# 2021 Arkansas
# Fire Weather Operating Plan

National Weather Service
Forecast Office
Little Rock, Arkansas

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Forecast Office – Little Rock
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## Introduction

This document is the latest Arkansas Fire Weather Operating Plan. It serves to consolidate the fire weather services provided by National Weather Service (NWS) offices covering the state. The purpose of this operating plan can be broken down into three distinct areas.

The first is to consolidate all the fire weather services provided by the five NWS offices covering the state of Arkansas.

The second purpose is to describe the services available to all land management agencies in Arkansas.

The final purpose is to provide information and guidelines to the forecasting staff at the five NWS offices to ensure that consistent information is given to their customers.

Customers of NWS fire weather products and services in Arkansas must understand that the products and policies contained within may differ slightly based on local policy and procedure. The entire document may not completely apply to them.

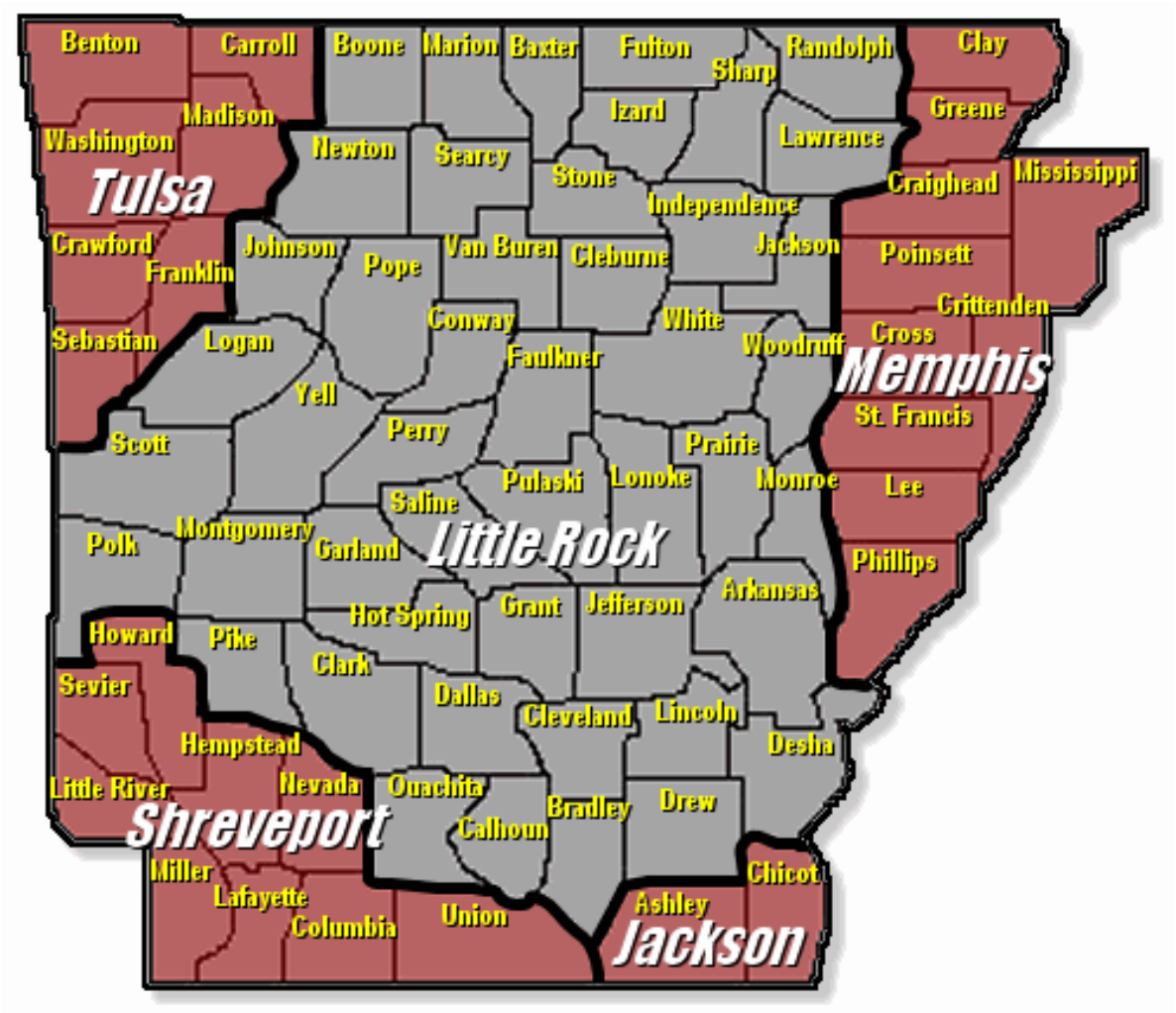
Due to the continuing changes in the NWS, this operating plan will be a constant “work in progress” and will be updated as necessary. In the event this is necessary, affected agencies will be notified and addenda to this plan will be issued. Important changes and clarifications of the fire weather services will be listed in the introductory section in the next update.

The primary author of this edition of the Arkansas Fire Weather Operating Plan is Joseph Goudsward, Senior Forecaster, fire weather program leader and Incident Meteorologist (IMET) at the National Weather Service office in Little Rock, Arkansas.

Input and information was received from other NWS fire program leaders who have fire weather responsibility in Arkansas. These people are

Matt Hemingway - NWS Shreveport, LA
Andrew Chiuppi - NWS Memphis, TN
Craig Sullivan - NWS Tulsa, OK
Nick Fenner - NWS Jackson, MS

Fire weather services for the state of Arkansas are carried out by five National Weather Services offices with individual counties mapped out below.



## Significant Changes

No significant changes have been made to the document for 2021.

## General Information

**What is a wildfire?**
A wildfire is an unplanned or unwanted natural or human-caused fire, or a prescribed fire that threatens to escape its bounds. Each year more than 100,000 wildland fires occur in the United States.

**What is a prescribed fire?**
A prescribed fire is the planned use of carefully controlled fire for habitat enhancement. Prescribed burns are commonly used to prepare a site for planting, manage a fire hazard or reduce pest problems. The timing of the burn is determined by a number of conditions including weather, fuel moisture, soil moisture and relative humidity to ensure the fire is confined to the planned area.

**How do wildfires start?**
About 90% of wildfires are started by humans; the other 10% are started by lightning. Three components are necessary to start a fire: oxygen, fuel and heat. At least 16 percent oxygen must be in the air for a fire to start (our atmosphere contains 21%). Fuel is any living or dead material that will burn. Fuels such as dead plants, dry leaves, pine needles and grass will burn more readily than moist green plants because the dead material contains less moisture. Heat is usually supplied by a lightning strike to a tree or dry grass. People also can provide heat by carelessly starting a fire or leaving a fire unattended.

**When is fire season?**
The fire season is Arkansas is complex, and to a large extent dependent upon dormant fuels and drought. While the majority of wildfires occur from October to April, wildfires are possible at any time of the year. As such, the user-defined fire weather season in Arkansas is for the entire year. In reality, fire season extends from October 1st to April 30$^{th}$ for a total season of 212 days. These time frames correspond with the majority of the prescribed burning.

**Why manage smoke*?**
The state of Arkansas has in effect a Smoke Management Program (SMP). The purpose of the plan is to assure adherence to air quality regulations and to manage smoke from prescribed fires so that the smoke's impact on people and the environment will be acceptable. In 1997, the U.S. Environmental Protection Agency (EPA) reported that fine particles (2.5 micrometers or smaller in size) have the potential to significantly impair human health when people are exposed to high levels.

***** Taken from Arkansas Forestry Commission Smoke Management Program Document
http://mail.arkforests.org/pdf/ArkansasVSMG.pdf

The fine particles that can impair human health can also reduce visibility in federally mandated Class I areas such as Caney Creek Wilderness Area and Upper Buffalo Wilderness Area. In these areas, EPA has established a goal to make reasonable progress at removing any human-caused impairment to visibility.

An estimated 70 % of the particulate matter emissions in smoke are fine particles. Therefore, prescribed fire should be planned to: limit public safety hazards posed by smoke intrusion into populated areas; prevent deterioration of air quality; prevent National Ambient Air Quality Standards (NAAQS) violations; and limit visibility impairment at Class I areas or other smoke sensitive areas.

The Smoke Management Guidelines require the prescribed fire manager to minimize the impact of particulate matter released into the atmosphere by estimating how many tons of fuel may be burned in an area. The amount of fuels that can be burned in an air shed (36 square miles) is based upon the ability of the atmosphere to disperse the particulate matter and the distance downwind to a smoke-sensitive area.

## What is the role of the National Weather Service?

The objective of the National Weather Service Fire Weather Program is to provide meteorological support to wildland fire management agencies for the protection of life and property. This support includes warnings, forecasts, and on-site services during wildfires, and meteorological training for firefighters. The mission of operational excellence through superior service, scientific advancements, and new technologies is being supported by the Boise Risk Reduction Project. The National Weather Service Forecast Office in Boise Idaho is located at the National Interagency Fire Center. This office is the focus of the risk reduction project which is still seeking to improve and modernize fire weather forecasting services in conjunction with NWS policy and procedure.

Weather is one of the most significant factors in determining the severity of wildland fires. The spread rate and intensity of fires are directly related to the wind speed, temperature and relative humidity. Climatic conditions such as long-term drought also play a major role in the number and intensity of wildfires. Accurate and timely weather information is vital to the planning and execution of strategies for suppressing wildfires. An accurate weather forecast can mean life or death to a firefighter and is also critical in protecting forest and range lands as well as the increasing number of homes in the wildland urban interface.

**The National Weather Service Mission-**
It is well known the primary mission of the NWS is to protect life and property from hazardous weather. This is normally accomplished through the issuance and dissemination of watches, warnings, advisories and forecasts with the general public and emergency managers being the primary beneficiary of the information. However, through an agreement between the NWS and wildland fire agencies, this mission has been expanded to support specific land management, fire protection and suppression activities.

**The National Weather Service Fire Weather Objective-**
Our objective is to provide fire weather products and services to the fire and land management community for the protection of life and property, promotion of firefighter safety, and stewardship of America’s public wildlands.

**The National Weather Service Mission and fire weather-**
To accomplish the fire weather aspect of the NWS mission, each NWS office is staffed around the clock with meteorologists who are trained in fire weather. Each office provides a level of fire weather support determined by the local NWS office and fire agencies. In addition to general training, each office has designated a certain individual or several individuals with special skills, knowledge and training to serve as the Fire Weather Program Leaders (FWPL). These meteorologists are the main liaison between the NWS office and fire agencies. The FWPL will also coordinate the administrative activities and be the primary contact point in the office to maintain the successful working relationship with the fire weather customers. Routine fire weather support is provided by the general forecast staff with oversight by the FWPL.

The Fire Weather Program Leader is the customer's representative and the liaison between user agencies and the National Weather Service Meteorologist in Charge (MIC) at said office. The Fire Weather Program Leader will provide additional services at the request of the user agencies. These additional services may involve visits for familiarization of operations, training of observers, and course instruction.

Certified Incident Meteorologists (IMETs) are strategically positioned at NWS offices across the country. Nationwide, the NWS employs nearly 80 experienced IMETs who can be dispatched to remote locations to support wildfire operations or other hazards. IMETs assist fire crew safety; provide tactical support to the fire management team and provide weather forecasts to the Fire Behavior Analyst (FBAN). These meteorologists are specifically trained to aid in wildfire suppression in the field. IMETs have undergone specialized training in localized, small scale forecasting, ICS, fire behavior, and fire operations that makes these fire weather forecasters key members of fire management teams.

Every year, IMETs are deployed to support hundreds of fires nationwide but are being used increasingly for all hazards support. NWS forecasters help on-scene fire management teams obtain and interpret weather information, train fire personnel on how weather may affect their operations during critical fire situations, and ensure the safety of firefighters. Requests for IMET deployment to a wildfire are coordinated by the Southern Area Coordination Center (SACC) and staff meteorologist (Larry Vanbussum) at the National Interagency Fire Center (NIFC) which is located in Boise, Idaho and are ordered through the Arkansas-Oklahoma Interagency Coordination Center. An IMET is assigned to the National Weather Service Forecast Office in Little Rock. Additional details can be found in the National Interagency Mobilization Guide (http://www.nifc.gov/nicc/mobguide).

Questions, comments, topics for discussion or queries regarding any aspect of fire weather or the fire weather program should be addressed to the appropriate NWS office, or that office's Meteorologist in Charge (MIC). Contact Information for the individual offices are listed in the section entitled "NWS Offices and Responsibility".

## Red Flag Program

The intent of the **Red Flag** program is to provide land management agencies with appropriate notification of the likelihood that weather conditions associated with the outbreak of wildfire will occur. A Red Flag event is defined as a combination of critical fire weather patterns and critically dry fuels that could lead to the development of large wildland fires or cause containment problems for preexisting fires or prescribed burns. Forecasters will issue a **Fire Weather Watch** or **Red Flag Warning**, based on the criteria and timing explained below, under the product identifier RFW. The criteria may differ slightly between offices based on local criteria and user need.

**Criteria-**
The criteria for **Fire Weather Watches** and **Red Flag Warnings** have been established by the NWS in conjunction with various state and federal land agencies. For a red flag event in the Little Rock area of responsibility, all three of the following criteria must be met.

*Afternoon minimum relative humidity is expected to be 25% or lower.

*20-foot sustained winds of 14 mph or greater are expected. Stronger 10-meter high winds that are measured at airports are not used. We are concerned with winds that are 20 feet above the ground or above the average height of the vegetation. These winds may be as little as ½ of what airport winds are running. 20 foot winds are used to negate the effects of friction from the ground or the vegetation.

*10-hour fuels that are determined to be critically dry. This is determined by coordination with the USDA Forest Service and Arkansas-Oklahoma Interagency Coordination Center. If contact cannot be established, then the fire weather forecaster should access the 10-hour dead fuel moisture map which is available at

https://www.wfas.net/index.php/dead-fuel-moisture-moisture--drought-38

Values less than 10 percent are considered critical for 10- hour fuels. Other parameters that also should be considered include the likelihood of lightning occurrence, wind shifts, and/or current wildfire activity.

## Basic versus special services

It is crucial to point out the differences in basic services and special services as defined by the national interagency agreement.

**Basic Services -**
Basic services are meteorological services performed from the local NWS office. Basic services are usually performed during normal hours of operations and are provided to user agencies at no cost. The Arkansas Forestry Commission, the USDA Forest Service, the National Park Service, and the U.S. Fish and Wildlife Service have land management responsibilities for the majority of the state of Arkansas. The NWS is responsible for providing accurate and timely fire weather forecasts for these and all other agencies to effectively carry out their responsibilities for the protection of life and property.

**Special Services -**

1) Special services are meteorological services provided to user agencies that often have unique requirements for weather support. These services may best be performed by the Fire Weather Program Leader or an IMET at a site other than the forecast office. Special services are usually initiated by the requesting agency, and costs such as travel and per diem will be reimbursable to the NWS.

2) Special meteorological services are those requiring a meteorologist to be away from the forecast office, and/or, in non-emergency situations, to be on overtime.

**3)** Special services include the transportation of the All Hazards Meteorological Response System (AMRS), interim staffing at the home office of the IMET, other on-site meteorological services such as weather observer training, weather station visits, and training requested by other user agencies. User agencies such as the USDA or the National Park Service are responsible for paying overtime, travel, and per diem costs for special services. Costs to be recovered from the user are calculated on the basis of expense reports submitted by the forecast office to NWS Southern Region Headquarters. Billing of the user agencies is handled by the appropriate NWS administrative division based on the expense report. Bills include a statement of services rendered, as well as the dates and locations of services provided.

**4)** IMETs use specialized equipment to prepare critical information for wildfire suppression. The All Hazards Meteorological Response System (AMRS) is a miniature mobile forecast station complete with communications equipment, laptop computer, printer and weather observation equipment. The system enables the IMET to provide close meteorological support to suppression efforts at fire command centers. Designed to be deployed rapidly, the AMRS is set up by the IMET near the fire command center to provide forecast information to help managers decide where to deploy firefighting resources. The AMRS will accompany the IMET to the fire when dispatched from his or her home office.

IMETs use laptop computers with built in Internet capability. The IMET also has specialized software where they can receive the latest information about surface and upper air observations, computer models, as well as Doppler weather radar and weather satellite data to make specialized forecasts.

IMETs also have the capacity to launch weather balloons to sample the upper levels of the atmosphere. The upper air "kit" contains weather balloons, a nozzle and regulator for a helium tank, radiosondes, parachutes and miscellaneous expendables.

The IMET can also request one or several **IRAWS (Incident Remote Automatic Weather Stations)** which are self-contained portable weather stations with instruments for measuring temperature, dew point and wind. It is powered by a solar panel and battery. It is 8.2 cubic feet and weighs 125 pounds. When an IRAWS is ordered up, it is accompanied by two trained technicians from the National Interagency Fire Center (NIFC) in Boise, Idaho who will oversee the installation, maintenance and removal of the system.

Requests for the IMET based in Little Rock, AR should be made through the USDA Forest Service Arkansas-Oklahoma Interagency Coordination Center in Hot Springs, AR. The Meteorologist-in-Charge at the appropriate NWS office should be made aware of the need for AMRS and IMET services in their County Warning and Forecast Area (CWFA). Typically, the IMET nearest the incident will be deployed. Note: Not all NWS offices have a certified IMET. USDA Forest Service Regions will have a list of available IMETs. During times of limited resources, IMETs from other areas of the country may be called.

The requesting agency is responsible for coordinating transportation of the IMET and all necessary equipment to and from the incident. The requesting agency is also responsible for any storage of the unit while in transit and shelter for the IMET and unit at the site. A sheltered work area, of at least 50 square feet with a table and chair, must be protected from excessive dust, be free of standing water or condensation, and must be heated and/or cooled sufficiently to allow efficient operation of all equipment. Power (120V AC) must be provided for the AMRS electrical equipment and priority telephone access during certain short periods each day must be made available.

The first notification of the mobilization of the fire weather meteorologist will normally be by phone from the staff meteorologist (Larry Vanbussum or designated alternate) at the National Interagency Fire Center (NIFC) in Boise, Idaho. The following information should be obtained if available at that time:

1. Location and name of fire or incident
2. Fire resource number
3. Travel arrangements

After notification, immediate steps should be taken to cover all the shifts that the fire weather meteorologist would otherwise be working in his home office.

**Fire Weather Training -**
National Weather Service fire weather meteorologists are available to assist fire control agencies with training at fire behavior school and other related courses. Requests for assistance should be forwarded to the Meteorologist-in-Charge (MIC) at the respective NWS office. The requesting agency may be responsible for any cost incurred such as lodging and per diem if necessary.

**Communications-**
Any weather forecast product produced by the NWS is transmitted through the Advanced Weather Interactive Processing System (AWIPS). The products are then routed in the U.S. Forest Service's Weather Information Management System or WIMS. The NWS carries the responsibility of ensuring successful transmission of fire weather products through AWIPS and its communications subsystems; it maintains no control over the operation of WIMS. All products are available on the Internet. However, the Internet is not sanctioned by the NWS for the operational distribution of forecast products.

User agencies should establish a local agreement with the program leader from each NWS office on a reliable means of dissemination. While fire weather watches, red flag warnings, red flag alerts and spot weather forecasts are posted to NWS office websites, their primary means of dissemination to wildland fire agencies maybe through a facsimile, electronic mail or another method agreed upon between the agencies served and the appropriate NWS office.

NWS offices should always coordinate with the Arkansas Forestry Commission, the USDA Forest Service and other appropriate land management agencies if a red flag event is possible.

## Forecast Products

Arkansas fire weather forecast products are produced by five individual NWS offices. Even though all offices follow a standardized format with certain required elements, the actual forecast products issued by each individual NWS office will differ slightly from the formats discussed in this section due to local forecast adaptation. Local forecast adaptation may include several weather and forecast parameters not listed below. The following format is for fire weather forecast products produced at the office in Little Rock, AR.

**Routine Fire Weather Forecasts (FWF)-**
Daily routine fire weather forecasts are available to anyone with an interest in land management and pre-suppression activities in Arkansas. These forecasts are issued twice a day by the NWS office with fire weather responsibilities for its particular part of Arkansas. Forecasts that are issued in the morning will include a detailed forecast of all required and localized parameters for three 12-hour forecast periods. The afternoon issuance of said forecast will include a detailed forecast of all required and localized parameters for four 12-hour forecast periods. All products will also include a three to seven day extended forecast of cloud cover, temperatures, winds, precipitation and minimum humidity. The forecast for any specific day is broken down to the county level. The number and grouping of counties will likely vary with each forecast issuance depending on the expected weather conditions.

Routine fire weather forecasts must include (1) a forecast discussion; (2) predictions of cloud amount and precipitation, temperature and temperature trend, humidity and humidity trend and wind; (3) any optional forecast parameters and (4) an extended forecast. Individual NWS offices have different parameters based on the feedback received from their customers.

***Current red flag status-***
Identification of red flag events is a primary responsibility of the forecaster producing the fire weather forecast. The purpose of Fire Weather Watches and Red Flag Warnings is to provide land management agencies with appropriate notification of the likelihood those weather conditions associated with the outbreak of a wildfire may occur.

A headline is required when Red Flag Warnings and/or Fire Weather Watches are in effect. The headline will include the warning type, location and effective time period. The location will be described in terms of geographic or other easily identified markers, such as forests, parks, cities, towns, rivers, or highways. Also, the headline is required for a Red Flag Warning and/or Fire Weather Watch in each appropriate zone. Headlines will also be used for significant trends of locally-defined critical weather elements for non-watch or non-warning periods. These may include widespread thunderstorm activity, strong gusty winds or an expected wind shift. Particular attention should be paid to headlines when firefighting personnel are working in the field either on a wildfire or prescribed burn. The headline will alert the dispatcher who will then notify the appropriate crews.

