

CHAPTER 12

PLANNING AND EVALUATION

OBJECTIVES

- 1) Identify key elements; both required and recommended to be addressed in every prescription.
- 2) Write clear and measurable objectives for specific burns.
- 3) Develop a prescription which meets legal requirements, and agency/landowner directives
- 4) Describe the contingency plan elements for an escaped prescribed fire in Florida.
- 5) Execute an evaluation for a prescribed burn.

INTRODUCTION

Good planning has always been an essential ingredient for successful prescribed burning. In present day Florida, planning is more important than ever. Successful prescribed burners follow a formal planning process that demands extensive preparation and follow up evaluations for each burn. The preceding chapters deal with basic subjects and topics that are integral features of every successful prescribed burning program. The remaining chapters deal with the actual process of conducting a prescribed burn. Planning and Evaluation is so important that it is considered to be one of the four operational phases for all prescribed burns. The remaining phases (Ignition/Suppression, Mop Up and Declaring the Fire Out) occur within fairly well defined time segments but good planning is a continual process. During each operational phase fire behavior, weather, equipment failures, and the evolving dynamics of wildland fire management dictate constant evaluation and adjustments to the plan. During a well planned burn the casual observer may be unaware of these adjustments and experienced crews often incorporate these changes with minimal verbal communication. After ignition, it's far too late to begin thinking about key elements that may have been overlooked or things that may go wrong during the burn. A successful prescribed fire is one that safely and efficiently achieves the land management objective(s) for which it was conducted.

Land management planning encompasses a broad range of topics. Both long and short term consequences must be considered. Furthermore, land management plans must consider the interaction between onsite and off site activities. Fire is a primary force and management plans should address both wild and prescribed fire. While it is beyond the scope of this chapter, prescribed burners should be familiar with overall management plans and how prescribed fires have been incorporated into these plans. In many cases

the same topics are addressed in these other planning processes. On an annual basis, planning should commence well before the upcoming season.

For area land managers with multiple burn units the first task is to identify which units to burn. Criteria, such as fuel loads, burn history, known problem areas, desired fire return interval and other factors, should be used to develop a list. The list includes all areas that should be burned. Don't worry about actual capabilities at this point since this list is a simple inventory. Divide large areas into one operational period blocks and prioritize. Prepare written prescriptions for all of the units that you expect to burn in the current cycle. If your initial list far exceeds your capability, prioritize and prepare plans for those units you expect to burn but add an additional 15 to 20 percent. This will allow more flexibility if burning conditions are more favorable than expected, if wildfires burn some of the units or if priorities change. Prescriptions prepared ahead of time also make it easier to adapt plans and priorities to unexpected weather patterns.

PRESCRIPTIONS FOR INDIVIDUAL BURN UNITS

A burn prescription is a written document that details the purpose and objectives, weather parameters, environmental conditions, precautionary measures, ignition plan, personnel, equipment, and other factors that will allow a fire to be set and burn a predetermined area. A Florida Certified Burn Manager should prepare and implement the prescribed burning of these prescriptions. Each prescription must meet the requirements outlined in Florida Statutes 590.125 and Florida Administrative Code Ch 5I-2.

A PRESCRIPTION IS:

A written plan establishing the necessary criteria for starting, controlling, and extinguishing a prescribed burn.

Certified burn managers must prepare a written prescription for each burn and have a copy of the prescription onsite during the burn. The written prescription and evaluation provides a record of the burn. Area managers and landowners should maintain a documentation file that includes prescriptions, evaluations and names of those assisting for all burns conducted. Notes taken during the burn and any post burn evaluations should be included in the documentation file. Make sure any changes are recorded on the plan so that when the burn is completed you have an accurate description of what transpired. Weather records, observation forms, and major activities should also be included.

Some plans will be simple; others will be complex. There is no single required format for a prescription. Likewise, existing plans and formats are updated and modified when local conditions or specific requirements change. Even 'simple' plans contain a wealth of information and detail. In Florida all prescriptions should include specific information and details about the proposed burn. These details have been divided into sixteen (16) elements broken down into two categories, required and recommended. Examples and

discussion of plans can be found in Chapter Eight (8) and “A Guide for Prescribed Fire in Southern Forests” (Appendix F). Most state and federal agencies and large industrial land owners that use fire have burn plan forms which they will gladly share. If the objective(s) of a specific burn can be met under a variety of conditions, the plan should be flexible enough to accommodate these conditions.

