

# **Fire Weather Services**

For

## **South Carolina**

---

### **Operating Plan**

**NWS Charleston, SC**

**NWS Columbia, SC**

**NWS Greenville-Spartanburg, SC**

**NWS Wilmington, NC**

**January 31, 2016**

---

This operating plan will be a semi-permanent document, specifying services provided by National Weather Service in South Carolina. The plan incorporates procedures detailed in the Interagency Agreement for Meteorological Services.

# Table of Contents

Introduction.....	- 4 -
Purpose of AOP.....	- 4 -
Explanation of relationship between AOP and MOU.....	- 4 -
Service Area and Organizational Directory.....	- 5 -
Service Area.....	- 5 -
National Weather Service Headquarters.....	- 6 -
National Weather Service Regional Headquarters.....	- 6 -
Weather Forecast Offices (WFO).....	- 6 -
Meteorologists-in-Charge (MIC).....	- 7 -
Program Leaders (or Focal Points).....	- 7 -
Participating Agencies.....	- 8 -
Services Provided by the National Weather Service.....	- 9 -
Basic Services.....	- 9 -
Fire Weather Planning Forecast (FWF).....	- 9 -
Update Criteria for the Fire Weather Planning Forecast.....	- 9 -
Parameter Definitions.....	- 10 -
Atmospheric Dispersion Index (ADI).....	-12-
Low Visibility Occurrence Risk Index (LVORI).....	-13-
Fire Weather Point Forecast Matrix (PFW).....	- 14 -
Fire Weather Area Forecast Matric (AFW).....	-15-
Site Specific Wildland Fire Forecasts (Spot Forecasts).....	- 15 -
Content.....	- 16 -
Procedures.....	- 16 -
National Fire Danger Rating System (NFDRS) Forecasts.....	- 16 -
Issuance.....	- 16 -
Contents.....	- 17 -
Fire Weather Watch and Red Flag Programs.....	- 17 -
Criteria.....	- 17 -
Content.....	- 18 -
SC Red Flag Fire Alert.....	- 18 -
SC Burn Ban.....	- 19 -
Fire Danger Statements and Blow-Up Alerts.....	- 19 -
Participation in Interagency Groups.....	- 19 -
Special Services.....	- 20 -
ATMU Services.....	- 20 -
Fire Weather Training.....	- 22 -
Other Special Services.....	- 22 -
Communications.....	-22-
Wildland Fire Agency Responsibilities.....	- 23 -
Operational Support and Predictive Services.....	- 23 -
Program Management.....	- 23 -
Monitoring, Feedback and Improvement.....	- 24 -
Technology Transfer.....	- 24 -
Agency Computer Resources.....	- 24 -
Fire Weather Observations.....	- 24 -
On - Site Support.....	- 25 -
Training.....	- 25 -

Joint Responsibilities.....- 25 -

Meetings between the NWS offices and the natural resource agencies.....- 25 -

Maintenance and Revision of the Annual Operating Plan.....- 26 -

Agreements on Services Provided.....- 26 -

Training.....- 26 -

Service Evaluation.....- 26 -

Numbering and archiving of observation stations.....- 26 -

Effective Dates on the AOP.....- 27 -

Signatory Page.....- 27 -

Appendices.....- 28 -

Interagency Agreement for the Meteorological Services.....- 28 -

Fire Weather Zone Maps.....- 28 -

Catalog of Fire Weather Observation Sites.....- 29 -

Record of Changes to the AOP.....- 30 -

# Introduction

## Purpose of AOP.

This Operating Plan serves as the official document governing the interaction and relationships between the National Weather Service offices that serve South Carolina, and the federal, state and local land management agencies in the state of South Carolina.

## Explanation of relationship between AOP and MOU.

This State Operating Plan is issued in lieu of a formal Memorandum of Understanding (MOU) between the National Weather Service, US Forest Service, SC Forestry Commission, and other land management agencies that rely on fire weather support. The plan will also outline forecast operations and services available to users. This includes products and formats, dissemination and coordination, and the responsibilities of the customers.

