a prescribed fire escapes or burns out of prescription.
- 4) Discuss standards for mop up and declaring the fire out.

INTRODUCTION

Prescribed fire properly planned and executed is a valuable tool. In order to use this tool to the greatest advantage extensive planning and careful preparation are required. When a comprehensive plan is written and followed, the weather cooperates and your fire behaves as expected, the chance of problems occurring are greatly reduced. However, prescribed burns do not always proceed exactly as planned. Changes in weather, equipment breakdowns, human error, and countless variables interact in a unique manner on each prescribed burn. Problems may occur anytime and anywhere on every prescribed fire. Burn managers and each crew member must make constant adjustments during each successful prescribed burn. With all of the variables associated with prescribed fire most practitioners will experience and deal with escaped fires and other contingencies throughout their career. .

This chapter addresses the methodologies and actions that will allow prescribed burners to successfully complete each burn. Both wild and prescribed fires involve four operational phases. On wildfires firefighters respond to unplanned ignitions and often use direct suppression to extinguish the fire. Prescribed fires are either deliberately set or allowed to burn to meet measurable objectives. Prescribed fires are extinguished through indirect suppression techniques designed to allow consumption of the target fuels. This indirect suppression technique relies upon a series of well planned ‘holding’ actions which limit ignition to target fuels within the burn unit. The next four sections of this chapter examine crucial holding and contingency details for each operational phase. For prescribed fires these four operational phases are:

1. Planning/Evaluation
2. Ignition/Holding
3. Mop up
4. Declaring the fire out

Much of the material discussed in this chapter was originally presented in NFES Publication 1515, “Planning for Initial Attack” (Appendix C). This booklet was designed to give the initial

attack Incident Commander a checklist for use when responding to a wildland fire. In fact when a prescribed fire escapes from the burn crew and the authorized area it becomes a wildfire. “Planning for Initial Attack” will help the prescribed burner take specific actions during an escape which will minimize adverse impacts. These actions are discussed in the fifth and final section of this chapter.

Actions and planning during the normal operational phases of a prescribed burn are equally important. The old adage dealing with human health “an ounce of prevention is worth a pound of cure” is also true for prescribed fires. During each operational phase of a prescribed burn there are specific actions that can prevent escapes and there are common mistakes that can cause problems. This chapter examines these specific actions and outlines the basic steps to properly manage an escaped prescribed fire. A successful prescribed fire requires diligent completion of all four operational phases.

PLANNING/EVALUATION

Actions during the planning stage often determine success or failure. Planning on prescribed burns is best described as an ongoing process. While the written plan should be completed well in advance of a proposed burn the planning process includes evaluation. This process overlaps all operational phases and includes coordination, development of the written plan, evaluation, and communications during all operational phases.

The Burn Unit The burn unit and surrounding area should be thoroughly scouted and described in detail on a burn unit map. Each crew member should be provided a copy of the map. The map should include roads, vehicle trails and any trails which provide access to the burn unit. The boundary of the burn unit should be clearly marked both on the map and on the ground. Each crew member should be familiar with the burn unit boundaries, methods of access and adjacent areas. Restrictions to access should be noted. Weight limitations on bridges, narrow trails, and swamps may restrict access for some equipment. While a lightweight ATV can easily maneuver across a variety of terrain conditions the burn manager must also consider access for heavy equipment. The standard Florida Forest Service initial attack unit is the tractor/plow. The combined weight of a transport loaded with a tractor/plow exceeds 20 tons. Other travel barriers may include canals, ditches, fences and wetland areas. Locked gates may delay access at critical times and should be left open whenever possible. Canals without a crossover can pose additional problems for the burn manager. Some suppression forces may have to be positioned on the downwind side of the canal to handle potential spotovers.

Areas with high fuel loads should also receive special attention. High fuel loads within the burn unit can create intense fire behavior increasing both spotting frequency and distance. High fuel loads on either side of a fire line coupled with ladder fuels such as Spanish moss and vines may dictate remedial action during the planning phase. Fine, readily ignited fuels adjacent to the line also merit special attention. In Florida, ‘lighter’ snags and cabbage palms frequently cause problems. Cabbage palms can cause serious spotting problems when dead palm fronds are ignited and fall apart before they hit the ground. Even modest winds can transport these flaming embers considerable distances. Lighter pine can be found both as standing snags and as remaining stumps in areas which may have been logged many years earlier. While snags are

readily visible, stumps may be concealed within heavy palmetto thickets. Delayed ignition characteristics are common to both fuel types and problem spotting can occur hours and in some cases days after the main fire has burned. This is especially common with standing snags that are partially covered with bark and ‘punky’ softwood.

When ‘lighter’ snags and stumps are numerous they can produce significant amounts of residual smoke. In some cases it may be better to exclude significant concentrations of these fuels from the fire zone. In addition a burn unit with large peat or duff areas may require additional resources. If these areas are accidentally ignited significant resources may have to be committed during the mop-up phase.