The following sections describe both the required and optional forecast parameters that are provided in the fire weather forecast products issued by NWS offices in Arkansas. Which optional parameters are used will be determined by the individual NWS offices as they tailor their services to fit the needs of the user agencies. NWS offices are obligated to provide user agencies with units of measure and/or a legend to explain ambiguous weather parameters. All forecast elements are not site specific but rather averaged over the entire forecast area in any specific time frame.

**Required Forecast Parameters-**

***Forecast Discussion-***
The forecast discussion should be brief but concise and describe the main weather features adequately in order to explain the forecasted conditions. Typically the forecast discussion will cover the entire forecast period with the main emphasis on the first two days. The discussion should also cover the extended period but may be more general than the discussion for the first two days. Information on weather changes such as fronts, outflow boundaries and timing of precipitation and thunderstorms are among the most critical services that the NWS can provide. These elements all can be described qualitatively in this section. Forecasters are strongly encouraged to highlight any weather changes which could pose a threat to land management or fire control efforts in the headline statement preceding the narrative discussion. Synoptic discussions should focus mainly on changes in weather conditions that would impact land management activities and planning.

***Cloud amount-***
Sky condition trends may be discussed qualitatively in the synopsis to give the user agencies a better understanding of how other weather variables will be impacted. The predominant sky condition or trend will be forecast for the fire weather forecast zone.

***Chances of precipitation-***
The chance of precipitation, also referred to as probability of precipitation or POP, is the likelihood of occurrence, expressed as a percentage, that measurable precipitation (0.01 inch or more) will occur at any point within a specified forecast area over a specific period of time (typically 12 hours). Generally, a 20% chance of precipitation means that there is a 20 in 100 (or 1 in 5) chance of precipitation occurring. Anything less than a 50% chance of precipitation is generally a forecast of no precipitation, while anything more than a 50% chance is a forecast for precipitation. However, the value of the POP has no direct relationship to the amount of rain that may occur, despite the assumption that a higher POP implies greater precipitation amounts. The POP value is actually derived from the likelihood that precipitation will occur anywhere within the specified forecast area and the percentage of the area that is expected to receive precipitation in the event it does occur. The NWS will often qualify the chance of precipitation with expressions of uncertainty or use areal coverage qualifiers for convective events.

**POPs and Equivalent NWS Forecast Wording**

| POPs | Qualifying Terms | Areal Term (Convective) |
|---|---|---|
| 10 percent | Slight Chance or None | Isolated or none |
| 20 percent | Slight Chance | Isolated |
| 30 to 50 percent | Chance | Scattered |
| 60 to 70 percent | Likely | Numerous |
| 80 percent or more | None | None |

***Precipitation type-***
A forecast of the precipitation type will accompany a probability of precipitation forecast. The most hazardous type of precipitation for a particular fire weather zone will be forecast if one or more types of precipitation are possible. For example, if thunderstorms are possible, no matter how predominant when compared with other types of precipitation, they will be listed as the main type of precipitation due to the obvious impacts on fire weather. The same holds true in winter when both freezing rain and snow are forecast, freezing rain will be listed as the predominant precipitation type as it is *considered more hazardous.*

***Temperatures/Temperature Trends-***
Temperatures are given in degrees Fahrenheit. Temperatures have a direct impact on other weather parameters and should always be included in routine and spot forecasts. The maximum temperature will be forecast for the day period and the minimum temperature will be forecast at night. Forecasters may give one value that would be halfway between the expected range across a particular fire weather zone and a range of temperatures. Temperatures may vary greatly over a small area, especially in complex terrain and open areas compared to areas under a closed canopy of trees. Afternoon high temperatures likely will exceed the forecast maximum in valley locations while temperatures at higher elevations are usually cooler. A 24 hour temperature trend will also be included.

**From the Prescribed Fire Implementation Guide for the Ouachita and Ozark-St. Francis National Forests:** *Forests will develop maximum temperature levels for a cut-off level to prevent resource damage and allow for accomplishing the objectives of the bum. Threshold temperatures are, generally, 95 degrees Fahrenheit for all dormant season burning and for site prep and stand replacement burning conducted throughout the year. Growing season, line prep, ridge top, plantation*

*prep (all firing situations using only backing firing techniques) have no established limits on forecast daily maximum air temperatures. In those circumstances where deviation is needed from the stated limitations, implementation may be approved at the local level by the District Ranger who has GO/NOGO authority. Mitigations for burning when forecast air temperature exceeds the threshold level will be recorded in the project implementation file(s).*

***Relative Humidity/Relative Humidity Trends-***
Relative humidity is the ratio (expressed in percentage) of the amount of water vapor in the air compared to the amount the air is capable of holding at its temperature and pressure. Since relative humidity values are also critical to fire management activities, they should always be included in routine and spot forecasts. The minimum or lowest humidity will be forecast for the day period and the highest humidity at night. Relative humidity values can vary greatly over a small area due to variations in topography, vegetation and location with respect to bodies of water, amongst others.

One value, midway between the ranges expected across the fire weather zone, will be forecast, or a range of relative humidity will be given. Lower humidity than forecast will be typically observed in valleys during the afternoons, particularly on a sunny day.

**From the Prescribed Fire Implementation Guide for the Ouachita and Ozark-St. Francis National Forests:** *No bums shall be ignited when the on-site RH is less than 25% or when the RH is predicted to be less than 25% during the planned bum period unless approved at the Regional level. Humidity values from 25% through 29% require approval from the Forest Supervisor. When NWS forecast relative humidity is below 25%, the requesting unit will submit a Regional-level variance request for burn approval. On receiving a forecast minimum relative humidity of 25 through 29%, the requesting unit will submit a Forest- level variance request for approval of the burn. In each case, a BEHAVE run that defines expected fire behavior (and) a burning map that displays land ownership, fuel types and fuels conditions bordering the unit will be submitted as part of the variance request package.*

***20-foot wind direction and speed-***
Winds at 20-feet above the ground or above the average height of vegetation are the most common winds used in the routine fire weather forecast. Forecasts will reflect the 10-minute average that is commonly measured at observation sites. Since most surface stations used for NWS forecasts measure the 2-minute wind at 33 feet, a reduction factor is needed to arrive at the 20-foot wind. The standard reduction is 30 percent but a different conversion factor may be used if conditions warrant, especially when forecasting for a localized area like in a spot forecast. The wind direction will be forecast to eight compass points and wind speed will be expressed in miles per hour. Again, one value midway between the range expected across the fire weather zone or a range will be forecast. The following table may be used as a guide in converting the zone forecast winds to the 20-foot winds.

**From the Prescribed Fire Implementation Guide for the Ouachita and Ozark-St. Francis National Forests:** *Actual wind speed or forecast by NWS (20 foot wind speed) shall not exceed 20 mph. Wind gusts are to be considered part of the overall wind speed. Wind speeds above 20 mph require Regional level approval. Requests for prescribed burning when forecast wind speed is to exceed 20 mph will be processed on a Regional-level variance request form accompanied by a BEHAVE run that defines expected fire behavior by fuel type (and) a burning map of the unit that displays land ownership bordering the burn unit's perimeter. Use appropriate and reliable equipment to collect on-site weather observations.*

**20 Foot Wind Speed Conversion**

| Standard Wind Speed | 20-Foot Wind Speed |
|---|---|
| Around 5 mph | 3 mph or light and variable |
| 5 to 10 mph | 6 mph |
| Around 10 mph | 7 mph |
| 10 to 15 mph | 11 mph |
| Around 15 mph | 12 mph |
| 10 to 20 mph | 13 mph |
| 15 to 25 mph | 14 mph |
| 20 to 30 mph | 18 mph |

***Extended forecast-***
An extended forecast is critical to fire weather managers for planning purposes. Many prescribed burns are planned days in advance and often are dependent upon the extended portion of the fire weather forecast. Weather elements in the outlook period will include all of the mandatory day 1 and day 2 forecast elements. A wind forecast is required through 5 days and will reflect the most significant synoptically driven wind affecting fire operations or ignition. Minimum humidity conditions will be included.

## Optional Forecast Parameters

***Precipitation amount-***
A forecast of the expected precipitation amount that will fall in inches may be included. Rainfall amounts are very variable, especially in convective events, and in areas of complex terrain. With that in mind, the rainfall amount forecast will be a single number that will be an average across the forecast area.

***Precipitation duration-***
A forecast of how long the precipitation will fall over the fire weather zone during the 12 hour forecast period may be included. Rainfall duration is very variable, especially in convective events, and in areas of complex terrain. The time the precipitation is expected to fall may occur early in the forecast period, late in the forecast period or at intermittent times during the forecast cycle. Some offices put the precipitation beginning and ending times in their forecast, otherwise it may be gleaned from other information.

***1700 foot above ground level mixing height temperature-***
The 1700 feet above ground level mixing height temperature in degrees Fahrenheit may be forecast. This is the surface temperature that must be reached in order for the mixing depth to increase to 1700 feet above ground level, the minimum criteria established by the Clean Air Act. Once the forecast temperature at the burn site reaches this number, it can be assumed that the mixing height above the burn site is at least 500 meters or 1700 feet above ground level.

***Mixing height-***
The mixing height is the projected height in feet above ground level or mean sea level through vigorous mixing will take place based on the maximum temperature on a given day. It is the height at which smoke will lose its buoyancy and stop rising. The forecast of mixing height is critical for smoke dispersion efforts. Prescribed burning is a frequent activity of land managers and cannot be performed if mixing heights are not adequate for proper smoke dispersion. The objectives of prescribed burning include the elimination of dead fuels to reduce the threat of extreme fire behavior, creation of a wildlife habitat or recreation area, trail management or the eradication of certain diseases.

The Clean Air Act states that land managers must adhere to strict guidelines of smoke dispersion with a minimum mixing height depth of 1700 feet. Mixing heights are one of the most widely-used parameters of the fire weather forecast and are crucial to planning prescribed burns and is a critical tool for wildfire suppression. The mixing height is expressed in feet (mean sea level) or possibly AGL (above ground level). Once again, the mixing height is the top of the layer through which relatively vigorous mixing will take place. It is the height at which smoke will lose its buoyancy and stop rising. A well-mixed layer is a layer in the atmosphere in which temperature drops roughly 5.5 degrees per 1000 feet of elevation. Mixing heights commonly go through large daily and seasonal variations.

*USDA Forest Service Region 8 uses a weighted average for smoked dispersion based on the transport wind by using the following table. In some instances, mixing heights must be 2700 feet above ground level with low transport winds.*

**Minimum combinations for transport winds speeds and mixing heights (above ground level).**

| Transport Wind Speed | | Mixing Height Minimum | | Minimums Rounded to Nearest | |
|---|---|---|---|---|---|
| Meters per second | Miles per hour | Meters | Feet | Miles per hour | Feet |
| 3.0 | 6.7 | 890 | 2920 | 7 | 2700 |
| 3.1 | 6.9 | 850 | 2789 | | |
| 3.2 | 7.2 | 800 | 2625 | | |
| 3.3 | 7.4 | 770 | 2526 | | |
| 3.4 | 7.6 | 740 | 2428 | 8 | 2300 |
| 3.5 | 7.8 | 720 | 2362 | | |
| 3.6 | 8.1 | 690 | 2264 | | |
| 3.7 | 8.3 | 660 | 2165 | | |
| 3.8 | 8.5 | 640 | 2100 | 9 | 1900 |
| 3.9 | 8.7 | 620 | 2034 | | |
| 4.0 | 8.9 | 600 | 1968 | | |

Table is taken from the document USDA Forest Service Region 8 Smoke Management Guidelines.

The USFS will not burn when the minimum combination of mixing heights (above ground level) and transport wind speeds are below the values shown in Table 1, unless atmospheric dispersion modeling results clearly demonstrate no smoke sensitive targets are likely to be adversely impacted.

***Category day-***
Category day is derived by multiplying the forecast mixing heights by the transport winds. The resulting number tells the land management agencies whether smoke dispersion will meet the new federal guidelines and consequently if a planned prescribed burn can be ignited.

**Category Day**

| **TWS* (mph)** | **Mixing Height** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1500 | 2000 | 2500 | 3000 | 3500 | 4000 | 4500 | 5000 | 5500 | 6000 | 6500 | 7000 | 7500 |
| 7 | | | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| 8 | | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 |
| 9 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| 10 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 |
| 11 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 |
| 12 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 |
| 13 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 |
| 14 | 1 | 2 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 15 | 2 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 16 | 2 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 |
| 17 | 2 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 |
| 18 | 2 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 |
| 19 | 2 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 |
| 20 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 |

*TWS is transport wind speed and is discussed below.

Once the category day is calculated, the derived number is compared to the respective guidelines:

| Category Day | Guidelines |
|---|---|
| 1 | Burning between 11:00 a.m. and 4:00 p.m.; a maximum of 100 acres and not before surface inversion has lifted. No burning in slash, piled debris, or heavy fuel loads. |
| 2 | No burning until 11:00 a.m. and not before inversion has lifted. Burn should be substantially over by 4:00 p.m. |
| 3 | Burn only after surface inversion has lifted. |
| 4 | Burn anytime. |
| 5 | "Unstable" and windy. Excellent smoke dispersal.<br>Burn with caution. |

***Transport winds-***
Transport winds are defined as the average wind speed and direction for all the winds from the surface through the mixing height in knots. Knowledge of transport winds is crucial in the effective management of smoke dispersion. Transport winds provide land managers with information about the horizontal dispersion (location and distance downwind from the source) of suspended particulates from fires.

**SMOKE IMPACT SITUATIONS TO BE AWARE OF***

When forecasted transport wind speeds (i.e., the average wind speed throughout the mixing layer) are high (e.g., 12 - 15 mph and higher), then the risk of heavy smoke impacts farther downwind (30 miles or more) increases significantly. As the smoke begins to lift upward in the mixing layer, the higher wind speeds can push the plume over, causing it to remain close to the ground. The smoke is unable to dilute and disperse. As the higher winds carry the smoke plume, the potential for smoke impacts becomes greater much farther downwind than may be anticipated

- As evening hours approach, the mixing layer begins to lower. Residual smoke still within the mixing layer will become more concentrated as the layer compresses. This increase in concentrations can result in higher concentrations over populated areas, resulting in health impacts and a greater potential for an exceedance of the NAAQS. This can be 20 to 30 miles downwind.

- When the mixing height is 2000'- 2500' and the transport winds are over 15 mph, heavy smoke concentrations have been observed at ground level as much as 40 miles away.
- Even in situations where smoke is dispersing well, if the plume is tracking 20 miles or more downwind, any smoke entering a sensitive area in the early evening will be subject to the lowering mixing layer resulting in higher ground level concentrations.

* Taken from the document USDA Forest Service Region 8 Smoke Management Guidelines.

***Haines Index-***
Also referred to as LASI, the Haines Index (developed in 1988 by Donald Haines, a research meteorologist with the Forest Service), is used to indicate the potential (whether a fire is occurring or not) for wildfire growth by measuring the stability and dryness of the air. The Haines Index is calculated by combining the stability and moisture content of the atmosphere into a number that correlates well with large fire growth. This index has been shown to correlate with large fire growth on initiating and existing fires where surface winds do not dominate fire behavior. Because of differing terrain, Haines developed different criteria for low elevation, mid elevation, and high elevation locations. The Low Level Haines Index is used exclusively in the state of Arkansas.

The stability term is determined by the temperature difference between two atmospheric levels while the moisture term is determined by the difference between temperature and dew point at one specific level. Measurements are made at specific pressure (millibar) levels in the atmosphere. These pressure levels are roughly at 1500 and 5000 feet above ground level. All measurements are in degrees Celsius.

**Low Level Haines Index = Stability Term (Temp 950 - Temp 850) + Moisture Term (Temp 850 - Dew Point 850)** where 950 and 850 are the 950 (roughly 1500 ft) and 850 (roughly 5000 ft) millibar level. Each term is assigned a value between one and three based on the following criteria and added together. The Haines Index ranges from two to six depending upon the severity of the weather.

**Measured Atmospheric Terms**

| Assigned Value | Stability Term | Moisture Term |
|---|---|---|
| 1 | 3 degrees C or less | 5 degrees C or less |
| 2 | 4 to 7 degrees C | 6 to 9 degrees C |
| 3 | 8 degrees C or more | 10 degrees C or more |

Once the stability term and moisture term are derived, the values are added together to produce the Haines Index. The Haines index corresponds to Fire Growth Potential by using the following chart.

**Low Level Haines Index**

| Haines Index | Fire Growth Potential |
|---|---|
| 2 & 3 | Very Low Fire Growth Potential |
| 4 | Low Fire Growth Potential |
| 5 | Moderate Fire Growth Potential |
| 6 | High Fire Growth Potential |

Although this is just one factor in judging the potential for fire growth, a five or six can serve as an alert that wildfires or prescribed burns may get out of control. There are some precautions that must be taken into account when using the Haines Index.

The Haines Index does not take wind into account at all. It is possible to have a low Haines Index value while the wind is creating a very dangerous fire situation. The Haines Index also does not take into account fuel moisture. It only measures moisture at a pre-determined level in the free atmosphere. Moisture at this altitude may not be representative of the relative humidity conditions at the surface where the fuels are and finally the Haines Index does not account for terrain, fuel continuity, ignition risk or slope.

***Stability Class-***
The forecast of stability class is an attempt to qualify the degree to which vertical motion of the atmosphere is enhanced. Stability classes are dependent upon the amount of incoming solar radiation along with forecasts of wind speed and cloud cover. Atmospheric stability offers some clue as to how readily a pollutant will be dispersed. The more unstable the stability class, the more readily a pollutant is dispersed.

However, an extremely unstable atmosphere could lead to additional downwind concerns and likely convective development. A stability class of B or C is preferred for efficient smoke dispersion.

**Stability Class**

| Stability Class | Stability Class Description |
|---|---|
| A | Extremely Unstable |
| B | Unstable |
| C | Slightly Unstable |
| D | Neutral |
| E | Slightly Stable |
| F | Stable |

***Stagnation Index-***
The stagnation index is a number from zero to three computed from forecast variables that are produced from a complex numerical model used by the NWS. The model takes into account the relative humidity in the low levels, the model prediction of precipitation, vertical motion and wind speed. The index is used by fire managers, who are cognizant of the need to occasionally restrict open burning in order to reduce atmospheric contaminants. A higher index correlates to greater stagnation.

**Stagnation Index - Daytime Scale**

| Stagnation Index | Effect on Burning Operations |
|---|---|
| 0 | Permitted from sunrise to sunset. |
| 1 | Permitted 1 hour after sunrise until sunset. |
| 2 | Permitted 2 hours after sunrise until sunset. |
| 3 | Permitted 2 hours after sunrise until 1 hour before sunset. |

**Stagnation Index - Nighttime Scale**

| Stagnation Index | Effect on Burning Operations |
|---|---|
| 0 | Permitted from sunset to sunrise. |
| 1 | Permitted until 2 hours before sunset. |
| 2 | Permitted until 4 hours after sunset. |
| 3 | No burning permitted. |

A value of 0 equates to winds of greater than 10 mph
A value of 1 equates to winds 10 mph or less with rain
A value of 2 equates to dry conditions with decent winds
A value of 3 equates to dry conditions with light winds and stagnant conditions

***Ventilation Index-***
The ventilation index is also a product of the mixing height and the transport wind speeds. It is a measure of the volume rate of horizontal transport of air within the mixing layer per unit distance normal to the winds.

**Ventilation Index**

| Ventilation Index | Effect on ventilation |
|---|---|
| 150,000 kt-ft or greater | Excellent ventilation |
| 100,000 - 149,000 kt-ft | Very good ventilation |
| 60,000 - 99,999 kt-ft | Good ventilation |
| 40,000 - 59,999 kt-ft | Fair Ventilation |
| Less than 40,000 kt-ft | Poor Ventilation |

When ventilation values are less than 40,000 kt-ft along with transport winds of less than 7.0 knots, dispersion of any pollutants released into the atmosphere will be severely limited.

***Dispersion Index-***
The Atmospheric Dispersion Index (ADI) is a numerical rating of the atmosphere's capability to transport pollutants away from their sources. The model uses a 50km rectangular control volume with the pollutant source at the rear edge and also assumes that the pollutant changes linearly downwind from the emission source.

The Dispersion index incorporates the following elements into its calculation

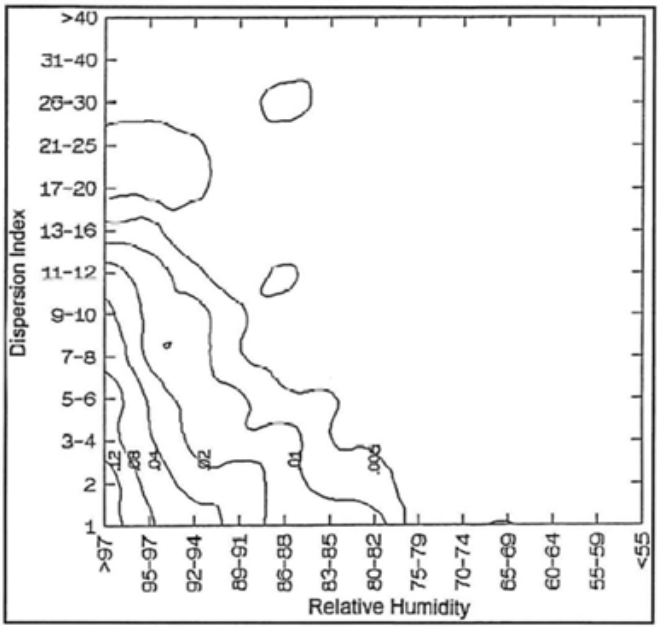
Ceiling – height at which clouds cover at least 50% of the sky, weighted for coverage.
Mixing height - height at which smoke will lose its buoyancy and stop rising.
Transport wind - average wind speed & direction for wind through the mixing height.
Surface wind - average winds speed & direction for the day.