This Operating Plan will be the governing document for fire weather procedures and cooperation among the following agencies:

- National Weather Service
- US Forest Service
- National Park Service
- South Carolina Forestry Commission
- US Army, Department of Defense
- US Forest Service Savannah River
- US Fish and Wildlife Service
- The Nature Conservancy

This Operating Plan for Fire Weather Services conforms to the [Interagency Agreement for Meteorological Services](#) , valid from 2012 through 2017.

The Southern Area Mobilization Guide and the National Mobilization Guide further define the relationship between the wildland fire agencies and the NWS Incident Meteorologist.

## Partners, Customers and Users

Partners, customers and users shall be defined as any person, group, agency or body which uses the products and services provided by the NWS in support of fire operations.

# Service Area and Organizational Directory

## Service Area

The service area covered by this AOP is the entire state of South Carolina.

Forecast areas are tied to the "radar umbrella" of the WSR-88D Doppler Radar. The umbrella is the area which is covered by the radar volume scan. This means that forecasts are not bound by state political borders, although county borders are generally observed.

The [South Carolina forecast areas](#) are each covered by a different NWS Weather Forecast Office (WFO).

The counties covered by the WFO CHS (Charleston) include:

Allendale	Beaufort	Berkeley	Charleston
Colleton	Dorchester	Hampton	Jasper

The counties covered by the WFO CAE (Columbia) include:

Aiken	Bamberg	Barnwell	Calhoun
Chesterfield	Clarendon	Edgefield	Fairfield
Kershaw	Lancaster	Lee	Lexington
McCormick	Newberry	Orangeburg	Saluda
Sumter	Richland		

The counties covered by the WFO GSP include:

Abbeville	Anderson	Cherokee	Chester
Greenville	Greenwood	Laurens	Oconee
Pickens	Spartanburg	Union	York

The counties covered by the WFO ILM (Wilmington) include:

Darlington  
Horry

Dillon  
Marion

Florence  
Marlboro

Georgetown  
Williamsburg

## **National Weather Service Headquarters**

NWS Headquarters, located in Silver Spring, Maryland, establishes policies and coordinates the national fire weather program. The national program manager coordinates the program with the regional program managers. The national program manager also works with the national headquarters of the Federal forestry and land management agencies and the Association of State Foresters in determining overall forestry and land management requirements for meteorological support. The national program manager coordinates national training in forestry and fire weather for NWS forecasters.

## **National Weather Service Regional Headquarters**

Regional Headquarters manage the technical operational aspects of the fire weather program within each region. They also provide guidance and assistance to meteorologists-in-charge (MIC) on program operations and problems through Supplements to the National Directives System (NDS) and conferences. Regional Headquarters advise National Headquarters on matters pertaining to technical planning and operations. The regional program managers coordinate the regions' fire weather programs and advise the Regional Directors on the operational and administrative aspects of the regions' programs.

## **Weather Forecast Offices (WFO)**

Weather Forecast Offices prepare and disseminate forecast products for all sectors of the population, including those for the Fire Weather program. These offices are responsible for providing forecasts for user agencies within their County Warning and Forecast Area (CWFA). Most offices have a designated fire weather focal point or fire weather program leader.

The National Weather Service Weather Forecast Offices serving South Carolina will provide 24-hour, 365 days a year service. WFO's can be reached at:

**Charleston National Weather Service**  
**5777 South Aviation Avenue**  
**North Charleston, South Carolina 29406**

**Columbia National Weather Service**  
**2909 Aviation Way**  
**Columbia, South Carolina 29170**

**Greenville-Spartanburg National Weather Service  
1549 GSP Drive  
Greer, South Carolina 29651**

**Wilmington National Weather Service  
2015 Gardner Drive  
Wilmington, North Carolina 28405**

NOTE: Unlisted telephone numbers used for coordination cannot be listed here. All user agencies have been or will be provided voice and fax numbers to be used for official purposes only.

## **Meteorologists-in-Charge (MIC)**

The Meteorologists-in-Charge are responsible for the provision of adequate forestry and fire weather services for the offices' assigned areas of program responsibility. The MIC's will ensure that the focal points or program leaders are provided adequate time for user liaison and assistance activities.