Areas adjacent to the burn unit should also be examined with emphasis on identifying areas with high fuel loads or easily ignited fuels. Open pastures and other low fuel areas which may serve as anchor points and fire breaks should also be marked. Capital improvements such as power lines, communications equipment, buildings, and signs also require additional consideration and protection.

Control Lines During the planning phase the burn manager must determine the location and type of control line required. If the control lines require additional work this should be completed prior to the burn day. A wide variety of control lines are used for prescribed burns. These may be as simple as a sparsely vegetated ecotonal zone between two vegetation communities to a multi-lane highway. Many types of control lines may be adequate under prescribed burning conditions. Under wildfire conditions interstate highways are often inadequate firebreaks.

Disked or tilled lines 8 to 12 feet wide are often used on prescribed burns. They offer the advantage of providing equipment access and easy inspection of the entire perimeter. Lines with bare mineral soil also provide a substantial interruption in fuel continuity which clearly delineates the burn unit. Monitoring frequency can be reduced and if crews must respond to other concerns there is a higher likelihood that this type of line will hold the fire. Other types of line include hiking trails, mowed areas, lines constructed with hand tools, and ‘wet’ or ‘foam’ lines. All of these lines may be adequate but they generally require more manpower.

Personnel Personnel requirements for each burn will vary. Experience, equipment, burn unit size and complexity determine training and crew requirements. Today, in Florida’s complex environment it is advisable to have at least three crew members on the smallest and least complex burns. Burn crews that have worked together on a consistent basis and formed a good working team can conduct relatively complex burns with fewer people. When new crew members join a team it may take several burns to achieve optimum performance. When planning prescribed burns potential crew experience should be evaluated before crew size is determined. Inexperienced crew members should be paired with experienced personnel. Simply meeting agency training requirements does not substitute for real world experience. Burn managers must insure that prescribed fire experience matches the complexity of the proposed burn.

Training This course is designed as initial training for prescribed burners. Additional training both formal and informal is essential. Federal courses offer training for wildland fire fighters through a series of courses. Three basic courses, S-130, S-190, and Standards for Survival, introduce basic tactics on wildland fire. Students receive copies of the fireline handbook (a good pocket reference). This manual and the handbook “Planning for Initial Attack” are also good references. Both training and learning should be *lifelong* processes.

Teamwork When things go wrong teamwork can make a difference. Adherence to the four C's will facilitate teamwork and help achieve the desired result.

Calm When things go wrong it is important for every team member to remain calm. Remember safety is a priority. Equipment can be replaced. If you are in imminent danger rely on your training. **Lookouts, Communications, Escape** routes and **Safety** zones will allow you to identify the proper response. If you move to a safety zone or other area, communicate your status.

Common Sense Actions, decisions and planning should always 'make sense.' Each team member should understand the plan and any instructions. Every proposed action should 'pass' a common sense test. Usually, a clarification will resolve the issue. If necessary the plan should be altered. In every case all crew members should be informed.

Communications Maintaining good communications insures that everyone has the required information when it is needed. A comprehensive written burn plan can serve as the foundation of good communications. The written plan should outline the basic communications procedures which will be followed during the burn. Communication equipment should be field tested at the burn unit and extra batteries or power sources should be available. The plan should include an emergency contact list which is available to all crew members. All communications should be in plain English. Instructions and orders should be repeated by the recipient to verify accuracy.

The burn manager who loses communication becomes an observer rather than a decision maker. Actions taken without communication may make matters worse and are often counterproductive. Listen to all communications on a burn. Remember that non-verbal communications convey a wealth of information. Watch and learn from experienced burners. How are they reacting to conditions on the burn? Be alert to all communications. Sometimes your first sign of trouble may be the response of others to a problem. Excited crew members can often be heard at a considerable distance. The urgency and pitch of their voice conveys a wealth of information to the experienced burner. Good communications requires a commitment from everyone.

Contingencies Contingency planning is the key. When scenarios and problems have been discussed in advance burn crews know what actions are required when things go wrong. Even when specific problems are not anticipated, contingency plans can still help. Details and specific actions from the contingency plans may be effective in solving the 'new' problem. It is quicker and more effective to revise and adapt an existing plan than it is to develop a plan from 'scratch.'

Equipment Conducting prescribed burns requires reliable equipment designed to operate for extended time periods under adverse field conditions. Equipment that has been field tested and proven reliable under the conditions encountered on the burn unit is desirable. When paired with an experienced crew member it is likely that both equipment and operator will provide uninterrupted reliable service on the burn. Equipment not field certified for the specific conditions on the burn unit or inexperienced operators can lead to problems. Under these conditions it is not unusual for equipment to be out of service at the critical moment. It doesn't matter whether the equipment is stuck in a mud hole, 'broken down', or if the equipment operator is lost.