**Dispersion Index**

| Dispersion Index | Description |
|---|---|
| **0 – 20** | Poor dispersion, stagnant air if conditions persist |
| **21 – 40** | Poor to fair dispersion, |
| **41 – 60** | Generally good dispersion |
| **61 – 80** | Very good dispersion, control problems likely |
| **80 +** | Excellent dispersion, control problems expected |

***LVORI Index-***
LVORI (low visibility occurrence risk index) is a nighttime dispersion forecast that is a function of both relative humidity and the dispersion index. LVORI is based on the proportion of accidents involving fog and or smoke as reported by the Florida Highway Patrol over a two year span.

Out of 400,000 accidents reported in that time frame, fog and or smoke was present for 3000 of them leading to a statistical analysis on which the index is based. The scale goes from one to ten with one meaning there is little chance of low visibility while 10 indicates low visibility is likely.




Using the chart on the left, it is easy to see the majority of the accidents occurred when relative humidity was high and dispersion index was low. The number of accidents decreased as dispersion index and relative humidity decreased.

As stated earlier, the LVORI index goes from one to ten. The following table summarizes and gives an interpretation of the statistical analysis of the accident information. The lower the LVORI index, the lower the chances of reduced visibility exist. The higher the LVORI index is, the more likelihood that low visibility will exist.

| Category | Interpretation |
|---|---|
| 1 | Lowest proportion of accidents with smoke and/or fog reported |
| 2 | Statistical reasons for not placing it in Cat 1 - accidents not much higher |
| 3 | 30% - 50% higher proportion of accidents than Category 1 |
| 4 | Accidents 2 times higher than Category 1 |
| 5 | Accidents 3 to 10 times higher than Category 1 |
| 6 | Accidents 10 to 20 times higher than Category 1 |
| 7 | Accidents 20 to 40 times higher than Category 1 |
| 8 | Accidents 40 to 75 times higher than Category 1 |
| 9 | Accidents 75 to 125 times higher than Category 1 |
| 10 | |

Be cautious when the LVORI forecast is 8 through 10 and smoke is expected to persist through the night, areas of reduced visibility are likely. Be particularly cautious when a road is within three miles of the burn site with open fields, logging roads or open streams than can provide an easy transport of smoke. LVORI of six or seven should be treated with caution if there is smoke and a road is near.

**Fire Weather Watch (RFW)-**
A fire weather watch is issued to alert fire and land management agencies to the possibility of red flag conditions beyond the first forecast period (12 hours). The watch is issued generally 12 to 48 hours in advance of the expected conditions, but can be issued up to 72 hours in advance if the forecaster is reasonably confident. The term FIRE WEATHER WATCH will be headlined in the routine fire weather forecast and before each forecast group the watch is in effect for. It will also be issued as a special forecast product. The watch will remain in effect until it expires, is canceled, or upgraded to a red flag warning. A fire weather watch will not usually be issued in the first period unless there is a threat of dry lightning or scattered thunderstorms during extreme drought. If the fire weather watch is canceled before its expiration time, a new RFW will be issued to notify users that the fire weather watch is no longer in effect.

**Red Flag Warning (RFW)-**
A red flag warning is used to alert fire and land management agencies that red flag conditions exist or are imminent. A red flag warning will be issued immediately when there is high confidence that red flag criteria will occur within the next 24 hours, or if those criteria are already being met. Due to forecast uncertainty beyond 12 hours, a fire weather watch will be more often used in the 12 to 24-hour time frame than a red flag warning.

When a warning is issued, the term RED FLAG WARNING will be headlined in the routine fire weather forecast and before each forecast group the warning is in effect for. It will also be issued as a special forecast product to inform users of the warning. The warning will be continued on subsequent forecasts until no longer valid. If the red flag warning is canceled before its expiration time, a new RFW will be issued to notify users that the red flag warning is no longer in effect.

Contents of Fire Weather Watch/Red Flag Warning:

1. A headline containing a brief description of the areal coverage and the time that the watch or warning will be in effect for.
2. The specific fire weather zone numbers included in the watch or warning area.
3. A brief discussion of the event.
4. An advisory sentence to alert the appropriate officials out in the field.

**Update policy –**

An agreement is in effect with the AOICC (Arkansas Oklahoma Interagency Coordination Center), located in Hot Springs Arkansas, concerning updates and significant changes in sensible weather. If a red flag watch or fire weather warning is issued or is cancelled early, the forecaster will call the AOICC dispatcher at 501-321-5232 during normal business hours or on the AOICC on-call cell phone (501-574-8758) after hours to inform them. This agreement includes anytime a Red Flag Warning or Fire Weather Watch is issued including those issued with a normally scheduled Fire Weather Forecast.

People may be burning any time and sudden drastic weather changes may affect fire behavior and more important, pose a hazard to the people in the field. Forecasters are encouraged to keep an eye on conditions at wildfire or prescribed burn sites where a spot weather forecast was requested. If gusty winds, a sudden wind shift or thunderstorms are near the vicinity of crews in the field, please contact the AOICC so they can advise crews in the field. Conversely, often times the National Weather Service may not be aware of personnel in the field, it would then be the responsibility of the responsible agency to contact the NWS is conditions are becoming adverse to crew safety.

**Spot Forecasts-**

Spot forecasts are site-specific forecasts for wildfires, prescribed burns, search and rescue operations, aerial spraying, etc. By being site-specific, these forecasts take into account the effects of topography, vegetation and any nearby bodies of water. Spot forecasts contain detailed forecast information including sky condition, precipitation and thunderstorm probability, specific temperatures and humidity, and wind speed and direction for the specific area. Spot forecast formats are now standardized to provide the best possible services to the user agencies.

**The Interagency Agreement for Meteorological Services (NWS directive 10-406) states that spot forecasts for wildland fires or any other special federal projects (i.e. spraying, seeding, fuels management, or search and rescue operations) shall be made available without cost to Interagency Wildland Fire Agencies. These agencies include the Bureau of Land Management, Bureau of Indian Affairs, U.S. Fish and Wildlife Service, National Park Service of the U.S. Dept. of Interior; and the Forest Service of the U.S. Dept. of Agriculture. The agreement includes any state, local or tribal fire agency working in coordination with a federal participant in the Interagency Agreement for Meteorological Services.**

**The NWS will not provide routine forecast support to state and local fire management agencies working outside the Interagency Agreement for Meteorological Services. However, forecast support will always be provided to any requesting agency in support of wildfire activities or any other situation which involves the protection of life and property or is essential to public safety, e.g. due to the proximity of population centers or critical infrastructure.**

Spot forecasts are available upon request at any time of day, week, year or season. Consultation service is also available for planning projects for which weather might be a factor. Requests for spot forecasts will be serviced by at least one trained meteorologist. These requests will be completed as soon as possible and should typically take around 30 minutes or less. However, protection agencies should be aware that other duties (such as severe weather) may take higher priority, and short delays may occur. If excessive delays are encountered, please notify the appropriate NWS office. If the spot forecast is to support a wildfire, please inform the forecaster, or annotate the spot request form accordingly.

**Requesting a Spot Forecast-**

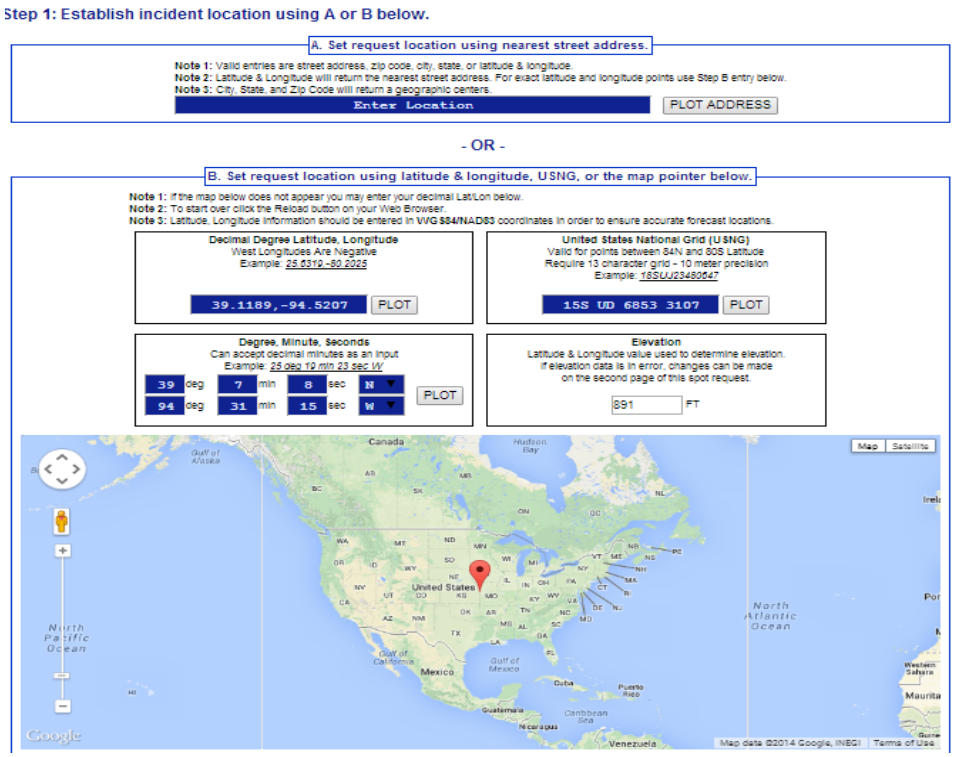
To request a spot forecast, go to the home page of the appropriate National Weather Service office. Open up the fire weather page and click on the button or link labeled "Click for spot forecast" or something similar. You will then be taken to the Spot Request Form.

On the National Weather Service's Little Rock office's web site, click on the local fire page graphical user interface or type in http://www.weather.gov/lzk/forest

Once you enter the local fire page, scroll down roughly half way to the spot forecast section and click on "Submit spot Request"

***Spot Request Form-***
Fill in the spot request form with the all information needed to request a spot forecast. Any elements highlighted in red are required for us to complete your spot forecast. While the other items may not be necessary, they are very important for our ability to make an accurate and useful forecast. The more information you can provide the forecaster, the more accurate the spot forecast will be. There are several sections on the spot request form.

***Step 1 - Location Section / Map -***
In this step you will provide us with the precise location of the forecast request. There are several options. This section provides the user with an editable ESRI map interface where you can use a marker to zoom down to the exact street level location of your area of interest. Latitude and longitude can also be used along with the USNG national grid amongst others. The beauty of this interface is when one of the incident location is selected, the other will auto-populate. The elevation will also auto fill upon completion.

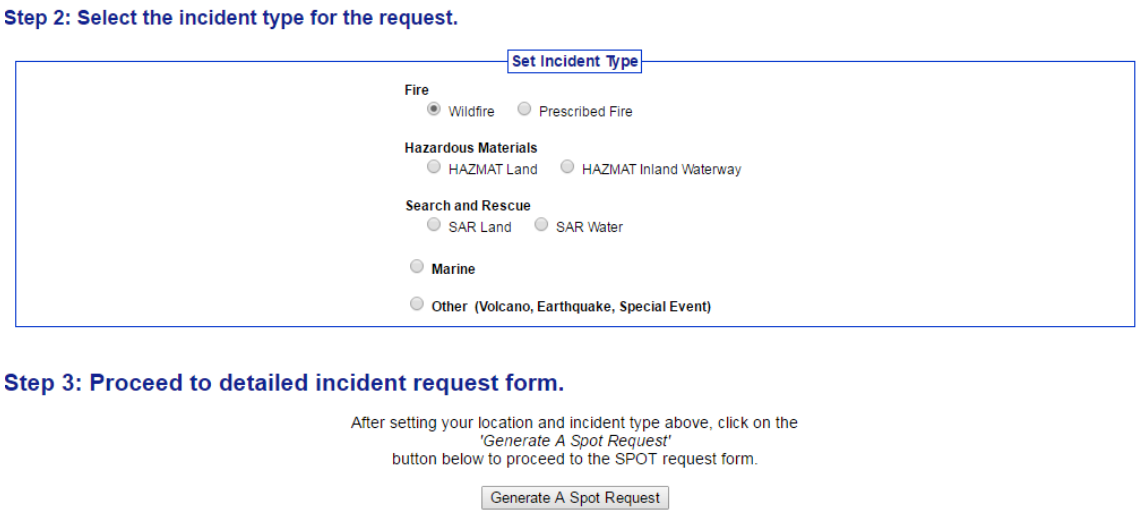



***Step 2 – Set Incident Type -***

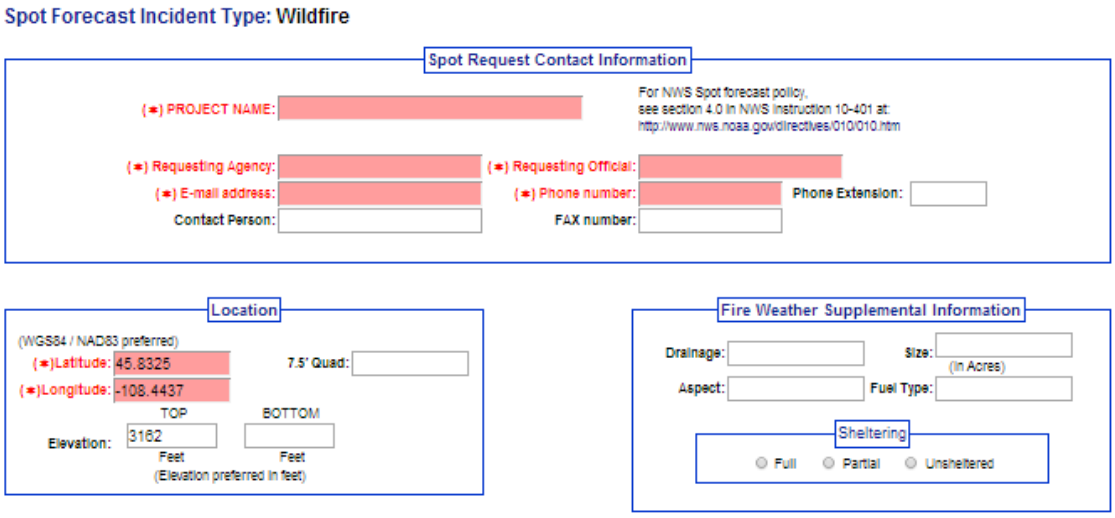
In this step you must state the reason for the forecast request by choosing either fire, hazardous materials, search and rescue, marine or other. If the prescribed fire option is selected, a separate box will appear where your justification for a prescribed burn forecast must be entered.

***Step 3 – Proceed to the detailed incident request form-***

Simply click on the "Generate a Spot Request" button.



This will bring you to the next page in the spot request procedure.




***Project Name Section-***
Provide the name for your project or the wildfire. The name cannot be the same as any other project or wildfire for the same day.

***Requesting Agency Section-***
Here you provide your agency name, the name of the requesting official, your phone number for both voice and fax (please include the area code), e-mail address and your name. All this information will be helpful to us if there are problems or questions and we need to contact you.

***Location Section-***
The location of the spot request will carry over from the previous page. The 7.5 Quad map and supplemental elevation information can be added here.

***Fire weather Supplemental Information Section-***
Please indicate the drainage, aspect and size of the burn. The more information provided to the forecast will result in a better forecast. Please indicate the type of fuel, either using fuel model numbers, or a description of the fuel such as "grass", "Ponderosa Pine", etc. Also, if you can indicate the amount of fuel sheltering where the observations were taken, it helps us tremendously in providing accurate wind forecasts. Please be aware not all forecasters are familiar with fuel model types. If at all possible refer to a description of the fuel type.

***NOAA Hysplit Model section -*** If you would you like to include a run of the Hysplit Model with this request click yes in this section. The model run will be sent separately to the email address above as this will be used to send you included in the requesting agency section. The turnaround time is usually less than 10 minutes. This request is for a Hysplit trajectory run only. A Hysplit dispersion run must be requested separately.

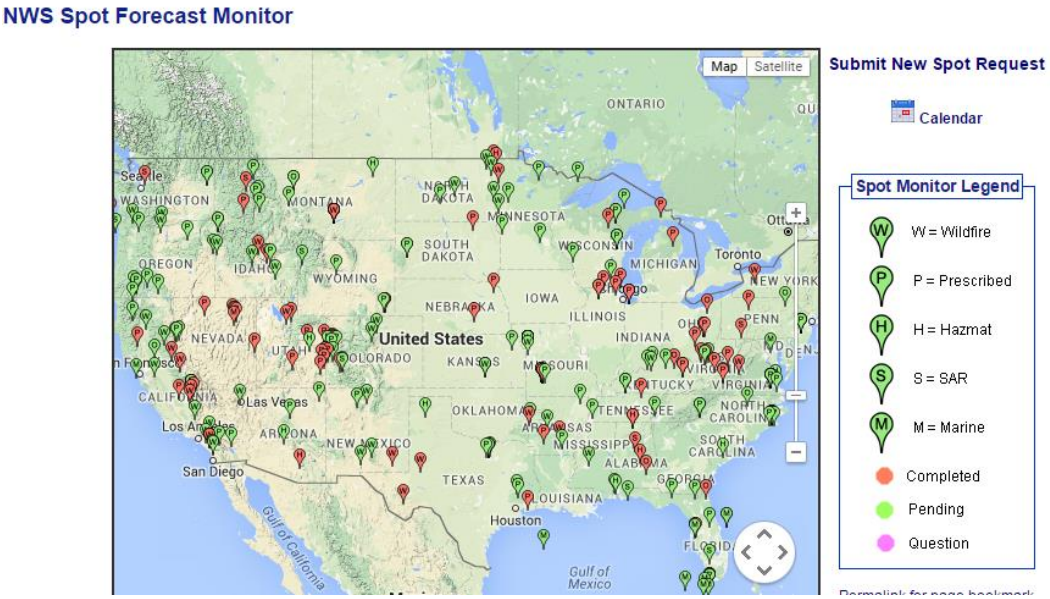
***Forecast Information Section-***
Please provide what forecast elements you need, or are particularly important. Select the parameters that you need only for the forecast periods you need. If the forecaster believes something is particularly noteworthy, the requesting agency will be notified. If a spot request is submitted in the evening for the next day, keep in mind that you are requesting parameters for the day of the burn. For wildfires, we will provide all parameters (except smoke dispersion), so you do not need to take time filling this in, unless you have a parameter that is particularly critical. For forecast parameters that are not listed here or if a specific time frame is needed, the request may be made in the remarks section.

***Remarks Section-***
If there is something else that you think we need to know, or something you couldn't fit elsewhere on the form, please enter it here. This would include any requests for a Hysplit dispersion run.

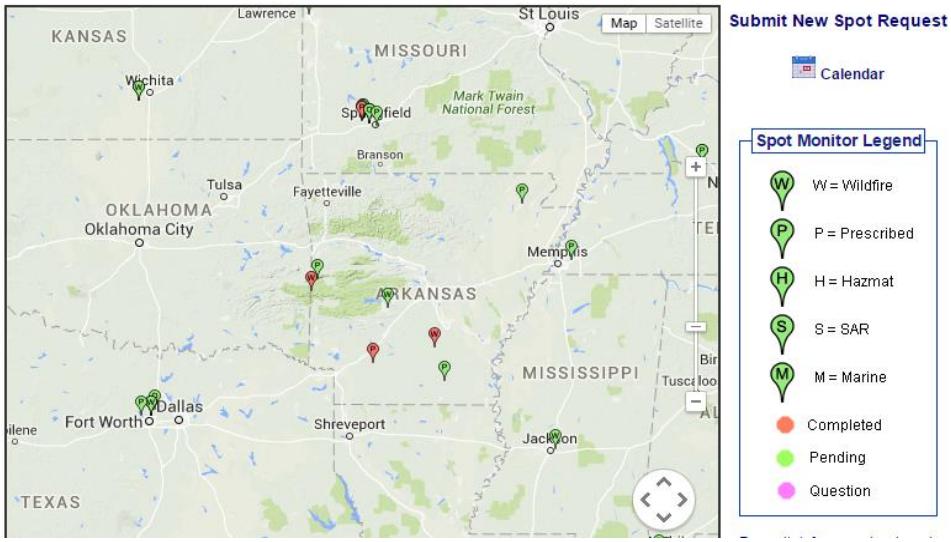
***Observation Section-***
In this section, provide us with local observations near or at the site. This may involve using a sling psychrometer or an automated weather observation system. For each observation, we need to know where it is in relation to the site, the elevation (in feet) and the time (preferably using a 24-hour clock). The wind (in miles per hour) can be specified as "N12 Gust 25" or something like that. The temperature and wet-bulb values (in degrees F) should be entered and the RH (in percent) and dew point (in degrees F) can also be entered if known (we will calculate the dew point from the temperature, wet-bulb, and elevation if you do not provide them). Finally, any remarks about clouds, weather or other important information should be entered in the remarks box.

***Submit the Form-***
Click on the "Submit Request" button at the bottom of the page to send the request. If you want to cancel the request you can click on the "Cancel Request" button. To clear the form and start over again, you can click on the "Clear Form" button. When you submit the form, various checks are performed on the data you have entered. Some problems make it impossible for your request to be accepted (for example, if you forget to enter a name for the burn), while others will produce warnings and messages for your information. If an error is found, you will be given the opportunity to go back and fix the form, or cancel the request.

Once the spot is submitted proceed back to the Spot forecast page and click on the link that say Monitor Spot Forecasts. This link will lead to a national monitor page which will show all spot weather requests.




Use the functionality of the interface to zoom into the area where your spot request is located. The reason the monitor spots page is constructed the way it is so several incidents can be monitored at once. The scale to the right will indicate what type of request and its status.



Beneath the mapping interface will be a table which lists all the requests and their status that are in the map above it. Locate the name of your spot request and click on the link to retrieve your spot forecast when the status of your request changes from pending to compere.