Key components of Florida prescriptions include required elements as listed in **Florida Administrative Code 5I-2.006 Open Burning Allowed (2)(a) and recommended elements.**

REQUIRED ELEMENTS:

1. Stand or site description
2. Map of the area being burned
3. Fire Breaks (External and Internal) to be constructed or re-worked (map);
4. Number of personnel and equipment types to be used on the burn;
5. Desired weather factors; including but not limited to;
 - a. Surface wind speed and direction
 - b. Transport wind speed and direction
 - c. Minimum mixing height
 - d. Minimum relative humidity
 - e. Maximum temperature
 - f. Minimum fine fuel moisture
6. Desired fire behavior factors such as:
 - a. Type of burn technique
 - b. Flame length
 - c. Rate of spread
 - d. Fuel conditions
7. Time and date the prescription was prepared
8. The authorization date and time period of authorization
9. An evaluation and approval of the anticipated impact of the proposed burn on related smoke sensitive areas
10. Signature and number of Certified Prescribed Burn Manager

RECOMMENDED ELEMENTS:

11. Purpose and objectives
12. Safety
13. Season and time of day
14. Ignition plan
15. Public relations
16. Contingencies, control and mop up, declaring fire out
17. Evaluation and monitoring

DISCUSSION

Items which should receive special attention or suggested parameters are discussed for each category. ****NOTE**** Not all required information for each prescription parameter is addressed in this chapter. Refer to the appropriate chapters for more detailed information on individual parameters. For example, smoke management is covered in Chapter Eight (8) and safety is discussed in Chapter Five (5).

REQUIRED ELEMENTS:

STAND OR SITE DESCRIPTION

Before any operational plan is developed the stand/burn unit must be described. There are seven basic categories that are commonly used to describe burn units.

- 1. Location and size**
- 2. Burn History**
- 3. Soils**
- 4. Plant Communities (Overstory & Understory)**
- 5. Topography**
- 6. Special Features**
- 7. Fuels**

Location And Size

The location and size of the unit should be described in general terms by stating the approximate distance and direction to the nearest major landmark (e. g. Approx, 3 miles SE of Palmdale). The size of the unit should be listed as acres (ie: burn unit is 40 acres or 440 acres). If the burn unit is part of a larger named parcel the name of the larger area should be included. The legal description including Section(s), Township and Range is necessary to obtain an authorization to burn. It is also a good idea to record the Latitude and Longitude of the burn unit. By recording all of these descriptions in the plan the chance of confusion or mistakes is minimized.

Burn History

If the area has been under prescribed fire management, unit records should detail the burn history of the unit and this information should be included. If this information is non-existent the area should be examined closely to determine as much as possible regarding the burn history. Persons with local knowledge may also be interviewed regarding wildfire history. Be sure to describe the reliability of any estimates or information.

If the area was not under prescribed fire management were other treatments utilized to help keep the area under control. Other treatments may include mechanical, chemical or a combination of the two. As a prescribed fire manager you would want to know and document on your prescription any form of treatment that may have been utilized in you're the proposed burn unit.

Soils

Describe soils in general terms with emphasis on listing any organic soils or significant duff buildup. County 'Soil Surveys' are an excellent reference source and they should be available through the local county extension office. Sandy well drained soils will influence fuels differently than marl soils located close to the water table. The actual depth to the water table is of vital importance especially in Florida. Most plant communities in Florida are determined by the depth to the water table and fire frequency. When dealing with prescribed fire it is also important to know if the water table is above or below normal for the current conditions. Drought, drainage, local conditions, and a variety of other factors can lower water tables and cause dramatic changes in fire behavior and severity. In some cases, small changes amounting to 'just a few inches' may be critical. All of the above items describing the burn unit determine which fuels will burn and how they burn.

Plant Communities

Divide plant community discussions into two parts. The overstory includes the trees and other vegetation which comprise the canopy layer. Include the age, species composition, percent cover, basal area, density and other important fuel characteristics. If vines, air plants or other ladder fuels are present be sure to include these items. The height to the bottom of the crown is also important since that will determine the fire's impact to the crown. For most prescribed fires, the understory contains the target fuels. Species composition, density, diversity, height, and general condition will affect fire behavior.