Personal/Individual Action Preventing problems can be accomplished when individuals are prepared for the problem, recognize the problem, and take action. On prescribed burns the difference between success and failure can depend on some simple tools and equipment. Here are just a few examples:

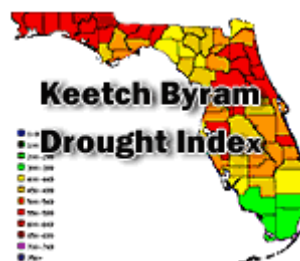
1. **Fusee** an emergency ignition device. A wind shift may threaten an unprotected flank requiring an immediate backfire along a critical section of line. A fusee or standard emergency flare is an excellent device for starting a fire and emergency blacklining. Matches, cigarette lighters, palm fronds, and other innovative items can also be used to successfully start a counterfire.
2. **Hand Tool** You may be assigned a hand tool as a member of a holding crew. If you are not assigned a hand tool but your duties permit, you should carry one on the burn. Try to select one that will be most useful for the anticipated tasks. Keep any hand tools with you at all times. A hand tool 300 yards away will not help you deal with the spotover right in front of you. In addition hand tools scattered around the burn unit are a hazard.
3. **Fire Extinguisher** If you are isolated and having trouble with a spotover consider using any available support. A fire extinguisher from a nearby vehicle may be the difference between containment and escaped fire.
4. **Compass** A compass is essential. It can verify wind direction and line orientation as well as vital navigational information during an emergency.

Fire Weather/Environmental Conditions Fire weather and environmental conditions should be monitored in the general area in the days and weeks prior to the burn. As discussed in Chapter 6, NOAA and the National Weather Service provide fire weather forecasts, general forecasts, and hydrological information. The Florida Forest Service also provides important information for prescribed burners. An example from their website follows:

(<http://www.freshfromflorida.com/Divisions-Offices/Florida-Forest-Service/Wildfire/Current-Fire-Conditions>) Under “Wildfire Information” current conditions are displayed in map format:

Florida Forest Service HOME > Wildland Fire > **WEB PAGE MODIFIED FOR MANUAL**
Wildfires in Florida occur at all times of the year. This informational page is designed to provide you with the most current information available regarding wildfires in Florida.

Current Conditions



KBDI, the Fire Danger Index, and current fires may be accessed. Estimates of the Keetch-Byram Drought Index (KBDI) are available in various formats. It is important to remember that these are estimates only. Accurate onsite measurements should be utilized when available. Prescribed burners should take extra precautions when the KBDI exceeds 500. The FFS website also provides a variety of weather forecasts including spot weather and long term. Water management districts also have valuable information regarding ground and surface water conditions. In many parts of the state the water table or depth to water in the soil can have an overriding influence on fire behavior. Minor deviations from 'normal' or 'average' conditions can create volatile situations. Onsite water gages can provide excellent information on surface and groundwater conditions.

Daily Activity Reports 'Wildland Fire Activity Daily Reports' may be accessed on the same web page under Wildfire Fire Statistics. Important information includes:

“Weather Observations:

Details the weather observations that were taken by each of the Florida Forest Service field units at 1400 hours (2:00 pm).

- **RH** is relative humidity.
- **Temperature** is given at the low and high for that day.
- **Herb Stage** is a measure of how green the vegetation is in that area:
3=green, 2=transition and 1=cured or frost killed.
- **Buildup** is a measure of the drought conditions.
- **Spread** tells us how difficult a fire will be to control due in large part to wind speed.
- **FRL** means Fire Readiness Level; this is a number between 1 and 5. The higher the number, the more severe the fire conditions are in that area.

Summary of Fires, Legal Actions and Personnel & Equipment Status:

“The important point to know about this section is that New Fires and New Acres are any new fires and any new acres that burned on that day.....The active fires and active acres are all fires and acres that the Florida Forest Service is currently dealing with at the time the report was completed.”

Know Your Suppression Forces In Florida, the Florida Forest Service is responsible for wildfire suppression. On some federal lands, like Everglades National Park, the federal land management agency has assumed primary suppression responsibility. In these cases close cooperation is still required because fires frequently cross jurisdictional boundaries.

The tractor/plow is the basic initial attack unit throughout most of the south. With a skilled operator this equipment can quickly contain many fires. Many wildfires are controlled by the initial attack unit. With limited manpower, this high level of efficiency is a basic requirement for the FFS. Some prescribed burners may be reluctant or apprehensive about using a tractor plow on sensitive natural areas. These concerns ***should be resolved*** during the planning stages. The FFS district office normally dispatches initial attack units and they can be reached at the same phone number used to secure a burn authorization.

Other resources may also be available. Many local fire departments have increased capabilities

to assist with both wildfire suppression and normal prescribed fire operations. Other land management agencies may also have equipment and trained personnel who can help. Good planning dictates that these resources be identified and contacted prior to the proposed burn. Utilization of these resources can be facilitated with good working relationships and mutual aid pacts.

Status of Suppression Forces, Fire Danger, and Fire Readiness Levels The status of each FFS District will have a major impact on response capability. The prescribed burner should be familiar with District operations and how they may impact prescribed fires. On a daily basis each district establishes fire danger ratings and fire readiness levels based on anticipated activity.