**Active Spot Forecasts**

| Name | Type/Start Time | Status | WFO | Actions |
|---|---|---|---|---|
| Another Test | Wildfire | Completed: 2015-12-09 7:24 PM CST | LZK | Submit Obs \| Close |
| Hot Springs Test2 | Wildfire | Request pending | LZK | Change Request \| Submit Obs \| Close |
| TEST Spot | Wildfire | Completed: 2015-12-03 1:14 PM CST | LZK | Submit Obs \| Close |
| Optimus Fields Rx | Prescribed 2015-11-24 11:00 AM CST | Completed: 2015-11-30 7:19 PM CST | LZK | Submit Obs \| Close |
| Little Mountain | Wildfire | Completed: 2015-08-09 6:50 AM CDT | LZK | Submit Obs \| Close |
| 1228/08 | Prescribed 2015-07-28 7:00 AM CDT | Request pending | LZK | Change Request \| Submit Obs \| Close |
| TEST AFC | Prescribed 2015-07-22 1:00 PM CDT | Request pending | LZK | Change Request \| Submit Obs \| Close |
| Crowley's Ridge State Park, Zone 3 | Prescribed 2015-12-09 12:00 AM CST | Request pending | MEG | Submit Obs |
| TEST BURN 1 | Prescribed 2015-12-09 9:00 AM CST | Completed: 2015-12-09 8:41 AM CST | SHV | Submit Obs |

If we have questions about your request, we may send you a message or call the number provided. If this happens, you will see a big red box in the forecast page, with our question. Usually, there is some problem with the request that you can easily fix (use the links at the bottom of the page to change the request) or you can call us.

**NWS Actions:** Correct Forecast

Printer Friendly Version of Forecast

Back to Forecast Monitor  Copy Info to Spot Request for a New Incident  Copy Info to New Spot Request for this Incident  Request Immediate Forecast Update

Delete Request

At the bottom of the spot will be several options for the requesting agency to use to request an update or copy the information into other upcoming spots amongst other things.

We hope that you can provide us feedback with how the forecast worked out, perhaps later in the day or several days down the road. This feedback helps us to improve our forecasts or points out areas of concern.

In the event of Internet or other communications failure, requesting agencies are encouraged to submit requests by faxing a completed Fire Weather Spot Forecast request. This form will be the standard form submitted for fire weather support and was derived through a cooperative effort between the NWS and the AOICC. When listing the location, requests should contain latitude/longitude coordinates, the quadrangle map name and a local reference.

Forecasters should be aware of the critical weather element thresholds for the spot forecast area. These thresholds are often determined by a fire behavior analyst or other fuels/fire behavior expert and define ranges of wind, relative humidity, etc. that, if realized, may cause significant increase (or decrease) in fire behavior. In most cases, such information can be obtained directly from the on-site requester. In the case of prescribed burns, these thresholds are often defined in the "Burn Plan", which is normally developed and approved well before a spot forecast is requested. If the forecaster on duty needs assistance in preparing spot forecasts for a wildfire, they should contact the FWPL meteorologist at home.

Forecasters are encouraged to keep an eye on conditions at the sites where spot forecasts have been requested and to issue an update if conditions are not representative of the forecast. Conversely, requesting agencies are encouraged to contact the appropriate National Weather Service office if the forecast does not seem to be panning out. The forecaster will use the nearest observation site which may not always be representative of the burn area so on site observations are always encouraged. Updates will be issued as needed and the contact person or the AOICC will be notified that an updated forecast is pending. It will be the responsibility of the requesting agency to alert the crews in the field that an updated forecast is pending or has already been issued.

***Specific parameters of interest to firefighters and others include:***

**Wind speed and direction** - remember we are dealing with 20 ft. surface winds over the mean vegetation. The 20-ft wind may be .50 to .75 of what the airport winds are running, depending on the type of vegetation. A shift in wind direction by 30 degrees is critical. Terrain features may cause local scale winds such as slope/valley winds or funneling.

**Humidity -** humidity recovery at night can be as important as minimum relative humidity during the afternoon. Ridges exposed to winds at night may allow sufficient mixing so that humidity remains lower; thus, fire activity may continue through the night.

**Inversions -** strength of thermal inversions should be mentioned along with a forecast of when the inversion is likely to break up if applicable.

Remember that the operations around the fire are exposed to all the weather elements that present hazards to outdoor activities, such as lightning, thunderstorm winds, high heat index, dense fog, etc. Notify the dispatcher at the AOICC or the AFC dispatch center if the spot weather forecast is unrepresentative and an update is forthcoming.

In order to make sure that spot forecasts are as accurate as possible, the NWS verifies spot forecasts. The NWS asks that each spot forecast request be accompanied by a preliminary observation (recorded at the time of the request) and a follow-up observation (recorded at the time of maximum or minimum heating depending upon the time that the request was sent) at the burn site, if possible. User agencies should also understand that preliminary observations are critical to giving the spot forecast a significant improvement over the routine fire weather forecast.

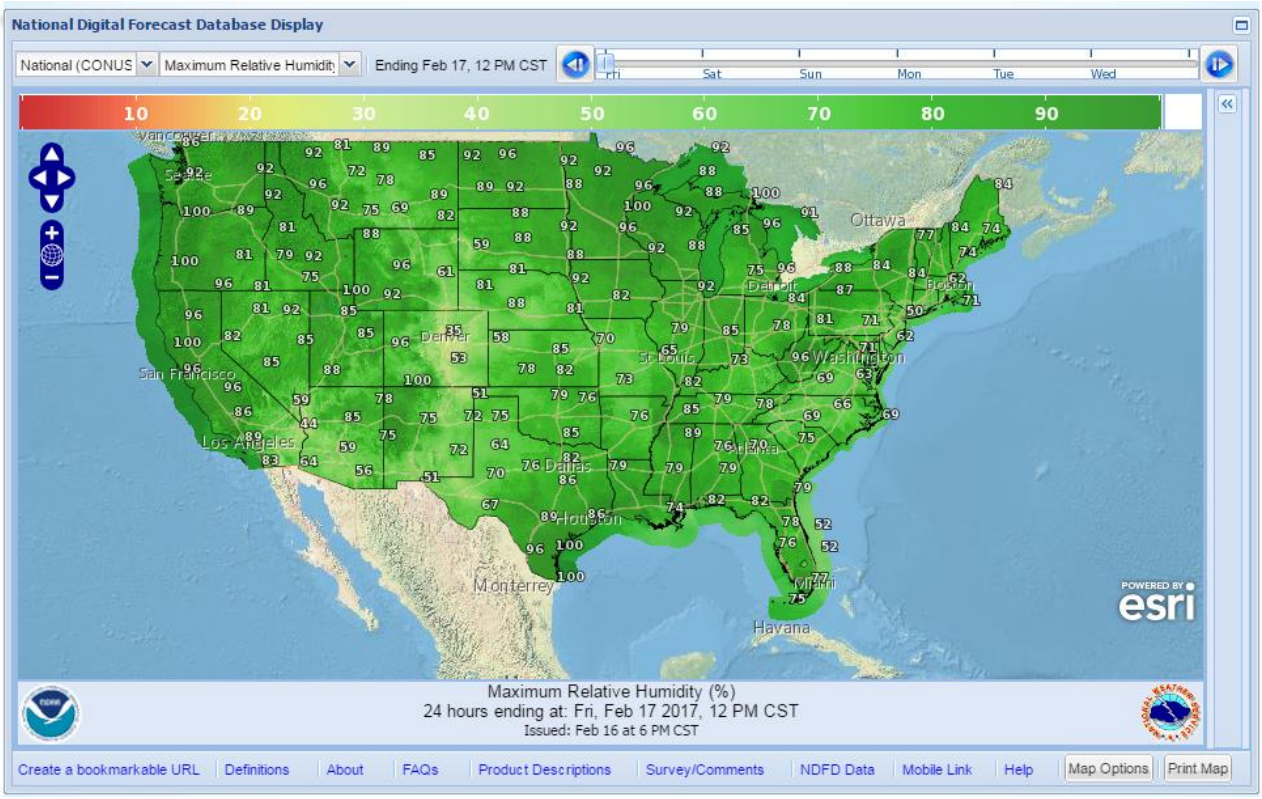
**Note**: Spot forecasts may be used as general planning tools for the following day but this practice is not recommended. “Planning” type forecast information should be obtained from the routine fire weather forecast or the zone forecast product, and can be augmented by direct phone consultation with a forecaster on duty at the appropriate NWS office. Spot forecasts are intended to support ongoing or imminent wildfire or federal prescribed burn activity only.

## Other Forecast Products

### Graphical Forecasts

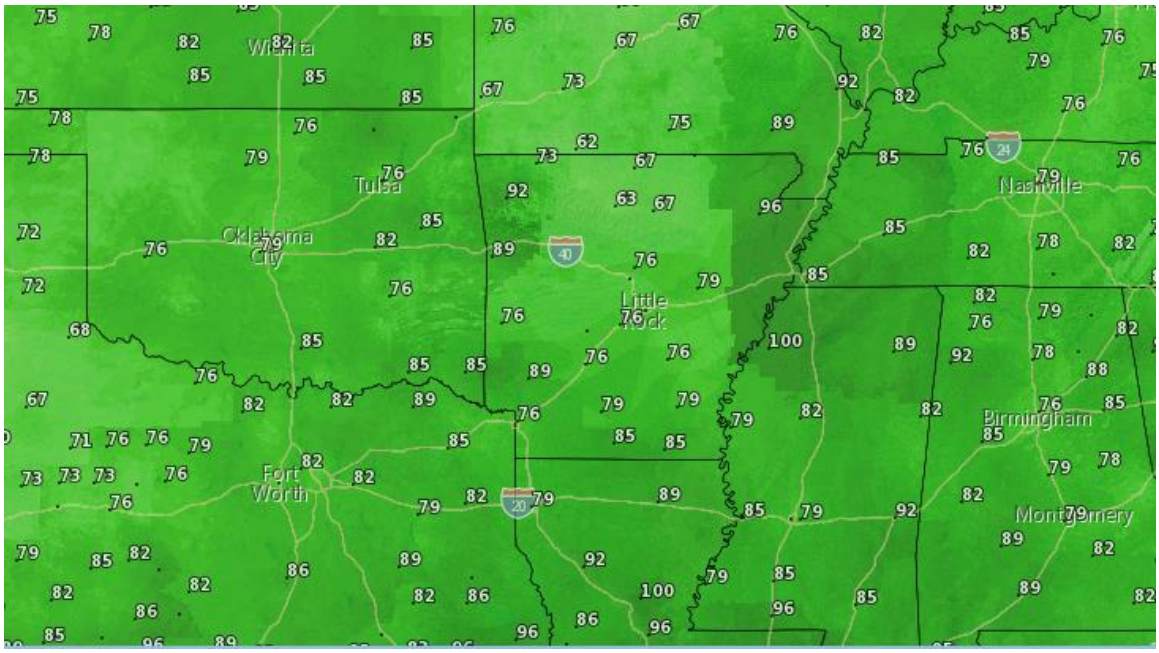
In addition to text products, the National Weather Service also issues graphical forecasts for most fire weather parameters. These graphics allow the user to quickly scan the entire forecast area and beyond and often, the fire weather parameter will extend beyond the time restraints of the routine fire weather product. These products break down the fire weather forecast parameters into three or six hour segments and are continuously updated. These graphics can be found off of any NWS homepage or by typing in https://digital.weather.gov/

National View

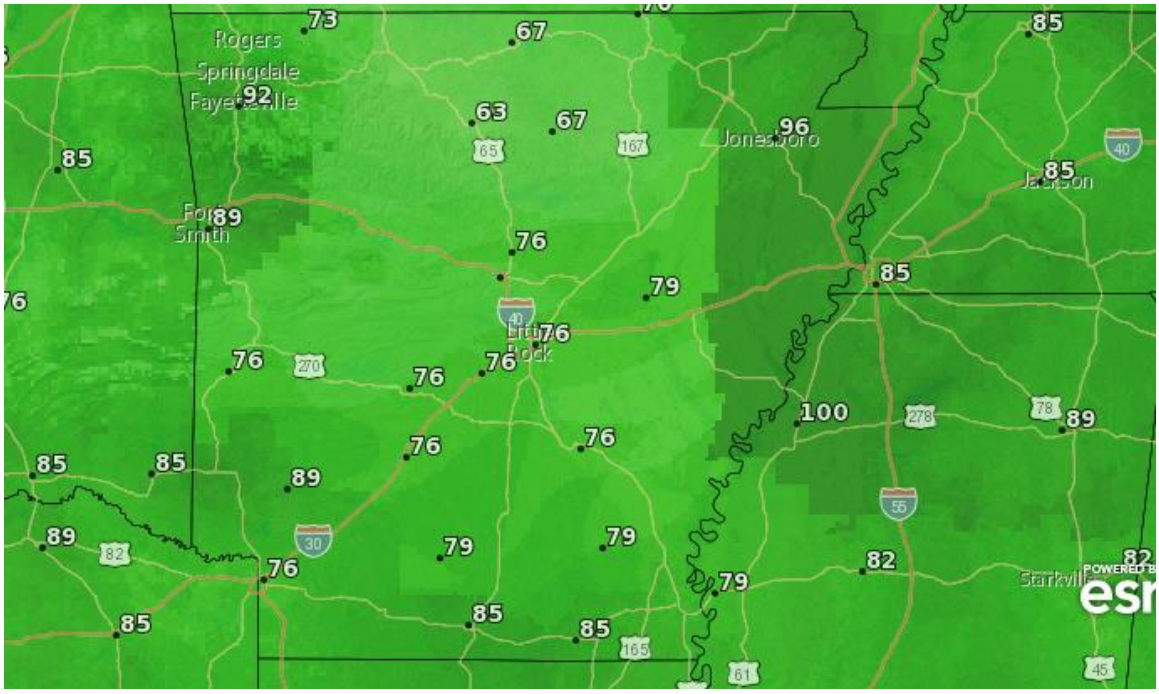



The map has built in functionality where the user can zoom in to any particular region by simply click on the area on interest until the desired geographic area is selected.

Regional View

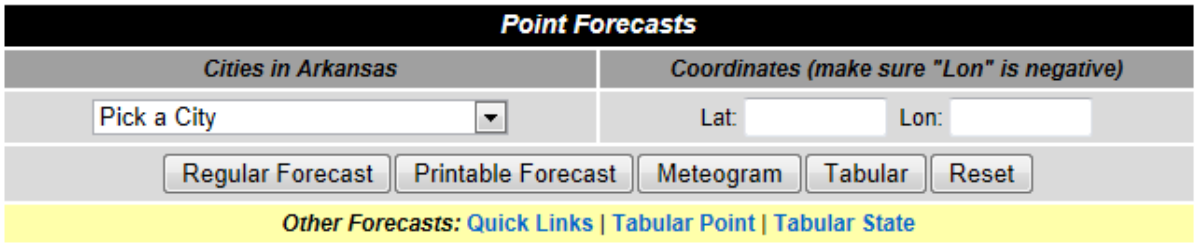



State View



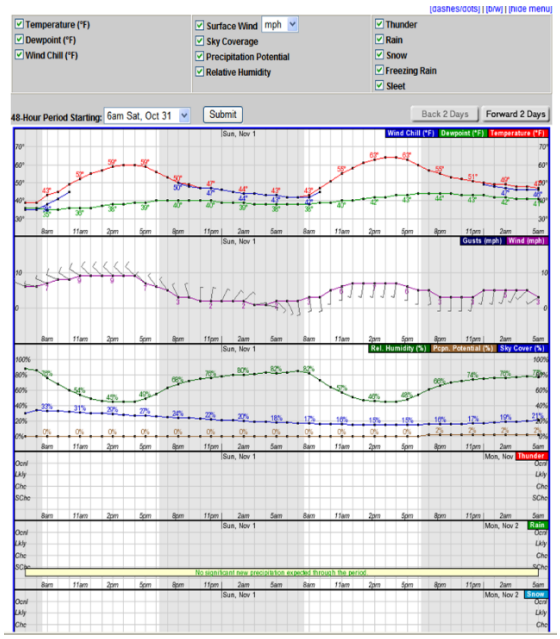
**Tabular and Meteogram Forecasts-**

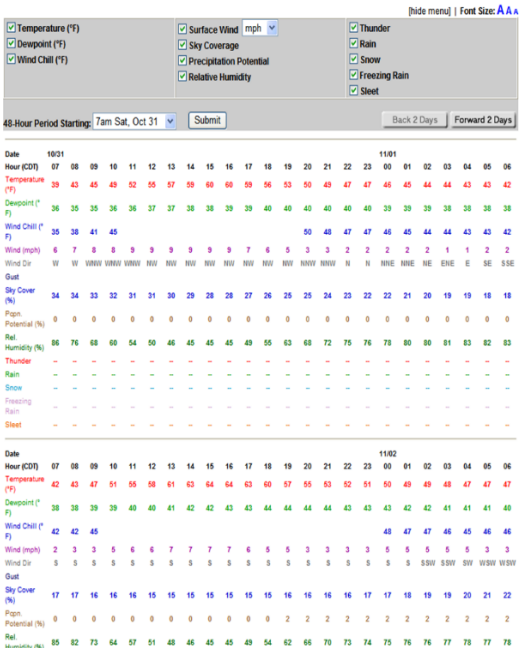
The National Weather Service also provides detailed tabular or meteogram forecasts. These forecasts allow the user to obtain detailed information that is broken down into hourly segments for a variety of forecast parameters. To obtain this information, start about halfway down on the National Weather Service's Little Rock office homepage and look for the box titled Point Forecasts.




The data may be obtained by using the drop down menu on the left for a myriad of specific cities or by typing in a specific latitude and longitude (making sure that the longitude is a negative number). The user may request a meteogram forecast or a tabular forecast by selecting the appropriate box. The following are examples of meteogram and tabular forecasts.

The primary difference between these forecasts and a spot forecast is quality control. The tabular and meteogram forecasts come directly out of the National Weather Service's data base with no forecaster interaction. A spot weather request is forecasted and quality controlled by a NWS meteorologist.



**Fire Weather Point Forecast Matrices-**

The National Weather Service also issues a product for specific locations called a Fire Weather Point Forecast Matrix or PFW. The PFW is an easily accessible tabular forecast data that is tailored toward fire behavior applications and includes forecasts of numerous fire weather parameters broken into three or six hour segments. The PFW's are generated for the Remote Automated Weather Station (RAWS)/NFDRS sites and specific Automated Surface Observing System (ASOS) sites.

This product is updated twice a day and is for planning and review purposes only. It is not to be substituted for an official fire weather spot forecast

**An example of Fire Weather Point Forecast**

```
DEVILS KNOB RAWS-JOHNSON AR
35.62N  93.30W ELEV. ???? FT
330 PM CST SAT JAN 17 2009

DATE             SAT 01/17/09            SUN 01/18/09            MON 01/19/09
UTC 3HRLY     09 12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 21 00
CST 3HRLY     03 06 09 12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 15 18

MAX/MIN                      52          29          48          26          43
TEMP                         45 39 36 33 31 34 43 47 40 36 33 30 28 31 39 42 39
DEWPT                        32 30 27 26 25 25 26 25 24 23 22 21 22 24 26 27 26
MIN/MAX RH                   38          77          43          79          54
RH                           61 71 69 73 77 68 50 43 51 58 63 69 78 75 61 54 61
WIND DIR                      W NW NW NW  W NW NW NW NW NW NW NW NW NW NW NW NW
WIND SPD                      6  4  5  4  4  6 10  9  8  6  5  4  5  6  8  6  6
WIND CHILL                         30    25 27 36    34 29 27 24 21 24 32    33
CLOUDS                       CL CL CL FW SC SC SC SC SC B1 B1 B1 B1 B1 B2 B2 B2
CLOUDS(%)                     0  0  3 21 45 50 48 44 44 55 66 62 56 62 70 73 72
POP 12HR                      0           5           5           5           5
QPF 12HR                      0           0           0           0           0
LW LVL HAINES                       4     3     4     4     4     4
STABILITY                           6     3     3     5     5     3     3     5
MAX. MIX HGT                     1400  1600  3800  3800  1400  1600  4400  4400
1700 MHGT T                                     39    39                32    32
T WIND DIR                         NW    NW    NW    NW    NW    NW    NW    NW
T WIND SPD                         25    23    20    27    31    25    20    25


DATE              TUE 01/20/09  WED 01/21/09  THU 01/22/09  FRI 01/23/09
UTC 6HRLY     06  12 18 00 06   12 18 00 06   12 18 00 06   12 18 00
CST 6HRLY     00  06 12 18 00   06 12 18 00   06 12 18 00   06 12 18

MIN/MAX           29    48      27    56      33    59      37    47
TEMP          34  32 43 41 33   26 48 49 40   36 52 52 44   38 42 42
DEWPT         24  23 24 25 24   23 29 31 31   31 32 34 35   35 36 34
MAX/MIN RH        71    42     100    37      80    41      91    65
RH            68  71 47 53 69   86 48 51 69   80 47 51 70   91 79 72
PWIND DIR         NW    NW       W
WIND CHAR        <15   <15     <15
AVG CLOUDS    B1  SC SC SC FW   FW FW FW FW   SC SC B1 B1   B1 B1 B1
POP 12HR           0     0       0     0       5    20      20    10
RAIN SHWRS                                           IS IS   IS
```

## National Fire Danger Rating System (NFDRS) Site Specific Forecasts

**What is NFDRS?**
The National Fire Danger Rating System measures wildfire danger at key points throughout the United States. "Fire danger" in NFDRS parlance, means a daily evaluation of the potential for wildfire ignition, growth and intensity over a broad sampling area. NFDRS takes into account many different vegetative types throughout the United States, their annual growth cycles, seasonal climate trends, local topography, fuels, and the effect of daily weather changes.

Fire managers receive numeric output that suggests the severity of fire danger. In general, one or more fire weather observation sites are carefully located in the forest in order to represent the worst conditions. NFDRS is not intended to be "site specific" like the Fire Behavior Prediction System but rather a general overview of fire danger. Effective fire suppression planning depends heavily on NFDRS because it is an objective tool for predicting the difficulty of suppressing a wildfire.