Fuels

Carrier fuels are dead plant tissue which may be still attached to the live plant or it may be on the ground, surface or tangled in with living tissue elevated above the surface. Pine needles, leaves, palmetto fronds, grasses and small branches are typical 'carrier' fuels in Florida. First, list those fuels that are likely to carry the fire. Fuel types, loading, continuity, arrangement and exposure should be recorded. Second, look at non-target fuels which may also burn. This should include non-target surface fuels, duff, and ladder fuels which may cause problems if they burn. While it is sometimes done deliberately burning the duff layer or a portion of the duff layer is a complex operation even for experienced burners.

Topography

In addition to fuels the burn unit also includes a second major component of the fire environment, Topography. In Chapter Seven (7) topography in Florida fire was discussed. Because much of Florida is relatively flat, topography affects fire behavior in more subtle ways. Where slope is significant it has the same impact it does in other regions. Maximum local relief (slope) is greatest in the Florida panhandle and the central Florida ridge. The area around Sugarloaf 'Mountain' (elevation 312 feet) in the central Florida highlands contains numerous areas where slope is significant. In addition other natural (sandhills and river bluffs) or man-made (levees and canal banks) features throughout Florida may have significant slope. Finally, minor changes in elevation can have dramatic impacts on vegetation, fire behavior, and smoke. Drainages although not apparent may funnel smoke to a major highway or organic soil on one end of a burn unit may be dry enough to burn while the other end of the unit is under water.

Special Features

Special features include a variety of man-made and natural resources. Buildings, towers, fences, power lines, communications equipment, trails, roads and other man-made features may require protection. Archaeological sites and endangered species may dictate special precautions. Other human activities both on the burn unit and adjacent areas should be assessed and described.

MAP OF BURN UNIT

The burn unit map should serve as a guide for burn team members and other interested parties. The unit boundaries should be well defined along with adjacent or nearby property owners. Access to the unit should also be shown on this map or if required on a second area map. Include access for reinforcements such as the Florida Forest Service if they are called. A Florida Forest Service transport loaded with a tractor plow has more restricted access than other equipment used on prescribed burns. Also consider access for other emergency equipment including medical rescue and local fire departments. In emergencies it may be necessary to meet certain equipment at designated points. This may include designating landing spots for helicopters as well as locations for meeting medical rescue units. Identify on a map contingency lines or natural breaks which may be utilized if the fire escapes containment. Improved structures or natural features which should be protected should also be identified. Special hazards, areas of fuel buildup, dead end roads and other problem areas should be highlighted. The map should include a verified scale, directional arrow for proper orientation and the date prepared.

FIRE BREAKS

Any man-made fire breaks need to be indicated in the prescription. These breaks can be perimeter breaks or internal breaks. They should be indicated on the burn unit map. In the event that the burn unit map is cluttered, it may be necessary to include a separate map showing the fire breaks.

PERSONNEL AND EQUIPMENT

The complexity, site conditions and size of each burn will determine personnel and equipment requirements. Many agencies have established standards and or guidelines for crew and equipment on prescribed fires. It is the responsibility of the burn manager to make sure that these standards and guidelines are met but, ultimately, the burn manager must also determine that crew members have the combined knowledge, skills, and experience to conduct the prescribed burn. It is also their responsibility to make sure that the available equipment and PPE meets the required standards.

Actual personnel and equipment needs will be determined for each burn. When setting standards it is important to include proper equipment to suppress any escaped fire which is outside the unit. In addition equipment and personnel should have the capability to put out the prescribed fire in a timely fashion if it is causing an unacceptable problem. Site preparation should be accomplished prior to the burn. Communications equipment should include portable radios and at least one cell phone. When conditions warrant (e.g. heavy rough in surrounding units) a tractor plow should be either on site or nearby. Urban Interface, other complications, or larger burns will require additional equipment and personnel.

WEATHER FACTORS

Weather is a major component of the fire environment. Three major components (fuel, weather, and topography) determine how each fire will burn. Weather during the burn is a primary concern but pre-burn weather and environmental conditions also affect fire behavior. Post-burn weather can affect mop-up and has a major impact on floral and faunal responses. Using available weather forecasts and measuring on site weather conditions are essential components of all successful prescribed burns. The Florida Forest Service web site and National Weather Service (NWS) weather offices located throughout Florida are excellent resources for fire weather information including spot forecasts for exact locations. An example of a fire weather forecast is included in Chapter Six (6). Wind and relative humidity are the two most important weather factors which directly impact how fuels burn. Wind direction determines in which direction the fire will spread and wind speed will determine the fire's rate of spread. Relative humidity will directly impact fuel moisture and fuel moisture determines how rapidly, or if, a given fuel will burn. Other weather factors are discussed in the sections on fuel conditions, smoke management, and season of burn. Specific objectives, site conditions, anticipated fire behavior and ignition patterns may dictate more restrictive conditions.