WILDLAND FIRE DANGER INDEX

The Wildland Fire Danger Index (FDI) is a continuous reference scale for estimating the potential for a fire to start and require suppression action on any given day. Information from the web page http://www.floridaforestservice.com/fire_weather/information/wfdi_index.html is summarized below: The FDI in Florida uses two separate components: the forecast/actual Energy Release Component and the forecast/actual minimum relative humidity. The forecast FDI is based on the National Weather Service forecast for that particular area; the actual is based on the observations taken at 1:00 PM. As moisture levels in both live and dead fuels go down, more fuel becomes available to a fire in that area. More fuel burning results in more heat being released. This amount of energy release is what the ERC measures (in BTU/ft²). If the environment were to be compared to a charcoal grill, the ERC could be seen as a measure of how many briquettes are in the grill. The ERC is valuable when determining fire danger because it acts as a composite fuel moisture index. It has contributions from all types of live and dead fuels. Changes in the "heavy" fuels, which are 6 inches or larger in diameter, have a greater impact on the ERC than a change in "fine" fuels, which are ¼ inch or less in diameter. The ERC has a memory. Each daily calculation considers the past 7 days in calculating the new number. Daily variations of the ERC are relatively small as wind is not part of the calculation. The Keetch-Byram Drought Index (KBDI) on the other hand, has been used by many private and public fire managers in Florida as a key indicator of daily wildfire potential since June 1998. Although the KBDI index has value, the FFS has determined that the ERC is a better indicator of fuel availability and correlates better with Florida's fire business. The Florida Forest Service has decided to use the ERC in place of the KBDI. Energy Release Component (ERC) is a calculated output of the 1978/88 National Fire Danger Rating System (NFDRS). The ERC is a number related to the available energy (BTU) p The FDI uses the Energy Release Component (ERC) and the Relative Humidity (RH) component because they best reflect wildland fire in Florida, and because they work well together. In some situations a low RH does not necessarily mean high fire danger and of course the reverse is true. By the same token a high ERC does not always indicate a potentially active day for wildfire.

FIRE DANGER INDEX RATING KEY

The Florida Forest Service uses the Wildland Fire Danger Index (FDI) for estimating the potential for a fire to start and require suppression action on any given day. It does not consider

how quickly any fires that do start will grow, or how difficult they will be to suppress. As indicated on the scale below 1 is a low fire danger and 5 is an extreme fire danger.

1	Low	2	Moderate	3	High	4	Very High	5	Extreme
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The Fire Danger Index (FDI) report for July 5 is printed below for 11 Florida counties.

Fire Danger Index (FDI) Report - Jul 05, 2012

<u>County</u>	<u>Observed</u>			<u>Forecast</u>		
	<u>RH@ 1:00PM</u>	<u>ERC</u>	<u>FDI</u>	<u>Min RH</u>	<u>ERC</u>	<u>FDI</u>
<u>Alachua</u>	<u>63</u>	<u>12</u>	<u>1</u>	<u>47</u>	<u>12</u>	<u>1</u>
<u>Baker</u>	<u>62</u>	<u>11</u>	<u>1</u>	<u>46</u>	<u>11</u>	<u>1</u>
<u>Bay</u>	<u>59</u>	<u>31</u>	<u>2</u>	<u>55</u>	<u>30</u>	<u>2</u>
<u>Bradford</u>	<u>63</u>	<u>12</u>	<u>1</u>	<u>47</u>	<u>12</u>	<u>1</u>
<u>Brevard</u>	<u>67</u>	<u>23</u>	<u>1</u>	<u>61</u>	<u>23</u>	<u>1</u>
<u>Broward</u>	<u>68</u>	<u>21</u>	<u>1</u>	<u>54</u>	<u>21</u>	<u>1</u>
<u>Calhoun</u>	<u>59</u>	<u>22</u>	<u>1</u>	<u>54</u>	<u>21</u>	<u>1</u>
<u>Charlotte</u>	<u>55</u>	<u>13</u>	<u>1</u>	<u>54</u>	<u>13</u>	<u>1</u>
<u>Citrus</u>	<u>55</u>	<u>11</u>	<u>1</u>	<u>59</u>	<u>9</u>	<u>1</u>
<u>Clay</u>	<u>58</u>	<u>15</u>	<u>1</u>	<u>45</u>	<u>17</u>	<u>1</u>
<u>Collier</u>	<u>55</u>	<u>21</u>	<u>1</u>	<u>53</u>	<u>20</u>	<u>1</u>

FIRE READINESS LEVELS (FRL)

FIRE READINESS LEVEL 1 Little or no fire activity is anticipated.

FIRE READINESS LEVEL 2 Some routine fires anticipated. No more than 50% of resources should be committed at any given time. No difficulty expected with control or mop-up.

FIRE READINESS LEVEL 3 Very active fire day anticipated. Fire occurrence above average and difficulty of control expected. May have to commit 80% of resources at any given time.

FIRE READINESS LEVEL 4 Fire situation expected to be difficult. May have fires carrying over from the previous day, new fires starting and most fires difficult to control. All resources likely to be committed and assistance from outside the District may be required.

FIRE READINESS LEVEL 5 Both fire danger and fire situation extreme. Requirements will exceed District capability. Numerous large fires expected. Difficulty with control and mop-up. Outside help will be required beyond a 24 hour period. Incident command team(s) may be set up.