**What is the role of the National Weather Service in NFDRS?**
The National Weather Service role in NFDRS is forecasting weather trends which allow NFDRS to predict the next day's fire danger indices. Daily weather observations entered into NFDRS by the fire agencies form the basis of the trend forecast input by the NWS. Each NFDRS reporting site is located at a spot which is representative of the terrain and fuel types dominant in that area. The NFDRS reporting sites are also RAWS (Remote Automated Weather Station) stations whose weather information is available on the internet or through WIMS (Weather Management and Information System).

The National Weather Service is obligated to prepare site specific forecasts for these NFDRS sites These forecasts will be entered into the NWS computer system no later than 345 PM CST/CDT. The NFDRS forecast consists of two separate and distinct parts. The first part is a time specific forecast for the basic time of observation (1 PM CST or 2 PM CDT). Note: Remember the NFDRS weather observations are at what is supposed to be the hottest, driest and windiest time of the afternoon. Thus, the time specific forecast is made for this time. The second part is a forecast for certain parameters during the 24 hours between the basic observation time on the day the forecast is being prepared and the basic observation time for the following day

**NFDRS Site Specific Forecast Points**

| Site | Elevation | Lat / Long | Site I.D. |
|---|---|---|---|
| Strickler | 1630 feet | 35.87 N / -94.30 W | STKA4 |
| Silver Hill | 928 feet | 35.97 N / -92.75 W | SVHA4 |
| Devils Knob | 2099 feet | 35.62 N / -93.3 W | DKBA4 |
| Booneville | 656 feet | 35.15 N / -93.90 W | BNVA4 |
| Oden | 895 feet | 34.62 N / -93.8 W | ODEA4 |
| Jessieville | 898 feet | 34.69 N / -93.22 W | JVLA4 |
| Felsenthal | 105 feet | 33.12 N / -92.19 W | LRRA4 |
| Evening Shade | 540 feet | 36.11 N / -91.56 W | ESDA4 |
| Guy | 610 feet | 35.32 N / -92.28 W | GYAA4 |
| Sheridan | 270 feet | 34.27 N / -92.39 W | SDNA4 |
| Bluff City | 360 feet | 33.69 N / -93.16 W | BLRA4 |
| Poinsett | 335 feet | 35.53 N / -90.69 W | LPSA4 |
| Monticello | 183 feet | 33.59 N / -91.80 W | AMOA4 |
| St. Francis | 300 feet | 34.76 N / -90.72W | SFFA4 |
| Blanchard Springs | 1200 feet | 35.97N / -92.19 | BSCA4 |
| Armstead Mountain | 1600 feet | 35.57N / -92.82 | AMAA4 |
| Compton | 2365 feet | 36.07 N / -93.36 | CMTTA4 |

**Offices that issue NFDRS Site Specific Forecasts**

| Site | County | NFDRS Issuing Office |
|---|---|---|
| Strickler | Washington | Tulsa |
| Silver Hill | Searcy | Little Rock |
| Devils Knob | Johnson | Little Rock |
| Booneville | Logan | Little Rock |
| Oden | Montgomery | Little Rock |
| Jessieville | Garland | Little Rock |
| Felsenthal | Union | Shreveport |
| Evening Shade | Sharp | Little Rock |
| Guy | Faulkner | Little Rock |
| Sheridan | Grant | Little Rock |
| Bluff City | Nevada | Shreveport |
| Poinsett | Poinsett | Memphis |
| Monticello | Drew | Little Rock |
| St. Francis | Lee | Memphis |
| Blanchard Springs | Stone | Little Rock |
| Armstead Mountain | Pope | Little Rock |
| Compton | Newton | Little Rock |

The single station forecast is in tabular form with the terminology as follows:

FCST,031201,070429,13,1,78,37,1,1,259,05,M,78,52,83,37,0,0,N

**FCST,031201,070429,13-** The administrative section of the forecast with the site identification (**031201**), followed by the date (**070429 in year/month/day format**) and the specific forecast time (**1300 hours**).

FCST,031201,070429,13,**1**,78,37,1,1,259,05,M,78,52,83,37,0,0,N
**State of Weather -** The state of weather is input as a code for the weather expected at basic observation time the next day. Forecasters will select the highest code when more than one type of weather is expected. For example, if both fog and rain are anticipated at basic observation time, the state of weather would be coded as six, the higher state of weather code.

**Weather Codes for Single Station Forecasts**

| Weather Code | Sensible Weather |
|---|---|
| 0 | Clear Skies |
| 1 | Scattered Clouds |
| 2 | Broken Clouds |
| 3 | Overcast Conditions |
| 4 | Fog |
| 5 | Drizzle |
| 6 | Rain |
| 7 | Snow |
| 8 | Showers |
| 9 | Thunderstorms |

FCST,031201,070429,13,1,**78,37**,1,1,259,05,M,78,52,83,37,0,0,N
**Temperature and humidity -** The forecaster will enter the temperature in degrees Fahrenheit, and the relative humidity in whole percent expected at observation time.

FCST,031201,070429,13,1,78,37,**1,1**,259,05,M,78,52,83,37,0,0,N
**Lightning activity level -** Currently these values default to 1 as dry lightning is a very rare event in Arkansas. The possibility of issuing a LAL for Arkansas is currently under review.

FCST,031201,070429,13,1,78,37,1,1,**259,05**,M,78,52,83,37,0,0,N
**Wind direction and speed -** The forecaster will enter the expected wind direction in degrees and the expected wind speed at the observation site in mph. The wind speed at a fire weather station is the average of the speed measured over a 10 minute period. Wind speeds measured at a fire weather station usually do not compare with the ASOS 10 meter winds measured at airports. Wind speeds are observed to be lower over the rougher terrain of a forest as compared to the observation site at an airport. The 10- minute average wind at the 20 foot level will produce lower wind speeds than the 2- minute ASOS winds. The forecast wind speed will reflect the lower wind speeds at fire weather stations by reducing the forecast wind speed by 70%.

FCST,031201,070429,13,1,78,37,1,1,259,05,M,**78,52,83,37**,0,0,N
**24 hour forecasts -** The forecaster will follow the basic observation time forecasts with the maximum temperature expected during the 24 hour period from basic observation time the day the forecast is being prepared to the basic observation time the following day. This is followed by a forecast of minimum temperature, maximum humidity and minimum humidity expected in the same 24-hour time frame.

FCST,031201,070429,13,1,78,37,1,1,259,05,M,78,52,83,37,**0,0**,N
**Precipitation time duration -** The forecaster will enter the expected duration of precipitation in whole hours that will fall at the site for the first 16 hours of the forecast between basic observation times. This sixteen hour forecast will be followed by a forecast of the expected duration of precipitation in whole hours that will fall at the site for the final eight hours of the forecast between basic observation times.

FCST,031201,070429,13,1,78,37,1,1,259,05,M,78,52,83,37,0,0,**N**
**Wet Fuels Condition-** A wet fuels condition anticipated at the next basic observation time is entered next. If the forecaster expects fuels to be wet, a Y for yes will be entered. If the forecaster feels fuels will not be wet, an N for no will be entered. Basically, this parameter will be yes when liquid water, ice or snow, will be sitting on the fuels at observation time, i.e., really soaked! Use yes with caution as all indices in the NFDRS are set to zero when wet fuels are forecast.

## Update policy

An agreement is in effect with the AOICC (Arkansas Oklahoma Interagency Coordination Center), located in Hot Springs, concerning updates and significant changes in sensible weather. The fire management officers check the morning forecast before heading out into the field and will not be aware if an update is issued. If an update is issued, please call the AOICC at 501-321-5232 during normal working hours and 501-574-8758 after hours to inform them an update has been issued. They will notify personnel in the field. If a significant change in the weather is likely to occur, please call the AOICC and tell them what is going on. They are interested in strong to severe thunderstorms approaching the forests, sudden wind shifts, a drastic rise in temperature or a drastic drop in humidity. This agreement will eliminate the forecasters from calling specific districts. The forecaster only has to call the AOICC and they will notify the personnel in the field as applicable. Remember, people may be burning every day during fire season and sudden drastic weather changes may affect fire behavior and more important, pose a hazard to the people in the field.

No official agreement is in place with the Arkansas Forestry Commission. As a courtesy, the AFC dispatch center in Malvern should be contacted at 501-332-2000 to inform them that a change to the forecast is forthcoming. They in turn will notify any of their personnel in the field about the update to ensure fire fighter safety

# National Weather Service Offices

All NWS offices issue fire weather forecasts and other fire weather products for their area of responsibility. In addition to the required forecast parameters and information on any fire weather watches and red flag warnings in effect, the routine fire weather forecast offers additional parameters based on customer need and local criteria. All fire weather forecasts are required to include a brief synopsis and forecasts of sky and weather conditions, probability of precipitation, maximum and minimum temperature, maximum and minimum humidity and wind over a specified time. All forecasts are also required to include an extended forecast of three to seven days which will include all of the mandatory forecast elements.

Fire weather forecasts may include optional elements below the required set of required. National Weather Service offices have the choice of including local optional elements in as many periods as desired in both the morning and afternoon forecasts. These elements will vary between offices and are selected on customer needs.

# National Weather Service - Little Rock, Arkansas

8400 Remount Rd - North Little Rock, AR  72118
Phone: 501-834-3955; Fax: 501-834-2019
Internet address: http://www.weather.gov/lzk
Meteorologist in Charge: Jim Reynolds
Warning Coordination Meteorologist: Dennis Cavanaugh
Fire Weather Program Leader and (IMET): Joe Goudsward

**The Little Rock National Weather Service Office has responsibility for fire weather services in the following counties in Arkansas:**

| | | | | | |
|---|---|---|---|---|---|
| Arkansas | Conway | Hot Spring | Lonoke | Polk | Stone |
| Baxter | Dallas | Independence | Marion | Pope | Van Buren |
| Boone | Desha | Izard | Montgomery | Prairie | White |
| Bradley | Drew | Jackson | Monroe | Pulaski | Woodruff |
| Calhoun | Faulkner | Jefferson | Newton | Saline | Yell |
| Clark | Fulton | Johnson | Ouachita | Scott | Lawrence |
| Cleveland | Garland | Lincoln | Perry | Searcy | Randolph |
| Cleburne | Grant | Logan | Pike | Sharp | |

**National Fire Danger Rating System Single Station Forecast Sites in Arkansas:**

| | |
|---|---|
| Blanchard Springs | Booneville |
| Devils Knob | Evening Shade |
| Guy | Jessieville |
| Oden | Silver Hill |
| Monticello | Armstead Mountain |
| Compton | |

**Federal Land Agencies in Arkansas Served:**

| | | |
|---|---|---|
| Ouachita National Forest | Cache River/Bald Knob National Wildlife Refuge | Hot Springs National Park |
| Ozark National Forest | Holla Bend National Wildlife Refuge | Arkansas Post National Monument |
| Buffalo National River | White River National Wildlife Refuge | Felsenthal/Overflow National Wildlife Refuge |

**Red Flag Criteria:**
For **a Red Flag Warning**, all three of the following criteria must be met.

1) Afternoon minimum relative humidity expected to be 25% or lower.
2) 20-foot sustained winds of 14 mph or greater.
3) 10-hour fuel moisture of less than 10 percent.

Routine Fire Weather Products Issued:
Fire Weather Forecast (product identifier LITFWFLZK; WMO Header FNUS54 KLZK). Fire weather forecasts from the National Weather Service Office in Little Rock are issued twice a day. The first issuance is in the morning around 730 am and the latter around 330 pm. The forecast will be updated if conditions warrant. In the event of communications failure or any other circumstance that would prevent fire weather products from being issued by the National Weather Service Forecast Office in Little Rock, Arkansas responsibility will fall upon the National Weather Service Forecast Office in Memphis, Tennessee. In the event Memphis is unable to assume responsibility, fire weather services would be provided by the National Weather Service Forecast office in Tulsa, Oklahoma.

In addition to the required forecast parameters and information on any fire weather watches and red flag warnings in effect, the routine fire weather forecast offers additional parameters, including precipitation amount, precipitation duration, 1700 ft mixing height temperatures, mixing heights, transport wind speed and direction, Haines index, stability class and 20 foot winds. An example of the Little Rock Fire Weather Forecast is included in Appendix 8.

# National Weather Service - Memphis, Tennessee

7777 Walnut Grove Road-OM1CR
Memphis, TN  38120
Phone: 901-544-0401; Fax: 901-544-0414
Internet address: http://www.weather.gov/meg
Meteorologist in Charge: Jim Belles
Warning Coordination Meteorologist: Gary Woodall
Fire Weather Program Leader: Andrew Chiuppi

**The Memphis National Weather Service Office has responsibility for fire weather services in the following counties in Arkansas:**

| | | | | |
|---|---|---|---|---|
| Clay | Crittenden | Green | Lee | St. Francis |
| Craighead | Cross | Phillips | Mississippi | Poinsett |

**National Fire Danger Rating System Single Station Forecast Sites in Arkansas:**

| | |
|---|---|
| Poinsett | St. Francis / Marianna |

**Federal Land Agencies in Arkansas Served:**

| | | |
|---|---|---|
| St. Francis National Forest | Big Bend Lake National Wildlife Refuge | Wapanoca National Wildlife Refuge |

**Red Flag Criteria:**
For a **Red Flag Warning**, both of the following criteria must be met.

1) Afternoon minimum relative humidity expected to be 25% or lower.
2) 20-foot sustained winds of 14 mph or greater.

Routine Fire Weather Products Issued:
Fire Weather Forecast (product identifier MEMFWFMEG; WMO Header FNUS54 KMEG). Fire weather forecasts from the National Weather Service Office in Memphis are issued twice a day. The first issuance is in the morning around 600 am and the latter around 330 pm. The forecast will be updated if conditions warrant. In the event of communications failure or any other circumstance that would prevent fire weather products from being issued by the National Weather Service Forecast Office in Memphis, responsibility will fall upon the National Weather Service Forecast Office in Little Rock, Arkansas. In the event Little Rock is unable to assume responsibility, fire weather services would be provided by the National Weather Service Forecast office in Nashville, Tennessee.

In addition to the required forecast parameters and information on any fire weather watches and red flag warnings in effect, the routine fire weather forecast offers additional parameters, including precipitation amount, precipitation duration, precipitation beginning and ending time, 20-foot winds, 1700-ft mixing height, transport winds, ventilation index, stability and stagnation index.

# National Weather Service –Tulsa, Oklahoma

10159 E. 11th St. Suite 300
Tulsa, OK 74128
Phone Number: 918-832-4116; Fax: 918-832-4101
Internet address: http://www.weather.gov/tsa
Meteorologist in Charge: Steven Piltz
Warning Coordination Meteorologist: Ed Calianese
Fire Weather Program Leader: Craig Sullivan

**The Tulsa National Weather Service Office has responsibility for fire weather services in the following counties in Arkansas:**

| | | | |
|---|---|---|---|
| Benton | Crawford | Madison | Washington |
| Carroll | Franklin | Sebastian | |

**National Fire Danger Rating System Single Station Forecast Sites in Arkansas:**

| | |
|---|---|
| Strickler | |

**Federal Land Agencies in Arkansas Served:**

| | |
|---|---|
| Ouachita National Forest | Pea Ridge National Military Park |
| Ozark National Forest | Fort Smith National Historic Site |

**Red Flag Criteria;**
For a **Red Flag Warning**, all three of the following criteria must be met.

1) Afternoon minimum relative humidity expected to be 25% or lower.
2) 20-foot sustained winds of 14 mph or greater.
3) 10-hour fuel moisture of less than 10 percent.

Fire Weather Forecast (product identifier OKCFWFTSA; WMO Header FNUS54 KTSA). Fire weather forecasts from the National Weather Service office in Tulsa are issued twice a day. The first issuance is in the morning around 730 am and the latter around 330 pm. The forecast will be updated if conditions warrant. In the event of communications failure or any other circumstance that would prevent fire weather products from being issued by the National Weather Service Forecast Office in Tulsa responsibility will fall upon the National Weather Service Forecast Office in Norman, Oklahoma. In the event Norman is unable to assume responsibility, fire weather services would be provided by the National Weather Service Forecast office in Little Rock, Arkansas.

In addition to the required forecast parameters and information on any fire weather watches and red flag warnings in effect, the routine fire weather forecast offers additional parameters, including precipitation amount, precipitation type, 1700-ft mixing height temperatures, mixing heights, transport winds, 20-foot winds, Haines index, stability, and ventilation rate.

# National Weather Service – Shreveport, Louisiana

5655 Hollywood Ave.
Shreveport, LA  71109
Phone: 318-636-7345 Fax: 318-636-9620
Internet address: http://www.weather.gov/shv
Meteorologist in Charge: Mario Valverde
Warning Coordination Meteorologist: Vacant
Fire Weather Program Leader: Matt Hemingway

**The Shreveport National Weather Service Office has responsibility for fire weather services in the following counties in Arkansas:**

| | | |
|---|---|---|
| Columbia | Lafayette | Nevada |
| Hempstead | Little River | Sevier |
| Howard | Miller | Union |

**National Fire Danger Rating System Single Station Forecast Sites**

| | |
|---|---|
| Bluff City | Felsenthal |

**Federal Land Agencies in Arkansas Served:**

| | |
|---|---|
| Felsenthal/Overflow National Wildlife Refuge | Ouachita National Forest, Oklahoma Ranger District – Broken Bow |

**Red Flag Criteria:**
For a **Red Flag Warning**, all three of the following criteria must be met.

1) Sustained 20 foot winds of 25 mph or higher at ASOS sites and/or 20 mph or higher at RAWS sites.
2) Relative Humidity of 25% or less.
3) Critically dry fuel moisture.

Fire Weather Forecast (product identifier NEWFWFSHV; WMO Header FNUS54 KSHV). Fire weather forecasts from the National Weather Service Office in Shreveport are issued twice a day. The first issuance is in the morning around 730 am and the latter around 330 pm. The forecast will be updated if conditions warrant. In the event of communications failure or any other circumstance that would prevent fire weather products from being issued by the National Weather Service Forecast Office in Shreveport, responsibility will fall upon the National Weather Service Forecast Office in Fort Worth, Texas. In the event Fort Worth is unable to assume responsibility, fire weather services would be provided by the National Weather Service Forecast office in Jackson, Mississippi.

In addition to the required forecast parameters and information on any fire weather watches and red flag warnings in effect, the routine fire weather forecast offers additional parameters, including precipitation amount, precipitation duration, 1700-ft mixing height temperatures, mixing heights, transport winds, 20-foot winds, stability class and category day.

# National Weather Service – Jackson, Mississippi

234 Weather Service Drive, Jackson, MS 39208
Phone: 601-939-2786; Fax: 601-965-4028
Internet address: http://www.weather.gov/jan
Meteorologist in Charge: Bill Parker
Warning Coordination Meteorologist: Vacant
Fire Weather Program Leader: Nick Fenner

**The Jackson National Weather Service Office has responsibility for fire weather services in the following counties in Arkansas:**

| | |
|---|---|
| Ashley | Chicot |

**National Fire Danger Rating System Single Station Forecast Sites in Arkansas:**
None

**Federal Land Agencies in Arkansas Served:** None

**Red Flag Criteria:**
For a **Red Flag Warning**, all the following criteria must be met.

1) Afternoon minimum relative humidity less than 25%.
2) 20-foot sustained winds of 14 mph or greater.
3) Keetch-Byram Drought Index of greater than 700.

Fire Weather Forecast (product identifier JANFWFJAN; WMO Header FNUS54 KJAN): Fire weather forecasts from the National Weather Service in Jackson office are issued twice a day. The first issuance is in the morning around 730 am and the latter around 330 pm. The forecast will be updated if conditions warrant. In the event of communications failure or any other circumstance that would prevent fire weather products from being issued by the National Weather Service Forecast Office in Jackson, responsibility will fall upon the National Weather Service Forecast Office in Huntsville, Alabama. In the event Huntsville is unable to assume responsibility, fire weather services would be provided by the National Weather Service Forecast office in Shreveport, Louisiana.

In addition to the required forecast parameters and information on any fire weather watches and red flag warnings in effect, the routine fire weather forecast offers additional parameters, including precipitation amount, precipitation duration, 1700 ft mixing height temperatures, mixing heights, transport winds, stagnation index, ventilation index, stability, category day and wind shifts.

# Appendix 1: Wildland Fire Terminology

**Aerial Fuels**: All live and dead vegetation in the forest canopy or above surface fuels, including tree branches, twigs and cones, snags, moss, and high brush.

**Aerial Ignition**: Ignition of fuels by dropping incendiary devices or materials from aircraft.

**Air Tanker**: A fixed-wing aircraft equipped to drop fire retardants or suppressants.

**Anchor Point**: An advantageous location, usually a barrier to fire spread, from which to start building a fireline. An anchor point is used to reduce the chance of firefighters being flanked by fire.

**Aramid**: The generic name for a high-strength, flame-resistant synthetic fabric used in the shirts and jeans of firefighters. Nomex, a brand name for aramid fabric, is the term commonly used by firefighters.

**Aspect**: Direction toward which a slope faces.

**Backfire**: A fire set along the inner edge of a fireline to consume the fuel in the path of a wildfire and/or change the direction of force of the convection column.

**Backpack Pump**: A portable sprayer with hand-pump, fed from a liquid-filled container fitted with straps, used mainly in fire and pest control.

**Behave**: A system of interactive computer programs for modeling fuel and fire behavior that consists of two systems: BURN and FUEL.

**Bladder Bag**: A collapsible backpack portable sprayer made of neoprene or high strength nylon fabric fitted with a pump.

**Blow-up:** A sudden increase in fire intensity or rate of spread strong enough to prevent direct control or to upset control plans. Blow-ups are often accompanied by violent convection and may have other characteristics of a fire storm.

**Brush**: A collective term that refers to stands of vegetation dominated by shrubby, woody plants, or low growing trees, usually of a type undesirable for livestock or timber management.