**(Vacant), Columbia, SC**

**Michael Caropolo, Wilmington, NC**

**Michael Emlaw, Charleston, SC**

**Stephen Wilkinson, Greenville-Spartanburg, SC**

## **Program Leaders (or Focal Points)**

Fire weather focal points and program leaders are the "customer service representatives" for the program. The focal points or program leaders, as representatives of the MIC's, are in regular contact with land management agencies, helping them assess their meteorological needs, informing them of NWS products and services available to meet these needs, and educating them in the most effective use of the various NWS products and resources, including NOAA Weather Radio (NWR). Focal points and program leaders will work with users to utilize existing NWS products and services produced for other programs that could meet the requirements of wildland management. The focal points and program leaders are also tasked with ensuring staff meteorologists are trained and remain proficient in preparing forecast products for support of the fire weather program.

**Mike Proud, Columbia, SC**

**Josh Weiss, Wilmington, NC**

**John Tomko, Greenville-Spartanburg, SC**

**Bob Bright, Charleston, SC**

## **Participating Agencies**

The following agencies are participants of this operating plan:

**National Weather Service.**

**National Park Service.**

**Savannah River Site.**

**South Carolina Forestry Commission.**

**The Nature Conservancy.**

**United States Fish and Wildlife Service.**

**United States Forest Service.**

**U.S. Army, Department of Defense.**



# Services Provided by the National Weather Service

## Basic Services

### Routine Fire Weather Planning Forecasts (FWF)

[NWS Charleston, SC](#)

[NWS Columbia, SC](#)

[NWS Greenville-Spartanburg, SC](#)

[NWS Wilmington, NC](#)

## Background

Routine Fire Weather Planning Forecasts are issued twice per day, every day of the year, by 0700 LT in the morning, and preferably by 1500 LT in the afternoon (no later than 1600L). An updated FWF will be issued by 11 AM if the forecaster feels the forecast has become unrepresentative based on the criteria listed below. Customers should note that updates to the FWF will not be issued at any other time of the day. The FWF will be available from each NWS office's website. In the event of an internet outage, the customers may call the NWS offices, and have the forecast faxed to them.

## Suggested FWF Update Criteria

Standard Air Temperature: +/- 5 degrees F.

Relative Humidity: +/- 5%.

Wind Speed and Direction at 20 ft AGL: +/- 5 mph and/or 45 degrees.

Precipitation POP, duration and amount: same as for public zones. Note: duration guideline for NFDRS is +/- 2 hours.

Inversions: +/- 100 m or 328 ft.

Freezing Level: +/- 100 m or 328 ft.

Transports Winds: +/- 5 mph and/or 45 degrees.

Mixing Height: +/- 100 m or 328 ft.

Stability: Must be in correct category 90% of time.

Burn Category: One category of change.

Dispersion: One category of change.

Note: Forecasters should examine regional morning upper air soundings to assist with forecast update decisions.

## Content

The format of the Fire Weather Forecast is specified in [National Weather Service Directive 10-401](#). The forecast will start with a **headline** of **Red Flag Warnings** or **Fire Weather Watches** (or of meteorological trends), followed by a meteorological discussion. The forecast will then be broken down by zone groupings of counties expecting similar weather in the early forecast period (days one and two).

The morning forecast will include three periods; today, tonight, and tomorrow. The afternoon forecast will include four periods; tonight, tomorrow, tomorrow night, and the next day.

### **Fire Weather Forecast (FWF) Parameter Definitions**

**CLOUD COVER** or **CLOUD AMOUNT**: Represents the average sky condition over the specified area during the specified period. For example, “Clear” or “Sunny” indicates cloud cover < 10%; “Mostly Clear” or “Mostly Sunny” are used when cloud cover is ≥10% and <30%; “Partly Cloudy” or “Partly Sunny” are used when cloud cover is ≥30% and <60%; “Mostly Cloudy” is used when cloud cover is ≥60% and <80%; and “Cloudy” is used when cloud cover is ≥80%.

**CHANCE PRECIP**: Represents the chance (rounded to the nearest 10%) of measurable (≥ 0.01 inches) precipitation over the specified area during the specified period. Note: Drizzle and snow flurries are not considered measurable precipitation and thus will not be given a probability.

**PRECIP TYPE**: Represents the predominant precipitation type over the specified area during the specified period. Note: The only exception is when showers and thunderstorms are expected, as only thunderstorms will be designated as the precipitation type.