These are established based on anticipated fire situations. Fire danger is a primary factor but weather, season, recent fire activity, and related factors are also considered. Fire readiness levels, fire activity, and current status of each FFS district can be reviewed by accessing daily activity reports at http://www.floridaforestservice.com/wildfire/stats_daily_reports.html. In general the Florida Forest Service will issue Burning Authorizations under normal guidelines when both FDI and FRL values are 1 or 2. As either of these values rise above 2 restrictions on authorizations are common. Authorizations are rarely issued when the FRL is 4 or greater.

Boundary Burns Respect adjacent property owners. Contact them well in advance and discuss how the proposed burn may impact them. Secure their permission for any activity you may conduct on their property. Take extra precautions to prevent an escape. If there is a boundary fence, disked lines on both sides of the fence are recommended. If the fence belongs to the adjacent landowner it is your responsibility to protect that fence. Do not use a fire line on adjacent property as a control line without express permission from the owner. Respond promptly and extinguish spotovers. Contact the landowner concerning any property damage and initiate remedial action as soon as possible.

IGNITION/HOLDING

During this stage the prescribed burners actually implement the burn plan. If the burn crew has developed a sound plan this stage should proceed smoothly. Good communications, dedicated crew members, and functional equipment can make this phase a rewarding experience.

Crew Briefing A crew briefing should be held just prior to the burn. Crew assignments are finalized and burn plan details are reviewed. Critical information should be reviewed during this briefing. A pre-burn checklist should be used on every prescribed burn. A checklist can help ensure that all identified issues are covered. Examples include:

The crew is qualified to conduct this burn.

Needed equipment is on site and operational.

Each crew member has a map and is familiar with and has inspected the burn unit.

Current weather conditions and forecasts have been reviewed.

Escape routes, lookouts and proper safety zone(s) identified.

Safety plans completed and reviewed. Check in procedure/location established for major event.

Public safety contingencies completed including smoke signs and notification to public safety/law enforcement.

Crew communications established and tested.

Emergency contact procedures established (telephone numbers, radio procedures).

Suppression forces have been notified and response times estimated.

Mop-up standards have been discussed and crew members or other personnel are available for extended duty.

Monitoring requirements and standards for declaring the fire out have been explained.

Test Fire The test fire should be started when the pre-burn checklist has been approved and crew members and equipment are at their assigned positions. The test fire is the final check. The test fire should be located in representative fuels and should be used to determine if the fire behavior and conditions are acceptable.

Do not ‘jump’ to conclusions. Allow sufficient time and observation to evaluate the fire but remember that a test fire is one that ***your crew can easily extinguish***. Be aware that the test fire indicates fire behavior at that time. If the test fire is conducted around 10:00 AM anticipate a rise in temperature and a decline in relative humidity by mid-afternoon. Wind may also increase and these factors can lead to dramatic increases in fire behavior.

Under normal conditions the test fire will be near the anchor point or initial blackline operation. Make sure that the test fire site is monitored until it has merged with the main fire. If the test fire results in cancellation of the burn make sure that someone monitors this site closely for several hours including the most active part of the ‘fire day’.

Blackline After the test fire has been completed the next step is to establish a ‘black’ or ‘base’ line on the **DOWNWIND** side of the burn unit. This job frequently takes longer than anticipated. Unfortunately when this job is rushed or, when the regular ignition pattern is started early, problems are likely. Establishing a good blackline gives extra protection to natural resources and capital improvements which are downwind from the unit. The backing fire should be started as close to the line as possible. Initially, only a very short distance should be ignited. This distance may be increased gradually to a distance consistent with the crew’s capability to monitor and handle any problems. Fireline intensity will dictate exactly how close the crew can work to the fire. Determining the length of active fireline that can be managed with existing resources and conditions is crucial. During the blacklining operation remember to have personnel patrolling the entire line even after the fire has burned a ‘safe’ distance from the line.

As the blackline is being completed the burn manager must determine when the fire has burned the proper distance from the line. The actual width depends upon the fuels in the burn unit, the fuels downwind, the specific ignition plan, and the weather conditions at the time of the burn. At a minimum the black line width should be several times the width of the original control line. For example, if the original control line is a disked line 10 ft wide then the blackline should be at least 30 feet wide.

Maximum Fire Behavior Fires burn differently as normal weather patterns unfold on a daily basis. On a normal Florida day management of a mid-morning fire may be accomplished with little difficulty. At 2:00 PM the same fire may exceed the capabilities of the prescribed burn crew. The burn manager and crew must regulate their rate of ignition and the ‘amount of fire’ on the ground in a manner that accounts for the normal fire day, unique Florida conditions, and any special burn unit conditions. In Florida the onset of a sea breeze can cause dramatic shifts in the wind direction. Thunderstorms anywhere near the burn unit can cause not only wind shifts but also marked increases in wind speed.

THE FLORIDA PRESCRIBED FIRE DAY

11:00 AM – 4:00 PM Fire burns readily. Low humidities and/or high winds will cause control problems.