In Florida Administrative Code 5I-2.006 (2) (a)(4) Open Burning Allowed, desired weather factors is a required component of the prescription. When putting weather components into your prescription certain weather parameters can have a range of numbers that may meet the needs of the certified burn manager. Examples of some ranges that could be used on a prescription are:

- A. Mid-Flame Wind Speed: 2 – 6 mph + direction (Usually referred to as eye level windspeed)
- B. Transport Wind Speed: 5 – 20 mph + direction

- C. 20 Foot Wind Speed: 5 – 20 mph + direction
- D. Minimum Relative Humidity: 30 to 35 percent

Remaining factors required in that paragraph are looking for minimums and maximum numbers for the given weather parameter includes:

- A. Days since rain
- B. Keetch-Byram Drought Index (KBDI)
- C. Low Visibility Risk Index (LOVRI)

FIRE BEHAVIOR FACTORS

Type Of Burn Technique

Selection of the proper firing technique or combination of techniques and ignition pattern should be based on the burning objective(s), fuels, weather, smoke management guidelines, and manpower and equipment available. A complete ignition plan should include both a narrative and a map depicting the ignition sequence. All ignition plans are based on the location and type of control lines. Fire lines which are constructed to bare mineral soil are preferred because these are the most reliable type of line. All fire lines should be completed prior to the scheduled burn date but they should also be inspected immediately prior to the burn.

Every prescribed burn should be preceded by a test fire within representative fuels in the burn unit. The test fire should be located on the downwind side of the burn unit near the anchor point. The test fire is a final check to verify that fire behavior will be within acceptable limits and that the objectives of the burn can be accomplished. After the test fire has been evaluated a decision is made to either extinguish the fire or to proceed. For cancelled burns the test fire site should be closely monitored for an extended time period to insure the fire is out. After the test fire is complete a blackline should be established on the downwind side of the unit. An anchor point should be established which secures the test fire area and from which the blackline can be established. The baseline is always established on the downwind side of the area to be burned and should be wide enough to stop a headfire. This is normally done in conjunction with burning the whole area but it can be done several weeks prior to the actual burn.

Once the blackline is established the actual ignition of the unit begins. The ignition pattern may be a single technique or a combination of techniques. These techniques can be grouped into two broad categories: line fires which are specifically set to back, head, or flank; and spot fires which combine all 3 components at the same time. The need for a secure perimeter line around the area to be burned is common to all firing techniques, as is a secure baseline.

Flame Length

Flame length is the distance between the flame tip and the base of the flame measured generally at the ground. As a certified burn manager you will want to establish a flame length you are trying to achieve. The flame length you will strive to achieve throughout your burn will help to dictate what firing technique you may utilize to complete the prescribed burn. As a certified prescribed fire manager your prescription should contain the maximum flame length that is acceptable.

Forward Rate Of Spread

Forward rate of spread is the speed with which a fire moves in a horizontal direction across the landscape, usually expressed in chains per hour or feet per minute. Usually it is expressed in chains or acres per hour for a specific period in the fire's history.

Rate of spread can relate to fuel conditions, weather factors such as relative humidity, wind speed and direction, dispersion, etc. As a prescribed fire manager you will want to prescribe a maximum rate of spread you would like to achieve on your burn based upon the firing techniques you will utilize to meet the objectives you set in the prescription.

Fuel Conditions

The fuels which will carry the fire and those fuels that are consumed during a burn determine how a fire burns and the difficulty of control. Fuel characteristics including arrangement, the volume or loading, the size of each fuel particle, continuity, density and chemical characteristics can play major roles in fire behavior. For fine fuels such as grasses and pine needles fuel moisture is critical. Exposure to sun and wind can quickly change fine fuel moistures while fuels in contact with wet surfaces or standing water may retain high fuel moistures. Desired fine fuel moistures will depend upon burn objectives, ignition techniques, fuel loads and site specific circumstances. In general dead fine fuel moistures between 8 and 20 percent are desirable.