**Brush Fire**: A fire burning in vegetation that is predominantly shrubs, brush and scrub growth.

**Bucket Drops**: The dropping of fire retardants or suppressants from specially designed buckets slung below a helicopter.

**Buffer Zones**: An area of reduced vegetation that separates wildlands from vulnerable residential or business developments. This barrier is similar to a greenbelt in that it is usually used for another purpose such as agriculture, recreation areas, parks, or golf courses.

**Bump-up Method**: A progressive method of building a fireline on a wildfire without changing relative positions in the line. Work is begun with a suitable space between workers. Whenever one worker overtakes another, all workers ahead move one space forward and resume work on the uncompleted part of the line. The last worker does not move ahead until completing his or her space.

**Burn Out**: Setting fire inside a control line to widen it or consume fuel between the edge of the fire and the control line.

**Burning Ban**: A declared ban on open air burning within a specified area, usually due to sustained high fire danger.

**Burning Conditions**: The state of the combined factors of the environment that affect fire behavior in a specified fuel type.

**Burning Index**: An estimate of the potential difficulty of fire containment as it relates to the flame length at the most rapidly spreading portion of a fire's perimeter.

**Burning Period:** That part of each 24-hour period when fires spread most rapidly, typically from 10:00 a.m. to sundown.

**Campfire**: As used to classify the cause of a wildland fire, a fire that was started for cooking or warming that spreads sufficiently from its source to require action by a fire control agency.

**Chain**: A unit of linear measurement equal to 66 feet.

**Closure:** Legal restriction, but not necessarily elimination of specified activities such as smoking, camping, or entry that might cause fires in a given area.

**Cold Front:** The leading edge of a relatively cold air mass that displaces warmer air. The heavier cold air may cause some of the warm air to be lifted. If the lifted air contains enough moisture, the result may be cloudiness, precipitation, and thunderstorms. If both air masses are dry, no clouds may form. Following the passage of a cold front in the Northern Hemisphere, westerly or northwesterly winds of 15 to 30 or more miles per hour.

**Cold Trailing:** A method of controlling a partly dead fire edge by carefully inspecting and feeling with the hand for heat to detect any fire, digging out every live spot, and trenching any live edge.

**Command Staff:** The command staff consists of the information officer, safety officer and liaison officer. They report directly to the incident commander.

**Complex**: Two or more individual incidents located in the same general area which are assigned to a single incident commander or unified command.

**Contain a fire:** A fuel break around the fire has been completed. This break may include natural barriers or manually and/or mechanically constructed line.

**Control a fire:** The complete extinguishment of a fire, including spot fires. Fireline has been strengthened so that flare-ups from within the perimeter of the fire will not break through this line.

**Control Line:** All built or natural fire barriers and treated fire edge used to control a fire.

**Cooperating Agency:** An agency supplying assistance other than direct suppression, rescue, support, or service functions to the incident control effort; e.g., Red Cross, law enforcement agency, Telephone Company, etc.

**Creeping Fire:** A fire with a low flame that is spreading slowly.

**Crew Boss:** A person in supervisory charge of usually 16 to 21 firefighters and responsible for their performance, safety, and welfare.

**Crown Fire (Crowning):** The movement of fire through the crowns of trees or shrubs more or less independently of the surface fire.

**Curing**: Drying and browning of herbaceous vegetation or slash.

**Dead Fuels:** Fuels with no living tissue in which moisture content is governed almost entirely by atmospheric moisture (relative humidity and precipitation), dry-bulb temperature, and solar radiation.

**Debris Burning**: A fire spreading from any fire originally set for the purpose of clearing land or for rubbish, garbage, range, stubble, or meadow burning.

**Defensible Space:** An area either natural or manmade where material capable of causing a fire to spread has been treated, cleared, reduced, or changed to act as a barrier between an advancing wildland fire and the loss to life, property, or resources. In practice, "defensible space" is defined as an area a minimum of 30 feet around a structure that is cleared of flammable brush or vegetation.

**Detection**: The act or system of discovering and locating fires.

**Direct Attack:** Any treatment of burning fuel, such as by wetting, smothering, or chemically quenching the fire or by physically separating burning from unburned fuel.

**Dispatch**: The implementation of a command decision to move a resource or resources from one place to another.

**Dispatcher**: A person employed who receives reports of discovery and status of fires, confirms their locations and takes action promptly to provide people and equipment likely to be needed for control in first attack, and sends them to the proper place.

**Dispatch Center:** A facility from which resources are directly assigned to an incident.

**Division**: Divisions are used to divide an incident into geographical areas of operation. Divisions are established when the number of resources exceeds the span-of-control of the operations chief. A division is located with the Incident Command System organization between the branch and the task force/strike team.

**Dozer**: Any tracked vehicle with a front-mounted blade used for exposing soil.

**Dozer Line**: Fireline constructed by the front blade of a dozer.

**Drip Torch**: Hand-held device for igniting fires by dripping flaming liquid fuel on the materials to be burned; consists of a fuel fount, burner arm, and igniter. Fuel used is generally a mixture of diesel and gasoline.

**Drop Zone**: Target area for air tankers, helitankers, and cargo dropping.

**Drought Index**: A number representing net effect of evaporation, transpiration, and precipitation in producing cumulative moisture depletion in deep duff or upper soil layers.

**Dry Lightning Storm**: Thunderstorm where negligible precipitation reaches the ground.

**Duff**: The layer of decomposing organic materials lying below the litter layer of freshly fallen twigs, needles, and leaves and immediately above the mineral soil.

**Energy Release Component (ERC)**: The computed total heat released per unit area (British thermal units per square foot) within the fire front at the head of a moving fire.

**Engine**: Any ground vehicle providing specified levels of pumping, water and hose capacity.

**Engine Crew**: Firefighters assigned to an engine. The Fireline Handbook defines the minimum crew makeup by engine type.

**Entrapment**: A situation where personnel are unexpectedly caught in a fire behavior related, life-threatening position where planned escape routes or safety zones are absent, inadequate, or compromised. An entrapment may or may not include deployment of a fire

shelter for its intended purpose. These situations may or may not result in injury. They include "near misses."

**Environmental Assessment (EA)**: EAs were authorized by the National Environmental Policy Act (NEPA) of 1969. They are concise, analytical documents prepared with public participation that determine if an Environmental Impact Statement (EIS) is needed for a particular project or action. If an EA determines an EIS is not needed, the EA becomes the document allowing agency compliance with NEPA requirements.

**Environmental Impact Statement (EIS)**: EISs were authorized by the National Environmental Policy Act (NEPA) of 1969. Prepared with public participation, they assist decision makers by providing information, analysis and an array of action alternatives, allowing managers to see the probable effects of decisions on the environment. Generally, EISs are written for large-scale actions or geographical areas.

**Equilibrium Moisture Content**: Moisture content that a fuel particle will attain if exposed for an infinite period in an environment of specified constant temperature and humidity. When a fuel particle reaches equilibrium moisture content, net exchange of moisture between it and the environment is zero.

**Escape Route:** A preplanned and understood route firefighters take to move to a safety zone or other low-risk area, such as an already burned area, previously constructed safety area, a meadow that won't burn, or natural rocky area that is large enough to take refuge without being burned. When escape routes deviate from a defined physical path, they should be clearly marked (flagged).

**Escaped Fire**: A fire that has exceeded or is expected to exceed initial attack capabilities or prescription.

**Extended Attack Incident**: A wildland fire that has not been contained or controlled by initial attack forces and for which more firefighting resources are arriving, en route, or being ordered by the initial attack Incident Commander.

**Extreme Fire Behavior**: "Extreme" implies a level of fire behavior characteristics that ordinarily precludes methods of direct control action. One of more of the following is usually involved: high rate of spread, prolific crowning and/or spotting, presence of firewhirls or strong convection column. Predictability is difficult because such fires often exercise some degree of influence on their environment and behave erratically, sometimes dangerously.

**Field Observer**: Person responsible to the Situation Unit Leader for collecting and reporting information about an incident obtained from personal observations and interviews.

**Fine Fuels**: Fast-drying fuels, generally with a comparatively high surface area to volume ratio, which are less than 1/4-inch in diameter and have a time lag of one hour or less. These fuels readily ignite and are rapidly consumed when dry.

**Fingers of a Fire**: The long narrow extensions of a fire projecting from the main body.

**Fire Behavior**: The manner in which a fire reacts to the influences of fuel, weather and topography.

**Fire Behavior Forecast**: Prediction of probable fire behavior usually prepared by a Fire Behavior Specialist, in support of fire suppression or prescribed burning operations.

**Fire Behavior Specialist**: A person responsible to the Planning Section Chief for establishing a weather data collection system and for developing fire behavior predictions based on fire history, fuel, weather and topography.

**Fire Break**: A natural or constructed barrier used to stop or check fires that may occur, or to provide a control line from which to work.

**Fire Cache**: A supply of fire tools and equipment assembled in planned quantities or standard units at a strategic point for exclusive use in fire suppression.

**Fire Crew**: An organized group of firefighters under the leadership of a crew leader or other designated official.

**Fire Front**: The part of a fire within which continuous flaming combustion is taking place. Unless otherwise specified, the fire front is assumed to be the leading edge of the fire perimeter. In ground fires, the fire front may be mainly smoldering combustion.

**Fire Intensity**: A general term relating to the heat energy released by a fire.

**Fireline**: A linear fire barrier that is scraped or dug to mineral soil.

**Fire Management Plan (FMP)**: A strategic plan that defines a program to manage wildland and prescribed fires and documents the Fire Management Program in the approved land use plan. The plan is supplemented by operational plans such as preparedness plans, preplanned dispatch plans, prescribed fire plans, and prevention plans.

**Fire Perimeter**: The entire outer edge; or boundary of a fire.

**Fire Season:** 1) Period(s) of the year during which wildland fires are likely to occur, spread, and affect resource values sufficient to warrant organized fire management activities. 2) A legally enacted time during which burning activities are regulated by state or local authority.

**Fire Shelter**: An aluminized tent offering protection by means of reflecting radiant heat and providing a volume of breathable air in a fire entrapment. Fire shelters should only be used in life-threatening situations, as a last resort.

**Fire Shelter Deployment**: The removing of a fire shelter from its case and using it as protection against fire.

**Fire Storm:** Violent convection caused by a large continuous area of intense fire. Often characterized by destructively violent surface indrafts, near and beyond the perimeter, and sometimes by tornado-like whirls.

**Fire Triangle**: Instructional aid in which the sides of a triangle are used to represent the three factors (oxygen, heat, fuel) necessary for combustion and flame production; the removal of any of the three factors causes flame production to cease.

**Fire Use Module (Prescribed Fire Module)**: A team of skilled and mobile personnel dedicated primarily to prescribed fire management. These are national and interagency resources, available throughout the prescribed fire season, that can ignite, hold and monitor prescribed fires.
**Fire Weather**: Weather conditions that influence fire ignition, behavior and suppression.

**Fire Weather Watch**: A term used by fire weather forecasters to notify using agencies, usually 12 to 72 hours ahead of the event, that current and developing meteorological conditions may evolve into dangerous fire weather.

**Fire Whirl**: Spinning vortex column of ascending hot air and gases rising from a fire and carrying aloft smoke, debris, and flame. Fire whirls range in size from less than one foot to more than 500 feet in diameter. Large fire whirls have the intensity of a small tornado.

**Firefighting Resources**: All people and major items of equipment that can or potentially can be assigned to fires.

**Flame Height**: The average maximum vertical extension of flames at the leading edge of the fire front. Occasional flashes that rise above the general level of flames are not considered. This distance is less than the flame length if flames are tilted due to wind or slope.

**Flame Length**: The distance between the flame tip and the midpoint of the flame depth at the base of the flame (generally the ground surface). It is an indicator of fire intensity.

**Flaming Front**: The zone of a moving fire where the combustion is primarily flaming. Behind this flaming zone combustion is primarily glowing. Light fuels typically have a shallow flaming front, whereas heavy fuels have a deeper front. It is also called the fire front.

**Flanks of a Fire**: The parts of a fire's perimeter that are roughly parallel to the main direction of spread.

**Flare-up**: Any sudden acceleration of fire spread or intensification of a fire. Unlike a blow-up, a flare-up lasts a relatively short time and does not radically change control plans.

**Flash Fuels**: Fuels such as grass, leaves, draped pine needles, fern, tree moss and some kinds of slash, that ignite readily and are consumed rapidly when dry. They are also called fine fuels.

**Fuel**: Combustible material. Fuel includes, vegetation, such as grass, leaves, ground litter, plants, shrubs and trees which feed a fire. (See Surface Fuels.)

**Fuel Bed**: An array of fuels usually constructed with specific loading, depth and particle size to meet experimental requirements; also, commonly used to describe the fuel composition in natural settings.

**Fuel Loading**: The amount of fuel present expressed quantitatively in terms of weight of fuel per unit area.

**Fuel Model**: Simulated fuel complex (or combination of vegetation types) for which all fuel descriptors required for the solution of a mathematical rate of spread model have been specified.

**Fuel Moisture (Fuel Moisture Content)**: The quantity of moisture in fuel expressed as a percentage of the weight when thoroughly dried.

**Fuel Reduction:** Manipulation, including combustion, or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control.

**Fuel Type**: An identifiable association of fuel elements of a distinctive plant species, form, size, arrangement, or other characteristics that will cause a predictable rate of fire spread or difficulty of control under specified weather conditions.

**Fusee**: A colored flare designed as a railway warning device and widely used to ignite suppression and prescription fires.

**General Staff**: The group of incident management personnel reporting to the incident commander. They may each have a deputy. Staff consists of operations section chief, planning section chief, logistics section chief, and finance/administration section chief.

**Geographic Area**: A political boundary designated by the wildland fire protection agencies, where these agencies work together in the coordination.

**Ground Fuel**: All combustible materials below the surface litter, including duff, tree or shrub roots, punchy wood, peat, and sawdust, which will normally support a glowing combustion without flame.

**Haines Index**: An atmospheric index used to indicate the potential for wildfire growth by measuring the stability and dryness of the air over a fire.

**Hand Line**: A fireline built with hand tools.

**Hazard Reduction**: Any treatment of a hazard that reduces the threat of ignition and fire intensity or rate of spread.

**Head of a Fire**: The side of the fire having the fastest rate of spread.

**Heavy Fuels**: Fuels of large diameter such as snags, logs, or large limb wood, which ignite and are consumed more slowly than flash fuels.

**Helibase**: The main location within the general incident area for parking, fueling, maintaining, and loading helicopters.

**Helispot**: A temporary landing spot for helicopters.

**Helitack**: The use of helicopters to transport crews, equipment, and fire retardants or suppressants to the fireline during the initial stages of a fire.

**Helitack Crew**: A group of firefighters trained in the technical and logistical use of helicopters for fire suppression.

**Holding Actions**: Planned actions required to achieve wildland prescribed fire management objectives. These actions have specific implementation timeframes for fire use actions but can have less sensitive implementation demands for suppression actions.

**Holding Resources**: Firefighting personnel and equipment assigned to do all required fire suppression work following fireline construction but generally not including extensive mop-up.

**Hose Lay**: Arrangement of connected lengths of fire hose and accessories on the ground, beginning at the first pumping unit and ending at the point of water delivery.

**Hotshot Crew**: A highly trained fire crew used mainly to build fireline by hand.

**Hotspot**: A particularly active part of a fire.

**Hot spotting**: Reducing or stopping the spread of fire at points of particularly rapid rate of spread or special threat, generally the first step in prompt control, with emphasis on first priorities.

**Incident**: A human-caused or natural occurrence, such as wildland fire, that requires emergency service action to prevent or reduce the loss of life or damage to property or natural resources.

**Incident Action Plan (IAP):** Contains objectives reflecting the overall incident strategy and specific tactical actions and supporting information for the next operational period. The plan may be oral or written. When written, the plan may have a number of attachments, including: incident objectives, organization assignment list, division assignment, incident radio communication plan, medical plan, traffic plan, safety plan, and incident map.

**Incident Command Post (ICP)**: Location at which primary command functions are executed. The ICP may be co-located with the incident base or other incident facilities.

**Incident Command System (ICS)**: The combination of facilities, equipment, personnel, procedure and communications operating within a common organizational structure, with responsibility for the management of assigned resources to effectively accomplish stated objectives pertaining to an incident.

**Incident Commander**: Individual responsible for the management of all incident operations at the incident site.

**Incident Management Team**: The Incident Commander and appropriate general or command staff personnel assigned to manage an incident.

**Incident Objectives**: Statements of guidance and direction necessary for selection of appropriate strategies, and the tactical direction of resources. Incident objectives are based on realistic expectations of what can be accomplished when all allocated resources have been effectively deployed.

**Infrared Detection**: The use of heat sensing equipment, known as Infrared Scanners, for detection of heat sources that are not visually detectable by the normal surveillance methods of either ground or air patrols.

**Initial Attack**: The actions taken by the first resources to arrive at a wildfire to protect lives and property, and prevent further extension of the fire.

**Jump Spot**: Selected landing area for smokejumpers.

**Keech-Byram Drought Index (KBDI):** Commonly-used drought index adapted for fire management applications, with a numerical range from 0 (no moisture deficiency) to 800 (maximum drought).

**Knock Down**: To reduce the flame or heat on the more-vigorously burning parts of a fire edge.

**Ladder Fuels**: Fuels which provide vertical continuity between strata, thereby allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease. They help initiate and assure the continuation of crowning.

**Large Fire**: 1) For statistical purposes, a fire burning more than a specified area of land e.g., 100 acres in timber. 2) A fire burning with a size and intensity such that its behavior is determined by interaction between its own convection column and weather conditions above the surface.

**Lead Plane**: Aircraft with pilot used to make dry runs over the target area to check wind and smoke conditions and topography and to lead air tankers to targets and supervise their drops.

**Light (Fine) Fuels**: Fast-drying fuels, generally with a comparatively high surface area to volume ratio, which is less than 1/4-inch in diameter and has a time lag of one hour or less. These fuels readily ignite and are rapidly consumed by fire when dry.

**Lightning Activity Level (LAL)**: A number, on a scale of 1 to 6 that reflects frequency and character of cloud-to-ground lightning. The scale is exponential, based on powers of 2 (i.e., LAL 3 indicates twice the lightning of LAL 2).

**Line Scout**: A firefighter who determines the location of a fireline.

**Litter**: Top layer of the forest, scrub land, or grassland floor, directly above the fermentation layer, composed of loose debris of dead sticks, branches, twigs, and recently fallen leaves or needles, little altered in structure by decomposition.

**Live Fuels**: Living plants, such as trees, grasses, and shrubs, in which the seasonal moisture content cycle is controlled largely by internal physiological mechanisms, rather than by external weather influences.

**Micro-Remote Environmental Monitoring System (Micro-REMS):** Mobile weather monitoring stations that are used to determine weather conditions on and close to the incident.

**Mineral Soil:** Soil layers below the predominantly organic horizons or soil with little combustible material.
**Mobilization:** The process and procedures used by all organizations, federal, state and local for activating, assembling, and transporting all resources that have been requested to respond to or support an incident.

**Modular Airborne Firefighting System (MAFFS):** A manufactured unit consisting of five interconnecting tanks, a control pallet, and a nozzle pallet, with a capacity of 3,000 gallons, designed to be rapidly mounted inside an unmodified C-130 (Hercules) cargo aircraft for use in dropping retardant on wildland fires.

**Mop-up**: To make a fire safe or reduce residual smoke after the fire has been controlled by extinguishing or removing burning material along or near the control line, felling snags, or moving logs so they won’t roll downhill.

**Multi-Agency Coordination (MAC)**: A generalized term which describes the functions and activities of representatives of involved agencies and/or jurisdictions who come together to make decisions regarding the prioritizing of incidents, and the sharing and use of critical resources. The MAC is not a part of the on-scene ICS and is not involved in developing incident strategy or tactics.

**Mutual Aid Agreement**: Written agreement between agencies and/or jurisdictions in which they agree to assist one another upon request, by furnishing personnel and equipment.

**National Environmental Policy Act (NEPA)**: NEPA is the basic national law for protection of the environment, passed by Congress in 1969. It sets policy and procedures for environmental protection. It authorizes Environmental Impact Statements and Environmental Assessments to be used as analytical tools to help federal managers make decisions.

**National Fire Danger Rating System (NFDRS)**: A uniform fire danger rating system that focuses on the environmental factors that control the moisture content of fuels.

**National Wildfire Coordinating Group:** A group formed under the direction of the Secretaries of Agriculture and the Interior and comprised of representatives of the USDA Forest Service, Bureau of Land Management, Bureau of Indian Affairs, National Park Service, U.S. Fish and Wildlife Service and Association of State Foresters. The group's purpose is to facilitate coordination and effectiveness of wildland fire activities and provide a forum to discuss, recommend action, or resolve issues and problems of substantive nature. NWCG is the certifying body for all courses in the National Fire Curriculum.

**Nomex ®**: Trade name for a fire resistant synthetic material used in the manufacturing of flight suits and pants and shirts used by firefighters

**Normal Fire Season**: 1) A season when weather, fire danger, and number and distribution of fires are about average. 2) Period of the year that normally comprises the fire season.

**Operations Branch Director**: Person under the direction of the operations section chief who is responsible for implementing that portion of the incident action plan appropriate to the branch.

**Operational Period**: The period of time scheduled for execution of a given set of tactical actions as specified in the Incident Action Plan. Operational periods can be of various lengths, although usually not more than 24 hours.
**Overhead**: People assigned to supervisory positions, including incident commanders, command staff, general staff, directors, supervisors, and unit leaders.

**Pack Test:** Used to determine the aerobic capacity of fire suppression and support personnel and assign physical fitness scores. The test consists of walking a specified distance, with or without a weighted pack, in a predetermined period of time, with altitude corrections.

**Paracargo:** Anything dropped, or intended for dropping, from an aircraft by parachute, by other retarding devices, or by free fall.

**Peak Fire Season:** That period of the fire season during which fires are expected to ignite most readily, to burn with greater than average intensity, and to create damages at an unacceptable level.