4:00 PM - 4:00 AM Fire gradually slows. By sunset, higher humidities and lower winds can substantially reduce fire behavior.

4:00 AM - 8:00 AM Lowest fire intensity and highest relative humidity occurs at this time. Best control conditions occur at this time. This also coincides with greater risk of low visibility caused by residual smoke and high humidity.

8:00 AM - 11:00AM Fuels dry slowly. Fire potential increases but prescribed burns may have to be delayed beyond the legal start time until fuels moistures reach

*In Florida, relative humidity, temperature and wind speed conditions interact to create the most volatile fire conditions between 1:00 and 4:00 PM. During a normal day relative humidity reaches its daily minimum while wind speed and temperature are at their maximum.

Situational Awareness Most experienced prescribed burners can name one or two fellow crew members who are exceptionally good at spotting problems on a prescribed burn. These crew members seem to have a well developed ‘situational awareness.’ While performing their assigned duties they also maintain an awareness of other factors and changes in their surrounding environment. Every crew member should make a conscious effort to improve situational awareness. Monitoring weather conditions is a key component of this process. Learn field signs which may indicate weather changes and incorporate passive monitoring into your fireline activity. Systematic field observations of weather should also be relayed to crew members. Small inexpensive weather radios can also provide updated forecasts while on the burn units. Each FFS district office also broadcasts updated weather forecasts.

The actually flaming part of the fire draws everyone’s attention like a magnet. However, spot fires occur downwind and outside the burn unit. Each crew member should develop the habit of periodically looking at the entire surrounding area for any signs of change. Crew members should relay any pertinent observations to the burn manger and other crew members.

Modification of the Ignition Plan Weather conditions or other field observations on the day of the burn may dictate some alteration to the ignition plan. Any changes to the ignition plan require three steps. First, the burn team should *verify* that altered conditions do exist and that an alternate ignition plan is safe and desirable. Inexperienced burn teams sometimes evaluate the test fire too quickly. Winds may sometimes appear variable or from the wrong direction on the test fire. If the test fire is near the fire line or near an ecotone winds may be influenced by these local features and give the impression that the forecast winds are incorrect. In fact, fire weather forecasts *are* good planning tools. **DO NOT CHANGE THE IGNITION PLAN BASED SOLELY ON SHORT TERM TEST FIRE BEHAVIOR.** Watch the test fire for an extended time and verify weather conditions with repeated measurements. Second, if necessary, the prescribed burn manager should *modify the written* ignition plan with an explanation of any changes. Third, *every crew member must be notified prior* implementation.

Crew Location and Behavior Crew location will change throughout the day as the burn progresses. It is important that the burn manager and crew members maintain discipline and remain dispersed at assigned locations. There is a tendency on quiet burns to ‘bunch up’ and discuss a plethora of topics unrelated to the prescribed burn. Extraneous communications including cell phones can seriously impair situational awareness. Crew members should avoid this behavior and focus on monitoring the burn and performing assigned duties. Systematic perimeter patrols are essential for early detection of any problems. Crew members should not assume that the burn manager knows the level of monitoring on all sectors at all times. They should advise the burn manager of any potential problems.

Shut Down It may be necessary to shut down a prescribed burn. When ordered by the FFS this task should be completed within two hours. If the burn is being shut down for other reasons the task should still be completed in a timely fashion. The ignition plan should identify strategies and stages of the burn conducive to this action.

Fire Outside the Unit All crew members should monitor adjacent areas for any sign of smoke or fire. These fires can be started by a variety of causes. Spotovers and ‘slopovers’ are the most frequent causes. A spotover is caused when burning material is transported across the line usually some distance from the burn perimeter. ‘Slopovers’ occur when the fire crosses the line and ignites adjacent fuels. This may be caused by radiant heat, direct contact of flames, ‘creeping’ fire, or by falling trees. Quick notification and response is essential. The first responder and the designated suppression crew should work this problem while other crew members should be on alert but remain in their assigned sector. Good, concise communications will allow the burn manager to quickly assign additional responders if required. Ignition crews should be prepared to delay or alter ignition based on the results of these initial efforts.

Call for Help Experienced burn crews take pride in their work and capability. Normally these are good traits but at certain times they may cause a delay in requesting needed help. Crew members should be alert to signs and indicators that problems may be developing. Equipment problems, frequent spotovers, smoke management concerns, adverse weather, and unanticipated fire behavior are all warning signs. Crew members and burn managers need to recognize these signs and when they occur in multiples it is time to adjust plans and at least alert FFS and other off site resources. Big problems usually start as a series of compounding small problems with delays in requesting help. A wildfire can be a powerful force. Suppression is best achieved with a quick response from forces with even greater power.

CALL for HELP sooner rather than later; always remember that your goal is to prevent major problems not to avoid asking for help.

This operational phase is complete when the legal definition of extinguished has been achieved, initial mop-up standards have been met, and the burn manager has determined the burn unit is safe until the next scheduled inspection.