Peat soils and duff layers should be excluded as available fuels. Prescription criteria that address the Keech-Byram Drought Index (KBDI), days since significant rain, and the depth to the water table can all serve as indicators of duff and peat conditions. A KBDI index above 500 indicates that peat or duff layers may be at risk. Little or no rain for the prior 10 days results in an extremely hot fire with complete fuel consumption. KBDI estimates are available on the FFS website. (Appendix B). Water tables at or near ground level generally indicate that duff or peat has sufficient moisture to prevent ignition. All of these parameters can serve as indicators but local experience will ultimately reveal their accuracy.

TIME AND DATE PRESCRIPTION WAS PREPARED

Once burn units have been chosen to burn, plans should be written and the time and date they were prepared should be documented on the plans. This will document that you have followed a procedure for establishing burn units in advance of the actual burn date.

AUTHORIZATION DATE

As a certified prescribed fire manager you will be required by rule to make sure you obtain an authorization from the Florida Forest Service and that you document the authorization number and the date you obtained it. The authorization number and date should be recorded on your prescription and kept in a documentation file upon completion of the prescribed burn.

SMOKE SCREENING

Smoke from any wildland fire has the potential to impact thousands of people. Smoke management is a plan of action to conduct prescribed fires in such a way that the smoke produced is dispersed without causing a health or safety hazard.

The combustion processes is comprised of four phases, each producing different types and amounts of combustion products. Understanding these phases is a prerequisite to estimating the total amount of smoke that may be produced from a prescribed burn. The total area and amount of time a fire remains in the smoldering phase will significantly impact total smoke production. Smaller, lighter fuels (e.g., grasses) will smolder for a relatively short time compared to larger fuels (e.g. logs, limbs stumps and organic soils like muck).

The smoke associated with fast-moving intense fires is black because of incomplete combustion. Head fires produce the most particulate and backing fires the least. Head fires result in more smoldering for a longer time than backing fires. In a typical heading fire, about half the fuel is consumed during the smoldering phase. In backing fires, most fuel consumption takes place in the flaming zones so little smoldering occurs behind the flaming front.

Water vapor and carbon dioxide (CO₂) comprise about 90% of the combustion products of wildland fuels but are not considered pollutants. Water vapor can, however, drastically reduce visibility.

Pollutants The major pollutants of prescribed burns or forest fires are particulate matter and carbon monoxide (CO). Current smoke management systems are all based on particulate matter. Particulate matter is defined as any solid or liquid particle suspended in the atmosphere. Most are too small to be seen with the naked eye and can stay suspended in the atmosphere for months. Particulate matter is largely responsible for reduced visibility in smoke, most being in the size class range that causes the maximum reduction of light. CO is rapidly diluted but it is very toxic and can cause headaches and disorientation with continued exposure near the combustion zone.

Smoke Management Guidelines

- 1) Follow a smoke screening process for each burn.
- 2) Choose wind directions which direct smoke away from sensitive areas.
- 3) Choose dispersion index values which will allow for safe and proper smoke dispersion.
- 4) Choose ignition methods which minimize smoke production
- 5) Communicate and provide advance information to everyone who may be impacted or concerned about smoke.
- 6) Be prepared to respond promptly and effectively to any problems.
- 7) Conduct more extensive mop up when smoke sensitive areas may be impacted.
- 8) Use ignition techniques and weather parameters that favor the flaming phase and minimize the smoldering.
- 9) Specific burns may require more stringent guidelines but the following minimum values should be met:

Mixing Height 1700 ft

Transport Wind 9 MPH

Daytime Dispersion 35

Night Dispersion 6

- 10) Reduce the number of acres to be burned by splitting units into smaller blocks.
- 11) Fireproof problem fuels within the burn unit or develop alternate treatment of these fuels.
- 12) Rotate crew members to minimize exposure to heavy smoke/carbon monoxide.
- 13) Incorporate experience and lessons learned from other burns both onsite and within the vicinity of the proposed burn.

SIGNATURE AND NUMBER OF CERTIFIED BURN MANAGER

The last required item, as stated in Florida administrative Code 5I-2.006, Open Burning Allowed, is the signature of the certified burn manager and certification number. These must be documented on the prescription.