**Personnel Protective Equipment (PPE)**: All firefighting personnel must be equipped with proper equipment and clothing in order to mitigate the risk of injury from, or exposure to, hazardous conditions encountered while working. PPE includes, but is not limited to: 8-inch high-laced leather boots with lug soles, fire shelter, hard hat with chin strap, goggles, ear plugs, aramid shirts and trousers, leather gloves and individual first aid kits.

**Preparedness:** Condition or degree of being ready to cope with a potential fire situation

**Prescribed Fire**: Any fire ignited by management actions under certain, predetermined conditions to meet specific objectives related to hazardous fuels or habitat improvement. A written, approved prescribed fire plan must exist, and NEPA requirements must be met, prior to ignition.

**Prescribed Fire Plan (Burn Plan)**: This document provides the prescribed fire burn boss information needed to implement an individual prescribed fire project.

**Prescription**: Measurable criteria that define conditions under which a prescribed fire may be ignited, guide selection of appropriate management responses, and indicate other required actions. Prescription criteria may include safety, economic, public health, environmental, geographic, administrative, social, or legal considerations.

**Prevention:** Activities directed at reducing the incidence of fires, including public education, law enforcement, personal contact, and reduction of fuel hazards.

**Project Fire**: A fire of such size or complexity that a large organization and prolonged activity is required to suppress it.

**Pulaski**: A combination chopping and trenching tool, which combines a single-bitted axe-blade with a narrow adze-like trenching blade fitted to a straight handle. It is useful for grubbing or trenching in duff and matted roots. It is well-balanced for chopping.
**Radiant Burn**: A burn received from a radiant heat source.

**Radiant Heat Flux**: The amount of heat flowing through a given area in a given time, usually expressed as calories/square centimeter/second.

**Rappelling**: Technique of landing specifically trained firefighters from hovering helicopters; involves sliding down ropes with the aid of friction-producing devices.

**Rate of Spread**: The relative activity of a fire in extending its horizontal dimensions. It is expressed as a rate of increase of the total perimeter of the fire, as rate of forward spread of the fire front, or as rate of increase in area, depending on the intended use of the information. Usually it is expressed in chains or acres per hour for a specific period in the fire's history.

**Reburn**: The burning of an area that has been previously burned but that contains flammable fuel that ignites when burning conditions are more favorable.

**Red Card:** Fire qualification card issued to fire rated persons showing their training needs and their qualifications to fill specified fire suppression and support positions in a large fire suppression or incident organization.

**Red Flag Warning**: Term used by fire weather forecasters to alert forecast users to an ongoing or imminent critical fire weather pattern.

**Rehabilitation:** The activities necessary to repair damage or disturbance caused by wildland fires or the fire suppression activity.

**Relative Humidity (RH)**: The ratio of the amount of moisture in the air, to the maximum amount of moisture that air would contain if it were saturated.

**Remote Automatic Weather Station (RAWS)**: An apparatus that will automatically acquire, process, and store local weather data for later transmission to the GOES Satellite, from which the data is re-transmitted to an earth-receiving station for use in the National Fire Danger Rating System.

**Resources**: 1) Personnel, equipment, services and supplies available, or potentially available, for assignment to incidents. 2) The natural resources of an area, such as timber, grass, watershed values, recreation values, and wildlife habitat.

**Resource Management Plan (RMP)**: A document prepared by field office staff with public participation and approved by field office managers that provides general guidance and direction for land management activities at a field office. The RMP identifies the need for fire in a particular area and for a specific benefit.

**Resource Order**: An order placed for firefighting or support resources.

**Retardant**: A substance or chemical agent which reduces the flammability of combustibles.

**Run (of a fire)**: The rapid advance of the head of a fire with a marked change in fireline intensity and rate of spread from that noted before and after the advance.

**Running fire**: A rapidly spreading surface fire; usually with a well-defined head.

**Safety Zone**: An area cleared of flammable materials used for escape in the event the line is outflanked or in case a spot fire causes fuels outside the control line to render the line unsafe. In firing operations, crews progress so as to maintain a safety zone close at hand allowing the fuels inside the control line to be consumed before going ahead. Safety zones may also be constructed as integral parts of fuel breaks; they are greatly enlarged areas which can be used with relative safety by firefighters and their equipment in the event of a blow-up in the vicinity.

**Scratch Line**: An unfinished preliminary fireline hastily established or built as an emergency measure to check the spread of fire

**Severity Funding**: Funds provided to increase wildland fire suppression response capability necessitated by abnormal weather patterns, extended drought, or other events causing abnormal increase in the fire potential and/or danger.

**Single Resource**: An individual, a piece of equipment and its personnel complement, or a crew or team of individuals with an identified work supervisor that can be used on an incident.

**Size-up**: To evaluate a fire to determine a course of action for fire suppression.

**Slash**: Debris left after logging, pruning, thinning or brush cutting; includes logs, chips, bark, branches, stumps and broken underscore trees or brush.

**Sling Load**: Any cargo carried beneath a helicopter and attached by a lead line and swivel.

**Slop-over**: A fire edge that crosses a control line or natural barrier intended to contain the fire.

**Smokejumpers**: A firefighter who travels to fires by aircraft and parachute.

**Smoke Management**: Application of fire intensities and meteorological processes to minimize degradation of air quality during prescribed fires.

**Smoldering Fire**: A fire burning without flame and barely spreading.

**Snag**: A standing dead tree or part of a dead tree from which at least the smaller branches have fallen.

**Spark Arrester:** A device installed in a chimney, flue, or exhaust pipe to stop the emission of sparks and burning fragments.

**Spot Fire**: A fire ignited outside the perimeter of the main fire by flying sparks or embers.

**Spot Weather Forecast**: A special forecast issued to fit the time, topography, and weather of each specific fire. These forecasts are issued upon request of the user agency and are more detailed, timely, and specific than zone forecasts.

**Spotter**: In smoke jumping, the person responsible for selecting the drop targets and supervising all aspects of dropping smokejumpers.

**Spotting**: A fire producing sparks or embers that are carried by the wind and start new fires beyond the zone of direct ignition by the main fire.

**Staging Area**: Locations set up at an incident where resources can be placed while awaiting a tactical assignment on a three-minute available basis. Staging areas are managed by the operations section.

**Strategy**: The science and art of command as applied to the overall planning and conduct of an incident.

**Strike Team**: Specified combinations of the same kind and type of resources, with common communications and a leader.

**Strike Team Leader**: Person responsible to a division/group supervisor for performing tactical assignments given to the strike team.

**Structure Fire**: Fire originating in, and burning any or all parts of buildings, shelters, or other structures.

**Suppressant**: An agent, such as water or foam, used to extinguish the flaming and glowing phases of combustion when directly applied to burning fuels.

**Suppression**: All the work of extinguishing or containing a fire, beginning with its discovery.

**Surface Fuels**: Loose surface litter on the soil surface, normally consisting of fallen leaves or needles, twigs, bark, cones, and small branches that have not yet decayed enough to lose their identity; also grasses, Forb, low and medium shrubs, tree seedlings, heavier branchiopod, downed logs, and stumps interspersed with or partially replacing the litter.

**Scamper**: A worker who assists Faller and/or sawyers by clearing away brush, limbs and small trees. Carries fuel, oil and tools and watches for dangerous situations. (2) A worker on a dozer crew, who pulls winch line, helps maintain equipment, etc., to speed suppression work on a fire.

**Tactics**: Deploying and directing resources on an incident to accomplish the objectives designated by strategy.

**Temporary Flight Restrictions (TFR)**: A restriction requested by an agency and put into effect by the Federal Aviation Administration in the vicinity of an incident which restricts the operation of nonessential aircraft in the airspace around that incident.

**Terra Torch ®**: Device for throwing a stream of flaming liquid, used to facilitate rapid ignition during burn out operations on a wildland fire or during a prescribed fire.

**Test Fire**: A small fire ignited within the planned burn unit to determine the characteristic of the prescribed fire, such as fire behavior, detection performance and control measures.

**Time lag**: Time needed under specified conditions for a fuel particle to lose about 63 percent of the difference between its initial moisture content and its equilibrium moisture content. If conditions remain unchanged, a fuel will reach 95 percent of its equilibrium moisture content after four time lag periods.

**Tolling of the Bells**: Before the telephone was commonplace, fire departments would use the telegraph to communicate. When a firefighter fell in the line of duty, the fire alarm office would tap out a signal. This was done for the purpose of notification, and as a sign of honor and respect for all firefighters who had made the ultimate sacrifice to serve their communities. This would be tapped out as five measured dashes, then a pause, then five measured dashes, then a pause, then five more measured dashes. Such symbolism has been a time-honored tradition, and is repeated at each service of a fallen firefighter.

**Torching**: The ignition and flare-up of a tree or a small group of trees, usually from the bottom up.

**Two-way Radio:** Radio equipment with transmitters in mobile units on the same frequency as the base station, permitting conversation in two directions using the same frequency in turn.

**Type**: The capability of a firefighting resource in comparison to another type. Type 1 usually means a greater capability due to power, size, or capacity.

**Uncontrolled Fire:** Any fire which threatens to destroy life, property, or natural resources.

**Under fire**: A fire that consumes surface fuels but not trees or shrubs.

**Vectors**: Directions of fire spread as related to rate of spread calculations (in degrees from up slope).

**Volunteer Fire Department (VFD)**: A fire department of which some or all members are unpaid.

**Water Tender**: A ground vehicle that is capable of transporting water.

**Weather Information and Management System (WIMS)**: An interactive computer system designed to accommodate the weather information needs of all federal and state natural resource management agencies. WIMS provides timely access to weather forecasts, current and historical weather data, the National Fire Danger Rating System (NFDRS), and the National Interagency Fire Management Integrated Database (NIFMID).

**Wet Line**: A line of water chemical retardant, sprayed along the ground that serves as a control line from which to ignite or stop a low-intensity fire.

**Wildland Fire**: Any non-structure fire, other than prescribed fire, that occurs in the wild.

**Wildland Fire Implementation Plan (WFIP):** A progressively developed assessment and operational management plan that documents the analysis and selection of strategies and describes the appropriate management response for a wildland fire being managed for resource benefits.

**Wildland Fire Situation Analysis (WFSA)**: A decision-making process that evaluates alternative suppression strategies against selected environmental, social, political, and economic criteria. It provides a record of decisions.

**Wildland Urban Interface**: The line, area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

**Wind Vectors**: Wind directions used to calculate fire behavior.

# Appendix 2: Southern Region of the National Weather Service Fire Weather Program Leaders and IMETs.

Southern Region Fire Weather Meteorologist: Paul Witsaman
819 Taylor Street, Room 10A26
Fort Worth, TX 76102
Phone: 817-978-1100 x116

1. Albuquerque, NM
Fire Weather Program Leader: Andy Church (IMET)
Phone: 505-244-9148

2. Amarillo, TX
Fire Weather Program Leader: Ken Schneider
Phone: 806-335-9022

3. Atlanta, GA
Fire Weather Program Leader:  Brian Lynn
Phone: 770-486-1133x241

4. Austin/San Antonio, TX
Fire Weather Program Leader: Constantine Pashos
Phone: 830-629-0205

5. Birmingham, AL
Fire Weather Program Leader: Mark Linhares
Phone: 256-621-5645

6. Brownsville, TX
Fire Weather Program Leader: Jason Straub
Phone: 956-504-3084

7. Corpus Christi, TX
Fire Weather Program Leader: Lara Keys
Phone: 361-289-0725

8. El Paso, TX
Fire Weather Program Leader: Tom Bird (IMET)
Phone: 575-589-3972

9. Fort Worth, TX
Fire Weather Program Leader: Vacant
Phone:  817-831-1595

10. Huntsville, AL
Fire Weather Program Leader: Steven Latimer
Phone: 256-890-8505

11. Houston/Galveston, TX
Fire Weather Program Leader: Kent Prochazka
Phone: 281-534-3876

**12. Jackson, MS**
**Fire Weather Program Leader: Nick Fenner**
**Phone: 601-939-2786**

13. Jacksonville, FL
Fire Weather Program Leader: Angela Enyedi
Phone: 904-741-5186

14. Key West, FL
Fire Weather Program Leader: Alan Albanese
Phone: 305-295-1316

15. Knoxville/Tri-Cities, TN
Fire Weather Program Leader: Tim Doyle
Phone: 423-586-8400

16. Lake Charles, LA
Fire Weather Program Leader: Kent Kuyper
Phone: 337-477-3422

**17. Little Rock, AR**
**Fire Weather Program Leader: Joe Goudsward (IMET)**
**Phone: 501-834-3955**

18. Lubbock, TX
Fire Weather Program Leader: Ron McQueen
Phone: 806-745-3980

19. Melbourne, FL
Fire Weather Program Leader: John Pendergrast (IMET)
Phone: 321-259-7618

**20. Memphis, TN**
**Fire Weather Program Leader: John Sirmon**
**Phone: 901-544-0357**

21. Miami, FL
Fire Weather Program Leader: Steve Ippoliti (IMET)
Phone: 305-229-4523

22. Midland/Odessa, TX
Fire Weather Program Leader: Greg Murdoch (IMET)
Phone: 915-563-6217

23. Mobile, AL
Fire Weather Program Leader: John Purdy
Phone: 251-633-5456

24. Nashville, TN
Fire Weather Program Leader: John Cohen
Phone: 615-754-8502

25. New Orleans, LA
Fire Weather Program Leader: Tim Destri
Phone: 985-649-0899

26. Oklahoma City/Norman, OK
Fire Weather Program Leader: Scott Curl
Phone: 405-325-3632

27. San Angelo, TX
Fire Weather Program Leader: Seth Nagle
Phone: 325-949-0715

28. San Juan, PR
Fire Weather Program Leader: Vacant
Phone: 787-253-4586

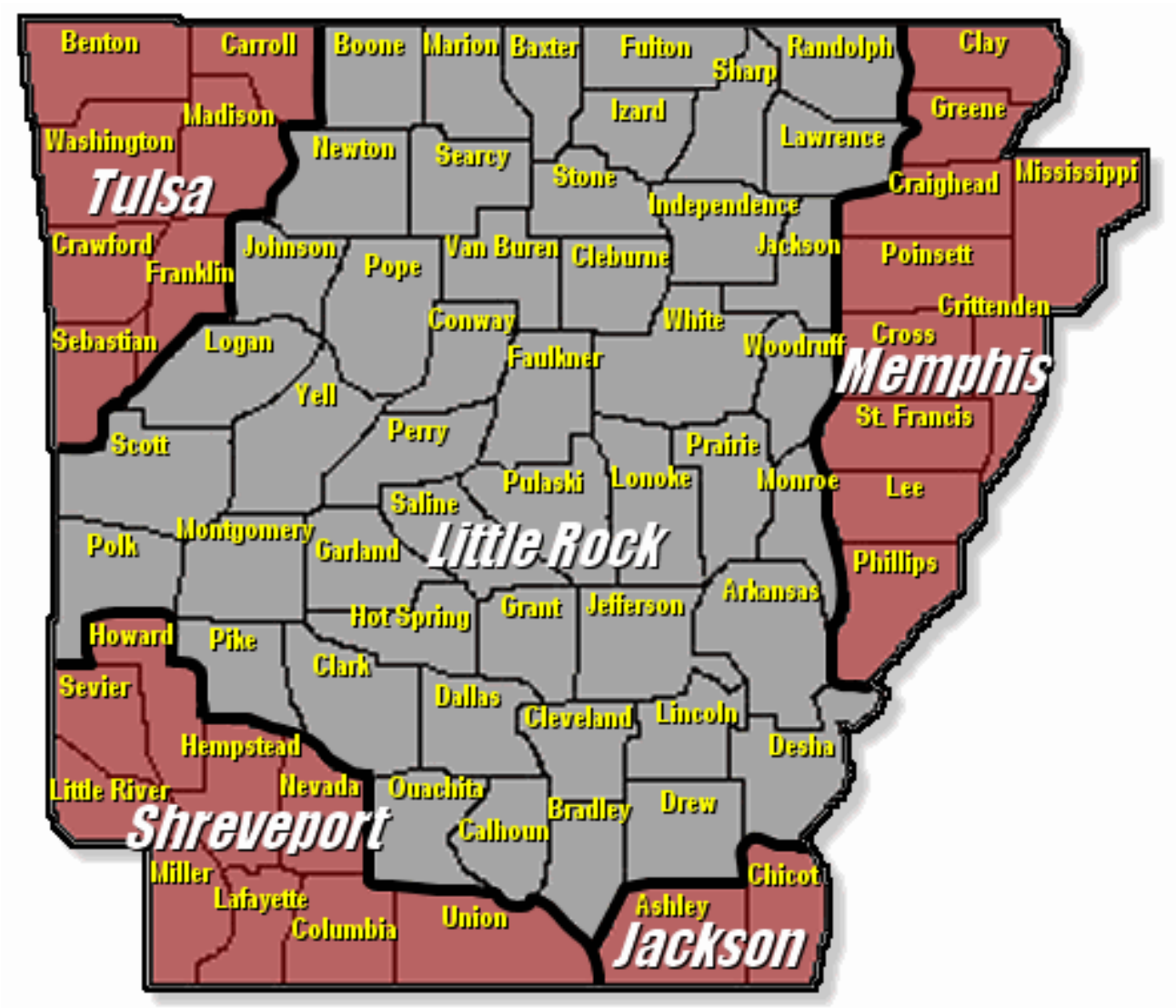
**29. Shreveport, LA**
**Fire Weather Program Leader: Matt Hemingway**
**Phone: 318-636-7345**

30. Tallahassee, FL
Fire Weather Program Leader: Tim Barry
Phone: 850-942-8835

31. Tampa Bay, FL
Fire Weather Program Leader: Rick Davis (IMET)
Phone: 813-641-2512

**32. Tulsa, OK**
**Fire Weather Program Leader: Craig Sullivan**
**Phone: 918-832-4116**

# Appendix 3: Fire Weather Areas of Responsibility



# Appendix 4: National Fire Plan

***NATIONAL AGREEMENT FOR METEOROLOGICAL SERVICES IN SUPPORT OF AGENCIES WITH LAND MANAGEMENT AND FIRE PROTECTION RESPONSIBILITIES***

**I. Introduction**

This National Agreement is between the National Weather Service (NWS) and agencies with land management and fire management responsibilities signatory to this agreement. They are referred to in this agreement as "NWS" and "USER AGENCIES," respectively. The User Agencies are responsible for the maintenance, improvements, and protection of the wildlands, owned or held in trust by the United States. Accurate and timely weather information is required to manage effectively and efficiently this valuable national resource. The NWS has the Expertise, organization, and legal charter to satisfy this need nationally. It is with this knowledge that this agreement is entered into. Its purpose is to combine resources so as to best serve the needs of the public and to fulfill the obligations of the respective agencies.

**II. Authority**

This agreement is authorized under the Economy Act (31 U.S.C. 686; 15 U.S.C. 313; 49 U.S.C. 1463) and the Cooperative Forestry Assistance Act of 1978 (16 U.S.C. 2101), etc.

**III. Objectives**

The objectives of this Agreement are to identify meteorological services to be provided, establish the interagency relationships, and define financial and other obligations of the NWS and User Agencies.

**IV. Responsibilities**

**A. National Weather Service**

Basic Meteorological services will be provided during normal working hours in accordance with Operating Plans for designated

NWS offices to the extent of NWS fire weather resources. NWS regional headquarters will identify to the User Agency headquarters a list of the designated fire weather offices on an annual basis. These services will be made available without cost and may include:

Routine daily fire weather forecasts
Outlooks and discussions

Weather observations
Red flag forecasts
Spot forecasts
Prescribed burn forecasts
Smoke management forecasts and information
Consultation and technical advice
Amendments / updates

Fire Weather Training -
The NWS recognizes the need for training in fire weather meteorology for NWS forecasters. To the extent of available resources, the NWS will meet this need.

Special meteorological services -
These services will be provided by designated NWS offices on a reimbursable basis as stated in Section IV B.
Weather observer training
Weather observation station visitations
Participation in User Agency training activities
Course development carried out at User Agency facilities
Classroom training
On-site meteorological services
Other special services

**B. User Agencies -**
The following services and resources will be provided by User Agencies:

Fire-management computer systems- Where existing fire management computer systems are locally available, access to the system will be provided.

Fire weather observations- Provide daily surface weather observations and enter data into fire management computer systems.

Provide all equipment, equipment maintenance, and inspection of weather observing sites.

Meet all travel and per diem costs associated with User Agencies' requests for visits of NWS personnel to weather-observing sites

Provide for collection of remote automatic weather systems data and entry into the fire management computer system.

Provide observations for site-specific and other special forecasts.

On-site meteorological support - Meet costs directly associated with on-site meteorological support by NWS personnel. This includes costs incurred by the backup NWS office.

Provide logistical and weather observation support to NWS personnel at on-site operations.

Provide access to telecommunication services where available.

Meet per diem and travel costs for NWS personnel participating in the conduct of User Agency training.

Provide technical assistance, instruction, and supporting material for NWS sponsored training sessions.

Other special services- User Agencies will provide logistics support and meet all overtime, travel, and per diem costs of NWS personnel associated with the provision of all other special services.

**C. Joint Responsibilities -**
NWS and User Agencies shall prepare an annual Operating Plan for individual fire weather office areas of responsibility. This plan will identify the basic weather services covered under Section IV.

**V. Procedures for requesting services**
Procedures for ordering services will be specified in Operating Plans for each NWS fire weather office.

**VI. Billing Procedures**
Costs to be recovered from User Agencies will be calculated on the basis of expense reports submitted to the NWS regional headquarters by field personnel. Copies of expense reports will be forwarded to appropriate User Agencies by NWS regional headquarters. This procedure will enable agencies to accurately determine costs to be reimbursed during a given fiscal year. Billing of User
Agencies will be accomplished by NWS regional submission of appropriate expense reports to the NOAA Reimbursable Division. Bills will include a statement of service rendered, dates it was provided, and location where provided. All questions relating to billing procedures, charges, current costs, and individual expense reports should be directed to the appropriate NWS regional contact or the NWS Technical Monitor.