MOP-UP

After the Ignition/Suppression phase has been completed the burn crew focuses on Mop-up. “Mop-up” is the process of making a prescribed fire safe by removing or extinguishing all burning material, normally along or near the perimeter of the burned area, but sometimes well inside the burn. Incomplete mop-up operations may allow the fire to escape. There is hardly a more serious, costly, or tragic mistake than planning and completing the ignition of a prescribed burn unit and then losing it by neglecting the tedious but vitally important task of mop-up.

Written mop-up standards and provisions to meet those standards are essential during the planning stage. Generally, some mop-up begins during the execution of the burn. Holding personnel may begin the mop-up process as they secure the blackline area. Unburned target fuels may be ignited, duff pockets may be wet down, and pieces of lighter pine may be covered with dirt to extinguish problems along the line. At this stage the purpose is not mop-up but

simply securing the line and reducing local residual smoke. Experienced crew members can efficiently accomplish this task by identifying the appropriate action for each hot spot. Some fuels should be allowed to burn until most or all of the fuel is consumed. Others may be easily extinguished or protected from ignition during the initial burn. These are generally larger fuels such as stumps or snags. Once ignited it may be extremely difficult to extinguish these fuels. During the active ignition phase, crew members must be sure that they do not squander critical resources on routine mop-up. Water, foam, personal energy reserves, and equipment needed for possible suppression activities should never be expended on routine mop-up.

Standards and Mop-up activities may include:

1. Clean out fire lines. Fire lines should be inspected and cleaned at each operational stage.
2. A secure fire line does not have any type of fire activity or unburned fuel within a threatening distance. Written standards usually cover a minimum distance and include any threat. If the minimum distance is within 25 feet of the line a flaming 50 ft snag would also be a threat if it was within 50 feet of the line.
3. Look for aerial fuels, snags, cabbage palm trees close to perimeter. Remove if possible or relocate fire line a safe distance from the threats.
4. When the ignition has been completed review the written mop-up standards taking into consideration current conditions on the burn unit and observed fire behavior. Advise the entire burn crew of any revisions and initiate mop-up.
5. If necessary, fell snags away from the line. Cut open and scatter fire and hot coals.
6. Extinguish stumps, logs, or burning duff near fire line.
7. Check for unburned fuels within the unit adjacent to the perimeter. Burn out or isolate these fuels.
8. Closely inspect any burned areas outside the burn unit. Plow or establish security line.
9. Cut off roots, muck pockets or duff that may go under or cross fire line.
10. Recheck problem areas, go completely around the perimeter. Pay particular attention to logs, stumps, roots, and duff pockets. Try 'cold trailing' (see glossary). In muck or duff areas do not rely on a simple visual check. Dig or scrape these areas and spray with water checking for heat or other signs of combustion. Use water with care since hot spots can 'explode' sending steam and ash several feet into the air.
11. Release the burn crew when the entire perimeter has been secured and initial mop-up standards are met.
12. Inspect the burn unit the next day. An early morning check is essential but the unit should also be inspected during the peak fire behavior period. Under ideal conditions these crew members will find a few hot spots that can be routinely extinguished.
13. Deal with any residual smoke problems promptly and with maximum force. Ask for help if needed.

Mop-up is tedious and dirty work. Written standards and 100% participation in this phase emphasize its importance in successful fire management. Too many fires have been lost because of 'shortcuts' taken in this phase. It is imperative that both initial mop-up procedures adhere to the written plan and that additional mop-up is conducted to resolve any problems. Extended mop-up operations are required when any combustion persists on the unit. Smoldering and residual smoke may require extensive tedious work in the days following a successful burn.

Proper mop-up must address both control and smoke management issues. While control issues must be a priority, smoke management issues may dictate more extensive mop up. Control

issues are normally addressed by working into the unit from the established control lines. Smoke management issues must be addressed on an individual basis but under normal conditions those closer to the smoke sensitive area are a priority. Properly addressing smoke management issues and residual smoke production is an essential requirement for prescribed burns in present day Florida. When residual smoke may cause a problem, smoke management mop-up may require substantial personnel and equipment resources for extended time periods.

DECLARING THE FIRE OUT

Declaring the prescribed burn out is the last active management phase (evaluation and planning will continue until the next burn is conducted). Mop-up operations may continue for several days especially when smoke sensitive areas are nearby. When mop-up has been completed the written standards for declaring the fire out should be reviewed. The burn manager should verify that those standards are valid when conditions during burn and mop-up are considered. These standards may need to be modified especially if the fire escaped or other significant problems were encountered. Under normal conditions a fire is declared out when all combustion has ceased and any problems associated with the burn have been resolved.

Shortcuts and casual attitudes during the last two operational phases can lead to serious problems including reburns, escapes and/or uncontrolled muck or duff fires. Repeated detailed inspections can help verify that all combustion has ceased.

Standards for declaring the fire out may include:

1. Mop-up has been completed and meets standards.
2. No combustion observed on the burn unit.
3. No combustion observed on any spotovers or escapes.
4. Equipment removed from site.
5. Firelines restored or in satisfactory condition.
6. Damaged fences have been repaired.
7. Immediate post burn evaluation and critique incorporated into burn plan notes.
8. Provisions in place for follow up evaluations.
9. Final inspection of burn unit and adjacent area complete and satisfactory.