Recommended Elements:

Purpose and Objectives

A successful prescribed burn depends upon the skilled application of fire following a comprehensive prescription developed for a defined area to accomplish specific objectives.

The first step in the planning process should identify the purpose of the proposed burn. In Chapter Two (2) the reasons for conducting prescribed burns in Florida were discussed. The landowner is ultimately responsible for establishing the purpose of each prescribed burn. While identification of a primary purpose is important, it is often advantageous to identify additional reasons for burning. A private landowner may be most interested in enhancing forage production for livestock or managing a forest to produce wood products

while public land managers are often concerned with ecological functions and values. Most prescribed burns in Florida provide some ecological benefits, some hazard fuel reduction, and some wildlife benefits. When appropriate these additional benefits should be recognized and stated as additional reasons for burning.

Once the purposes have been established specific objectives should be developed. Objectives are benchmarks which serve as indicators of the results of each prescribed burn. As such, objectives should be measurable. For example an objective to reduce hazard fuel should include the desired percent reduction and or an estimate of fuel loading before and after the burn. If a mosaic of burned and unburned areas is desired then an acceptable range should be listed. For example a burn which covers 50-70% may be desirable for one burn unit while it may be desirable to burn at least 90% of the unit when an extreme fire hazard exists. Finally, the actual fire results must be evaluated in order to measure and improve performance.

Successful prescribed burning requires a clearly defined purpose and objectives, carefully prepared plans to meet these objectives, and proper application of fire. Objectives should not be weakly or loosely written but should state how the success of the burn will be measured. Some examples of poorly stated burn objectives are:

1. To see what fire will do in a mixed conifer stand.
2. To try fire as a tool in managing timber stands.
3. To remove fuel loading.

BETTER STATEMENTS OF OBJECTIVES ARE:

1. Increase runner oak fruiting, for quail and turkey habitat improvement, by 50%.
2. Increase native grasses for forage by 40%.
3. Reduce logging debris by 80%-90%.
4. Top kill 90% or more of all hardwoods less than 10 feet tall.
5. Keep crown scorch to less than 50% of the overstory pines.
6. Reduce the palmetto/gallberry understory by 70%.

When the purpose(s) and objectives have been clearly defined everyone will have a better understanding of the value and role of prescribed fire. The person writing the plan will have a clear picture of how the prescribed burn should be executed and evaluated and will be able to communicate these ideas to others. Burn team members, cooperators, and support personnel will have the opportunity to perform their duties in a manner consistent with these clearly defined expectations. The general public will also have the opportunity to get precise and accurate information from anyone associated with the burn.

SAFETY

Both public and crew safety should be addressed in the prescription. Crew training, general safety standards and other policies are discussed in a later section. All personnel should have and use standard Personal Protective Equipment (PPE), be in proper physical

condition for their assigned duties and be advised of special hazards on each burn. Heat exhaustion and dehydration are frequent problems on Florida prescribed burns especially when higher ambient temperatures are encountered.

A crew briefing and preburn checklist should be used immediately prior to the burn. This briefing provides everyone the opportunity to review and understand the entire burn plan including contingencies such as escape routes, safety zones, emergency contacts and crew assignments during extended operations.

Public safety is a growing concern in Florida. Smoke management issues dominate public safety issues associated with prescribed burns. While health issues associated with breathing smoke filled air are always a concern it has been reduced visibility and impacts to transportation that have caused most problems. Smoke management and smoke screening can limit these impacts to acceptable levels but prescribed burners need to develop contingencies for regulating traffic if smoke reduces visibility on roads to unacceptable levels. Post informational signs and contact the Florida Forest Service before problems arise are proactive steps which should be taken on every prescribed fire.

SEASON AND TIME OF DAY

From an ecological perspective most lightning fires occurred in May and June at the beginning of the thunderstorm/rainy season. Plant communities are still relatively dry and fires have a greater chance to burn significant acreage. Lightning strikes are frequent during the rest of the rainy season but generally wetter conditions reduce the likelihood of ignition and hinder the spread of any fires that are started. Lightning strikes during the dry season are less frequent so there are fewer fires at this time. During dryer years these less frequent strikes were likely to start fires early in the dry season and these fires might burn until the arrival of the rainy season. Historical prescribed burns were conducted mostly in the winter. The approach and passage of cold fronts produce predictable weather patterns that are conducive to prescribed burning. Successful burn programs often rely on a combination of burning strategies to accomplish multiple objectives. Burn units which have not burned on a consistent rotation should first be burned under safe conservative conditions during the dormant season. Once a consistent rotation has been established some burns should be conducted during the early growing season. When woody vegetation is a valuable resource, prescribed fire should not be conducted during periods of high potential mortality (Fall for Pine Trees and Spring for Hardwoods). Early growing season burns coincide with the peak wildfire season and in some years little or no prescribed burning is possible during this time. For this reason prescribed burners should set yearly plans. Thus in years when growing season burns are restricted the burn manager can make a decision to shift the season of burn to winter or delay the burn for at least one year.