**VII. Amendments**
Upon written notice, the terms of this Agreement are subject to amendment at any time by mutual agreement of the parties. The signatory agencies agree to consider expansion of this Agreement to cover areas of mutual concern, e.g., changing technology and improved procedures, as opportunities for such cooperation become available.

**VIII. Terms of National Agreement**
**1.** The terms of this Agreement shall become effective upon execution by NWS and any or all User Agencies and shall remain in effect until such times as the Agreement is terminated by mutual agreement. Any agency may withdraw at any time by ninety (90) days written notice to all parties.

**2.** This Agreement does not constitute a financial obligation for any party in excess of appropriations authorized by law and administratively allocated for the purposes intended.

**IX. Technical Monitor For NWS**
Fire Weather Program Manager, W/OM12
NOAA/National Weather Service
1325 East-West Highway
Silver Spring, MD 20910
Telephone: (301) 713-1677 ext. 131

**Definitions**
When the following terms are used in this Agreement or in an operating plan, such terms will have the meanings stated below.

**1. Fire Weather Office Operating Plan**
A procedural guide which describes the services provided within the area of a fire weather office's responsibility.

**2. Basic Meteorological Services**
Basic meteorological services are those state-of-the-science meteorological forecasts, warnings, observations, and statements produced in a designated NWS fire weather office during normal working hours.

**3. Fire Weather Zone or District**
A fire weather zone or district is the area of routine service responsibility as defined by the NWS. This area is usually defined by climatological factors, but may be modified somewhat to the administrative boundaries of the User Agencies.

**4. Normal Working Hours**
Normal working hours are defined in the Operating Plan, but usually cover 8-hour workdays, Monday through Friday, except during fire season when the normal hours cover 7 days a week

**5. Prescribed Fire**
Prescribed fire is a fire burning in wildland fuels according to a planned prescription and confined within planned boundaries for the purpose of achieving specific objectives of resource management. (Prescribed burning is the practice of prescribed fire use.)

**6. Red Flag**
Red flag is a program which highlights the onset of critical weather conditions conducive to extensive wildfire occurrences.

**7. Special Meteorological Services**
Meteorological services uniquely required by User Agencies which cannot be provided at a designated NWS fire weather office during normal working hours.

**8. Spot Forecasts**
Spot forecasts are site-specific weather forecasts. They are issued upon request of User Agencies for wildfire, prescribed burns, or special projects.

**9. On-site**
That special service which dedicates a fire weather forecaster to a wildfire, prescribed fire, or special project such that the fire weather forecaster is removed from providing basic services at his/her assigned weather office.

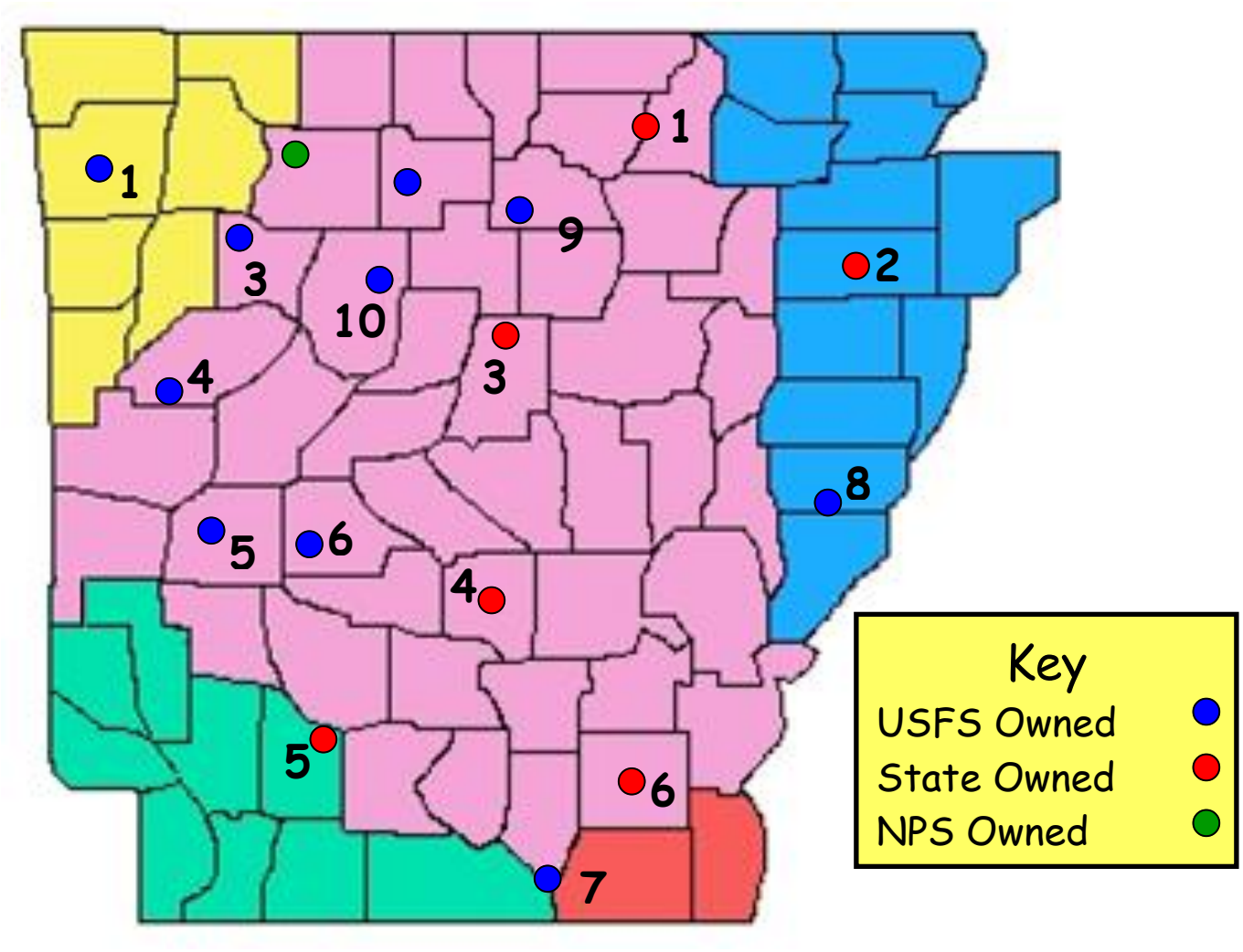
# Appendix 5: Fire Links

**National Weather Service Links:**
National Weather Service - http://www.weather.gov
National Weather Service Fire Weather Program- https://www.weather.gov/fire
National Fire Weather Products –
http://www.boi.noaa.gov/firewx.htm
Storm Prediction Center - http://www.spc.noaa.gov/products/fire_wx
NWS Little Rock - http://www.weather.gov/lzk/
NWS Shreveport - http://www.weather.gov/shv/
NWS Tulsa - http://www.weather.gov/tulsa/
NWS Jackson - http://www.weather.gov/jan/
NWS Memphis - http://www.srh.noaa.gov/meg/

**National and Regional Fire Weather Links:**
National Interagency Fire Center - http://www.nifc.gov/
Southern Area Coordination Center - http://www.gacc.nifc.gov/sacc/
USDA Forest Service Fire Site - http://www.fs.fed.us/wildlandfire/
National Park Service Fire Site - https://www.nps.gov/orgs/1965/index.htm
U.S. Fish & Wildlife Service Fire Site - https://www.fws.gov/fire/
USDA Wildland Fire Assessment System - https://www.wfas.net/
RAWS data server - https://raws.nifc.gov/
RAWS Climate Achieve - https://raws.dri.edu/

**Additional Links**:
Haines Index - https://www.wfas.net/index.php/haines-index-fire-potential--danger-34
Keetch-Byram Drought Index - https://www.wfas.net/index.php/keetch-byram-index-moisture--drought-49
Palmer Drought Index –
https://www.cpc.ncep.noaa.gov/products/monitoring_and_data/drought.shtml
8 to 14 day outlook – http://www.cpc.ncep.noaa.gov/products/predictions/814day/
30 day outlooks - http://www.cpc.ncep.noaa.gov/products/predictions/30day/
90 day outlooks -http://www.cpc.ncep.noaa.gov/products/predictions/90day/ Weather Calculator - http://www.srh.noaa.gov/lzk/html/metcalc.htm
Fire Danger Class - http://www.fs.fed.us/land/wfas/fd_class.gif
Observed Relative Humidity - http://www.fs.fed.us/land/wfas/rh.gif
Observed Temperature - http://www.fs.fed.us/land/wfas/temp.gif
Observed Wind Speed - http://www.fs.fed.us/land/wfas/ws.gif

# Appendix 6: Remote Automated Weather Stations and NFDRS Forecast Sites.




| USFS Owned | | State Owned |
|---|---|---|
| Point 1 | Strickler | Evening Shade |
| Point2 | Silver Hill | Poinsett |
| Point 3 | Devils Knob | Guy |
| Point 4 | Booneville | Sheridan |
| Point 5 | Oden | Bluff City |
| Point 6 | Jessieville | Monticello |
| Point 7 | Felsenthal | |
| Point 8 | St. Francis | **NPS Owned** |
| Point 9 | Blanchard Springs | Compton |
| Point 10 | Armstead Mountain | |

# Appendix 7: Contacts

**Arkansas Oklahoma Interagency Coordination Center**
110 Indiana Street
Hot Springs, Arkansas 71901
24 hour on call phone # 501-574-8758
AOICCdispatch@gmail.com
Phone: 501-321-5232
Fax: 501-627-0633
Center Manager: Tammy Milton
Assistant Center Manager: Kymberli Hoffman
Dispatcher: Darrell Barlow
Dispatcher: Luke Ballard

**USFS Fire Management Team**
Team Leader: Vacant
Phone: N/A
Asst. Team Leader Dan Martin:
Phone: 479-774-5793
Forest Aviation Officer: Kris Paxson
Phone: 479-964-7262
Fire Planner: Vacant
Phone: N/A
Native Program Coordinator: Vacant
Phone: N/A
Fire Admin: Sally Cross
Phone: 501-520-7297
Public Affairs Officer: Tracey Farley
Phone: 479-264-6869

**Southern Area Coordination Center – (SACC)**
1200 Ashwood Parkway; Suite 230
Atlanta, GA 30338
Phone: 678-320-3000
Fax: 678-320-3036
Meteorologist: Denver Ingram
Phone: 678-320-3008
Meteorologist: Kevin Scasny
Phone: 678-320-3009

**The Nature Conservancy**
601 North University Ave
Little Rock, AR 72205
Phone: 501-663-6699, Fax: 501-663-8332
Fire Manager: Kyle Lapham
Phone: 501-614-5074
Fire Restoration Fire Manager: McRee Anderson
Phone: 479-973-9001, ext 227

***State of Arkansas***
**Arkansas Forestry Commission**
3821 West Roosevelt Road
Little Rock, AR, 72204
Phone: 501-296-1940, Fax: 501-296-1949
Fire Information Officer: Vacant
Phone: N/A
State Forester: Joe Foxx
Phone: 501-296-1941
State Fire Chief: Vacant
Phone: N/A
Asst. Fire Chief: Bill Chaney
Phone: 501-296-1871
Firewise Coordinator: Kevin Kilcrease
Phone: 501-296-1872
Aviation manager: Michael Sellers
Phone: 501-296-1940

**Arkansas Forestry Commission Dispatch Center**
198 Airport Road
Malvern, AR 72104
Phone: 501-332-2000, Fax: 501-332-4447
Dispatcher: Sherry Russell
Phone: 501-332-2000

**U.S .Forest Service Fire Management Officer for Arkansas / Oklahoma**
**Joshua Graham – Call the AOICC for contact information**

***Ozark – St Francis National Forest***
605 West Main
Russellville, Arkansas 72801
Forest Supervisor: Craig McBroome
Phone: 479-964-7202
Safety Officer: Tim Holt
Phone: 479-747-8202
Haz Mat Specialist: Rosalie Colley

**Big Piney Ranger District - South**
*Hector Office:*
12000 SR 27
Hector, Arkansas 72843
Phone: 479-284-3150
Fire Management Officer: Mike Halstein

**Big Piney Ranger District -North**
*Jasper Office*
Highway 7 North - POB 427
Jasper, Arkansas 72641
Phone: 870-446-5122
Fire Management Officer: Mike Halstein

**Boston Mountain Ranger District**
1803 North 18th Street
Ozark, Arkansas 72949
Phone: 479-667-2191
Fire Management Officer: Cory Highfill

**Mt. Magazine Ranger District**
3001 East Walnut St.
Paris, Arkansas 72855
Phone: 479-963-3076
District Ranger: Ricky Williamson

**Pleasant Hill District**
2591 Highway 21 North
Clarksville, AR 72830
Phone: 479-754-2864
Fire Management Officer: Jeff Henderson

**St. Francis Ranger District**
2675 Highway 44
Marianna, Arkansas 72360
Phone: 870-295-5278
Fire management Officer: Clayton Swanger

**Sylamore Ranger District**
1001 E. Main St.
Mountain View, AR 72560
Phone: 870-269-3228
Fax: 479-295-3382
Fire Management Officer: Clayton Swanger

***Ouachita National Forest***
POB Box 1270 - Federal Building
Hot Springs, Arkansas 71902
Phone: 501-321-5202
Fax: 501-321-5353
Forest Supervisor: Norm Wagoner
Phone: 501-321-5275
Deputy Forest Supervisor: Shawn Cochran
Phone: 501-321-5274
Safety Officer: Ken Caraway
Phone: 501-321-5265

**Caddo / Womble Ranger District**
1523 Highway 270 East
Mt. Ida, Arkansas 71957
Fire Management Officer:
Phone: 870-867-2101
Fire management Officer: Vacant

**Mena / Oden Ranger District**
*Mena Office*
1063 Highway 71 North
Mena, Arkansas 71953
Phone: 479-394-2383
Fax: 479-394-2389
Fire Management Officer: Adam Strothers

*Oden Office*
POB 332
Oden, Arkansas 71966
Phone: 479-394-5595
Fax: 479-394-2383
Fire Management Officer: Adam Strothers

**Jessieville / Winona / Fourche Ranger District**
*Jessieville Office*
8607 N. Hwy 7 – PO Box 189
Jessieville, Arkansas 71949
Phone: 501-984-5313
Fire Management Officer: Wyatt Palin

*Winona Office* – Open Tuesday mornings only
1069 N. Fourche Ave
Perryville, Arkansas 72126
(Call the Jessieville Office)

*Fourche Office - Closed*
Danville, AR 72833
(Call the Jessieville Office**)**

**Cold Springs/ Poteau Ranger District**
*Cold Springs Office:*
2190 E. Main Street - POB 417
Booneville, Arkansas 72927
Phone: 479-637-4174
Fax: 479-675-3256
Fire Management Officer: Tim Nutley

*Poteau Office*
POB 2255
Junction of Hwy 71 & 248
Waldron, Arkansas 72958
Phone: 479-637-4174
Fire Management Officer: Tim Nutley

***US Fish and Wildlife Service***
**Big Lake National Wildlife Refuge**
P.O. Box 67
Manila, Arkansas 72442
Phone: 870-564-2429
Contact: Steve Rimer

**Cache River National Wildlife Refuge**
26320 Hwy 33 South Augusta, AR 72006
Phone: 870-347-2614
Project Leader: Keith Weaver

**Felsenthal National Wildlife Refuge**
5531 Hwy 82 W
Crossett, Arkansas 71635
Phone: 870-364-3167
Fire manager: Matthew Johnson

**Overflow National Wildlife Refuge**
3858 Hwy 8 E
Parkdale, Arkansas 71661
Phone: 870-473-2869
Contact: Ross Flagen

**Pond Creek National Wildlife Refuge**
1958 Central Road
Lockesburg, Arkansas 71661
Phone: 870-289-2126
Contact: Paul Gideon

**Wapanocca National Wildlife Refuge**
178 Hammond Ave
Turrell, Arkansas 72384
Phone: 870-343-2595
Refuge Manager: Jarrod Nance

**White River National Wildlife Refuge**
P.O. Box 205
St, Charles, Arkansas 72140
Phone: 870-946-1468
Contact: Bo Sloan

***US National Park Service***
**Buffalo National River**
402 North Walnut - Suite134
Harrison, Arkansas 72601
Phone: 870-365-2700
Fax: 870-365-2797
Fire Management Officer: Fenn Wimberly
Phone: 870-365-2766
Fire Specialist: Tony Collins
Phone: 870-577-2340

**Hot Springs National Park**
101 Reserve Street
Hot Springs, Arkansas 72901
Phone: 501-624-3383
Fax: 501-623-7310
Fire Coordinator: Steve Theisen

***Arkansas Game and Fish Commission***
1266 Lock and Dam Road
Russellville, Arkansas  72802
Phone: 877-967-7577
Fax: 479-967-5103

Prescribed Fire Manager: Randy Brents
Phone: 501-539-2559
Private Lands Biologist: Clint Johnson
Phone: 501-270-1926
Chief of Communications: Keith Stephens
Phone: 501-951-3562

# Appendix 8: Examples of Fire Weather Forecast Products

## Fire Weather Forecast

Issued by NWS Little Rock, AR

.Discussion... Precipitation will return to area starting tonight as a strong storm system kicks out of the western United States. While the majority of the state will see just a cold rain, some freezing precipitation can not be excluded especially across the higher elevations of the Ozarks. Dry weather returns early next week.

Pulaski-
Including the cities of Little Rock, North Little Rock, Sherwood, Maumelle, Jacksonville, and Wrightsville
353 PM CST Thu Jan 10 2019

| | Tonight | Fri | Fri Night | Sat |
|---|---|---|---|---|
| Cloud Cover | MCldy | Cloudy | Cloudy | MCldy |
| Chance Precip (%) | 0 | 80 | 90 | 70 |
| Precip Type | none | rain | rain | rain |
| Temp (24H Trend) | 31 (+3) | 41 (-3) | 35 | 47 |
| Mx/Mn RH% (24H Trend) | 87 (+13) | 66 (+28) | 99 | 85 |
| 20ftWnd-AM(MPH) | | E 1-5 | | SE 2-6 |
| 20ftWnd-PM(MPH) | E 0-4 | E 2-6 | E 2-6 | NE 2-6 |
| Precip Amount | 0.00 | 0.14 | 0.64 | 0.31 |
| Precip Duration | 0 | 7 | 11 | 9 |
| Mixing HGT(Ft-Msl) | | 2456 | | 1217 |
| Mixing HGT(Ft-Agl) | | 2121 | | 882 |
| Category Day | | 2 | | 1 |
| Transport Wnd (MPH) | | SE 12 | | W 16 |
| Dispersion Index | | 19 | | 14 |
| LVORI | 1 | | 1 | |
| Haines Index | 4 | 3 | 2 | 2 |
| Stability Class | E | D | D | C |
| Mix Hgt 500 (F) | | 38 | | 50 |

Remarks...None.

.Forecast for Days 3 Through 7...
.SUNDAY...Mostly cloudy. Slight chance of rain. Lows in the upper 30s. Highs in the mid 40s. Minimum RH 71 percent. Northwest winds 5 mph.
.MONDAY...Mostly cloudy. Lows in the lower 30s. Highs in the mid 40s. Minimum RH 61 percent. North winds 5 mph.
.TUESDAY...Mostly clear. Lows in the lower 30s. Highs in the lower 50s. Minimum RH 56 percent. Southwest winds 5 mph.
.WEDNESDAY...Partly cloudy. Lows in the upper 30s. Highs in the mid 50s. Minimum RH 59 percent. Southwest winds 5 mph.
.THURSDAY...Mostly cloudy. Slight chance of rain. Lows in the upper 30s. Highs in the mid 50s. Minimum RH 61 percent. East winds 5 mph.

ARZ007-014-015-023-061700-
/O.CON.KLZK.FW.A.0002.180306T1700Z-180307T0000Z/
Sharp-Stone-Izard-Van Buren-
251 AM CST Tue Mar 6 2018

...FIRE WEATHER WATCH IN EFFECT FROM 11 AM CST THIS MORNING THROUGH THIS AFTERNOON FOR FOR FIRE WEATHER ZONES 007, 014, 015, AND 023...

* AFFECTED AREA...Fire weather zones 007, 014, 015, 021, 022, 023, 030, 037, and 038.

* WIND...West to occasionally northwest winds will increase to 15 to 25 mph by late morning with gusts possibly in excess of 30 mph at times.

* HUMIDITY...Afternoon humidity is expected to drop to 20 to 25 percent Tuesday.

* IMPACTS...Any fires that develop will likely spread rapidly. Outdoor burning is not recommended.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

A Fire Weather Watch means that critical fire weather conditions are forecast to occur. Listen for later forecasts and possible Red Flag Warnings.

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Johnson-Pope-Logan-Scott-Yell-
251 AM CST Tue Mar 6 2018

...RED FLAG WARNING IN EFFECT FROM 11 AM THIS MORNING TO 6 PM CST THIS EVENING FOR FOR FIRE WEATHER ZONES 021, 022, 030, 037, AND 038...

The National Weather Service in Little Rock has issued a Red Flag Warning, which is in effect from 11 AM this morning to 6 PM CST this evening. The Fire Weather Watch is no longer in effect.

* AFFECTED AREA...Fire weather zones 007, 014, 015, 021, 022, 023, 030, 037, and 038.

* WIND...West to occasionally northwest winds will increase to 20 to 25 mph by late morning with gusts possibly in excess of 40 mph at times.

* HUMIDITY...Afternoon humidity is expected to drop to 20 to 25 percent Tuesday.

* IMPACTS...Any fires that develop will likely spread rapidly. Outdoor burning is not recommended.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

A Red Flag Warning means that critical fire weather conditions are either occurring now....or will shortly. A combination of strong winds...low relative humidity...and warm temperatures can contribute to extreme fire behavior.