ACTION IF YOUR FIRE ESCAPES

When a prescribed fire escapes, denial is a common reaction. Unfortunately, denial will not solve the problem. Wildfires respond best to the proper force applied in a timely manner. ***Call the Florida Forest Service*** if you think your fire ***might escape*** and immediately after you have determined that it ***has escaped***. When dealing with spotovers or other escapes the prescribed burner must act quickly and decisively. In some cases help will already be ‘on the way’ because the alert burn manager took decisive action due to prior problems. These problems may have been excessive spotting, utilization of reserve forces during the establishment of the blackline, loss of equipment or personnel, changes in weather, or some combination of problems. If an escaped fire was not anticipated the burn manager must quickly decide if onsite suppression forces can handle the escape. If there are doubts or if excessive forces are required on the

spotover then help should be requested. In most cases, prescribed burners recognize that the fire has escaped.

Once the need for help is recognized, it should be immediately requested. Quick response by the initial attack force often results in rapid control of the escape. Once help has been requested the several decisions concerning both the original prescribed burn and the escape must be made.

First, stop and size it up. Determine the location and status of all crew members. If the behavior of the escaped fire exceeds crew and/or equipment capabilities make sure they are repositioned to safety zones or assigned locations on the original burn. If possible secure equipment that may be at risk if this can be done safely. **DO NOT** endanger crew members to save equipment.

Decisions to make regarding the escape:

1. Where to attack
2. How to attack
3. Location of line
4. Type of line
5. Force needed (will a single tractor /plow be sufficient?)
6. Help needed (If more help is needed call **now**) (Include mop-up crews, public safety, law enforcement, local fire department, adjacent landowners, other agencies)

Decisions to make regarding the prescribed burn unit:

1. **Do not continue** ignition at this time. Either hold the burn or begin direct suppression.
2. Determine where the prescribed burn can be cut off.
3. Type of line
4. Time, manpower and equipment needed to shut down and secure the original burn unit.

Determine danger spots on all areas:

1. Snags near the line
2. Fuel build-ups
3. Swamps (too wet or too dry)
4. Flashy fuels, power lines, gas lines, other hazards

Location of control line:

1. Determine how far line should be in front of fire
2. Locate this place on the ground
3. Avoid dangerous areas (wet areas, electric lines, etc.)
4. Use area of easy line construction
5. Decide where to anchor line (wet area, creek, recent burn, graded road)

The prescribed burn manager should meet the initial attack crew and provide pertinent information including resources onsite and available for assistance. Upon arrival, the Florida Forest Service Initial Attack Ranger or Supervisor will take charge as the Incident Commander (IC). The prescribed burn manager should acknowledge this change in command and place the prescribed burn crew under the supervision of the IC.

At this stage it is imperative that crew members meet training and experience requirements for any assignments. Initially the prescribed burn crew may be assigned to shutdown and mop-up the original burn unit. Qualified suppression forces may be directed by the IC to assist on the escaped fire. Remember that fire behavior will change as the fire day progresses. Fire behavior may decline dramatically well before sunset. Crews with night experience can make substantial progress during periods of reduced fire activity.

If the fire is controlled consider relieving some crew members so they can return early the next day. All burn crew members should actively participate in mop-up. Implement contingencies from the original burn plan which are appropriate for actual conditions.

A lesser but equally important situation can occur if you determine that your fire is out of prescription. It may be as simple as higher than desirable relative humidity or it may be a significant wind shift causing major smoke problems. If the burn is out of prescription or causing any safety problem it should be shut down. Notify the Florida Forest Service, put the fire out and initiate mop-up.

SUMMARY

This chapter reviews the actions and processes which will guide and assist the prescribed burner during the planning and execution of prescribed burns. It incorporates contingency planning in all operational phases of prescribed fire from planning and evaluation until the fire is declared out. Establishment of contingency processes on every prescribed burn minimizes the frequency and severity of problems on every burn. It also minimizes the probability that an escape will occur. Most importantly these principles will lead to correct decisions when things go wrong. The call for help will be made promptly and the suppression forces and the burn crew will work cooperatively to put the fire out. Training, teamwork, and individual action will determine the success of any contingency action.

Contingency planning allows everyone an opportunity to prepare for the unexpected. Remaining calm and relying on common sense are crucial to effective action. With good communications these steps can reduce response time, improve the decision-making process, and enhance the response to many problems. ***In a crisis it is not what you know but rather what YOU DO that counts.***

REFERENCE MATERIALS

National Wildfire Coordinating Group. 1998. Planning for Initial Attack. PMS 413-1. National Interagency Fire Center, Boise, ID. 36p.

Wildfire information <http://www.freshfromflorida.com/Divisions-Offices/Florida-Forest-Service/Wildfire/Current-Fire-Conditions>

Fire danger http://flame.fl-dof.com/fire_danger/wims-report.html

Daily activity reports <http://www.freshfromflorida.com/Divisions-Offices/Florida-Forest-Service/Wildfire/Resources/Wildland-Fire-Daily-Report-for-Florida>