IGNITION PLAN

Selection of the proper firing technique or combination of techniques and ignition pattern should be based on the burning objective(s), fuels, weather, smoke management

guidelines, and manpower and equipment available. A complete ignition plan should include both a narrative and a map depicting the ignition sequence. All ignition plans are based on the location and type of control lines. Fire lines which are constructed to bare mineral soil are preferred because these are the most reliable type of line. All fire lines should be completed prior to the scheduled burn date but they should also be inspected immediately prior to the burn.

Every prescribed burn should be preceded by a test fire within representative fuels in the burn unit. The test fire should be located near the downwind side of the burn unit near the anchor point. The test fire is a final check to verify that fire behavior will be within acceptable limits and that the objectives of the burn can be accomplished. After the test fire has been evaluated a decision is made to either extinguish the fire or to proceed. For cancelled burns the test fire site should be closely monitored for an extended time period to insure the fire is out. After the test fire is complete a blackline should be established on the downwind side of the unit. An anchor point should be established which secures the test fire area and from which the blackline can be established. The baseline is always established on the downwind side of the area to be burned and should be wide enough to stop a headfire. This is normally done in conjunction with burning the whole area but it can be done several weeks prior to the actual burn.

Once the blackline is established the actual ignition of the unit begins. The ignition pattern may be a single technique or a combination of four techniques. These four techniques can be grouped into two broad categories: line fires which are specifically set to back, head, or flank; and spot fires which combine all 3 components at the same time. The need for a secure perimeter line around the area to be burned is common to all firing techniques, as is a secure baseline.

PUBLIC RELATIONS

Each plan should include a public relations element which identifies the individuals and agencies which should be notified just prior to the burn. A wide variety of methods may be included in this process and include: good neighbor letters, distribution of pamphlets or flyers, large posters or notices at strategic locations, public meetings, civic organizations, social media notifications and postings, and media outlets. The public should be notified well in advance and again within a few days of proposed burns. In addition a list should be developed for required contacts on the day of the burn. This list along with telephone numbers should be included in the plan for each individual unit.

Perhaps more than any other environmental program, prescribed fire requires public support. Publicity and education regarding prescribed fire will inform people before they see smoke that this particular fire will be beneficial. Their actions and cooperation both during and after the fire can help minimize any problems or adverse impacts which may arise. Public support and demand for prescribed fire will only be achieved when an effective program has been developed and when the public is informed. Individual crew members should be encouraged to maintain a professional demeanor whenever they are

involved in any facet of prescribed fire and to provide positive proactive responses to public inquiries.

LEGAL REQUIREMENTS

Legal requirements associated with prescribed burns include laws, rules, and policies administered by the Florida Forest Service (FFS), Environmental Laws and Endangered Species Laws and Rules. An authorization from the Florida Forest Service is required for each burn. All burns that qualify should be conducted under the Certified Prescribed Burn Act and meet all statutory requirements.

CONTINGENCIES, CONTROL AND MOP-UP, DECLARING THE FIRE OUT

Each prescribed fire plan must address specific details concerning contingencies, mop up and declaring the fire out.

Contingency plans should be developed for each proposed burn. They must address procedures and actions for escaped fire. Contingency plans should also address medical emergencies, equipment breakdowns, smoke management problems, and failure to meet prescription criteria. Good contingency planning is based on common sense and good communications. It will increase the likelihood that all personnel will remain calm during the crisis and that correct decisions will be made on a timely basis. Contingency plans and action decisions should provide for both public and crew safety. Contingency plans should include resources to manage the original prescribed fire as well as the escaped fire or other emergency action. If the fire has escaped, the burn manager should be prepared to turn the fire over to the Florida Forest Service or their designee upon arrival. The prescribed burn crew should remain on site and perform duties consistent with their training and skill levels. Contingency plans should also contain provisions for extended operations and provide for personnel replacements and shift work for extended operations.

Mop up standards and protocol should be clearly established in the burn plan. Special precautions should be taken on fires which are near smoke sensitive areas or which are near private property. When conducting burns near public roads smoke signs should be onsite or readily available. Snags, unburned fuels, residual smoke, burning peat or duff, or other problems may dictate more extensive mop up. Written guidelines and standards let everyone know what must be done before it is safe to release the crew.

Declaring the fire out is the final step in declaring the burn unit safe. Normally a fire is not declared out until the burn manager is certain that all combustion including smoldering and glowing phases has ceased. This determination is usually made several days after the burn has been completed but in some cases it may be several weeks.

EVALUATION AND MONITORING

Monitoring and evaluation of the burn are essential tasks for all prescribed burns. For each burn unit the evaluation process is a continual process. When the unit is burned again the process continues through a renewed cycle. Protocols for monitoring fire effects on soil, water, air, vegetation, and wildlife should be included in the burn unit plan. Monitoring should be conducted before, during and after the burn and should incorporate items such as fuel loads, wildlife observations, wildlife surveys, vegetation surveys and soil and duff conditions.

During the burn, onsite weather observations should be recorded at specified intervals. Observations of fire behavior should be recorded throughout the entire burn cycle. While it is important to record abnormal or unexpected fire behavior, it is also important to record fire behavior and responses that are consistent with predictions and expectations. Rate of spread, residence time, flame length, intensity, and other fire behavior observations should be recorded. While a single individual is often tasked with recording weather and other observations, it is a good idea to encourage everyone to carry a small notepad and pencil for recording significant observations as soon as their duties allow. The time of the observation should also be recorded.

A comprehensive evaluation of every burn should be mandatory. This process should begin with the crew after action review (AAR) which should be conducted as soon as possible after the prescribed burn. Review the burn plan to make sure it is an accurate rendition of what occurred. The primary recorder should incorporate team member observations and other pertinent information at this time. Describe the fire behavior produced by the combination of fuels, weather, topography, firing technique(s), and ignition pattern used, and the resulting fire effects so this knowledge can be utilized in planning the next burn. Were weather conditions, fuel conditions and fire behavior within the planned limits? Were the objectives met? Were there any accidents or near accidents? Was the fire confined to its intended area? Were there any escapes? Were the burning technique and ignition pattern correct? What would you do differently next time? Were costs compatible with benefits derived? Describe the effects on air, vegetation, soil, water, and aesthetics. Did the smoke behave as predicted? Were there any residual smoke concerns? Were they caused by smoldering combustion? The crew debriefing should conclude with a short summary discussion on ‘What went right?’, ‘What went wrong?’, and ‘What would be done differently?’

Conduct the post burn first monitoring/field evaluation within 2 weeks after completion of the burn so any crown scorch can be recorded before the needles fall. Conduct a second evaluation after the 1st growing season to get a better assessment of the vegetative response. Effects on soil, water and wildlife generally take at least several months to show up. Consider taking “before” and “after” photos as part of your documentation.

Evaluation should be a never-ending process; it should not stop with the second evaluation. Not only is evaluation a prerequisite to assessing how close a burn comes to meeting its objectives, but it should also serve as a quantitative statement of the effects of

the burn. For example, fire evaluations can provide information useful in answering questions that might arise in the future regarding the impact of the fire program on understory composition and stature, herbaceous species, or changes in overstory growth and yield.

A comprehensive evaluation will look at and address ecological results, operational issues, and problems or close calls. Was the burn completed economically and were problems dealt with in a timely manner. Are the benefits consistent with economic cost? The completed burn plan, field notes and written evaluation should be retained as part of the permanent records for the burn unit.

SUMMARY

The development of a good prescribed burning prescription incorporates the key elements that are required by law and recommended by this course. A good prescribed burner should be able to write clear, measurable objectives for the areas they intend to prescribe burn. That written prescription should meet the legal requirements, agency/landowner objectives and the best management practices for Florida.

Upon completion of the prescription the prescribed burner should be able to conduct the burn without incident then execute an evaluation of the prescribed burn. The last thing a prescribed burner should be able to do is adequately describe the contingency plan elements for an escaped prescribed fire in Florida.