**MAX/MIN TEMP**: Represents the expected maximum (during the daytime period) and minimum (during the nighttime period) temperatures over the specified area.

MAX/MIN RH: Represents the expected maximum (during the nighttime period) and minimum (during the daytime period) relative humidity (%) over the specified area.

WND20FT2MIN/EARLY and WND20FT2MIN/LATE : Represents the 2-minute average wind speed (MPH) and direction 20 feet above the ground or vegetative cover. Wind direction is the direction the wind blows from. "Early" refers to the morning hours (before noon) during daytime period and also the evening hours (before midnight) during nighttime periods. "Late" refers to the afternoon hours during the daytime period and the pre-dawn (after midnight) hours during the nighttime period. Wind gusts, which are rapid fluctuations in wind speed of usually less than 30 seconds in duration, are indicated if expected. The highest probable wind gust will be preceded by a "G" and will usually only be included if they are 10 MPH or greater than the sustained wind speed.

PRECIP AMOUNT: Represents the precipitation amount (hundredths of an inch) whenever the chance of precipitation is  $\geq 20\%$ .

PRECIP DURATION: Represents the duration of measurable precipitation (hours) when the chance of precipitation is  $\geq 20\%$ .

PRECIP BEGIN: Represents the begin time (to the nearest hour) of measurable precipitation when the chance of precipitation is  $\geq 20\%$ .

NOTE: Only used by WFO CAE, WFO CHS and WFO GSP.

PRECIP END: Represents the end time (to the nearest hour) of measurable precipitation when the chance of precipitation is  $\geq 20\%$ .

NOTE: Only used by WFO CAE, WFO CHS and WFO GSP.

LAL: Represents the Lightning Activity Level, as defined below.

1: No thunderstorms.

2: Cumulus clouds are common, but only a few reach towering cumulus stage. A single thunderstorm must be confirmed in the rating area. The clouds mostly produce virga, but light rain will occasionally reach the ground.

3: Cumulus clouds are common. Swelling and towering cumulus cover less than 2/10 of the sky. Thunderstorms are few, but two or three must occur in the observation area. Light to moderate rain will reach the ground and lightning is infrequent.

4: Swelling cumulus and towering cumulus cover 2/10-3/10 of the sky. Thunderstorms are scattered, but more than 3 must occur in the observation area. Moderate rain is commonly produced and lightning is frequent.

5: Towering cumulus and thunderstorms are numerous covering more than 3/10 of the sky and occasionally obscure it. Rain is moderate to heavy and lightning is frequent and intense.

6: Same as #3, but dry (little to no rain reaching the ground).

**HAINES INDEX:** Represents the Haines Index, which is used to describe the stability of the atmosphere, with values ranging from 2 to 6. In the South Carolina Coastal Plain, Piedmont, and Foothills, "low elevation" is assumed for the calculation of the Haines Index. It utilizes the atmospheric temperature at 950 mb and 850 mb as well as taking into account the moisture levels (dew point depression) at 850 mb. In the South Carolina mountains, the "mid level" Haines Index is calculated using the temperatures at 850 and 700 mb, and the dew point depression at 850 mb.

**DSI:** Represents the Davis Stability Index, which is the maximum surface temperature (in deg C) minus the 850 mb temperature (in deg C). If the difference is <10 deg C, it is considered a Category 1 (stable); between 10 deg C and 14 deg C, it is considered a Category 2 (conditionally unstable); between 15 deg C and 17 deg C, it is considered a Category 3 (unstable); and >17 deg C, it is considered a Category 4 (absolutely unstable). Note: DSI is only computed for the daytime period.

**MIXING HGT:** Represents the mixing height, or the height (in feet above the ground) to which vigorous vertical mixing takes place. The Miller-Holzworth (dry adiabatic) method is used for determining mixing heights at all WFO's but CAE, where the vertical dew point profile is used. Offices serving South Carolina have agreed to attempt to keep mixing heights within 1000 feet of those of neighboring offices.

**DISPERSION:** Represents the begin and end times of the low-level (usually surface-based) inversion as well as the category of dispersion during this period based on the surface wind speed. The dispersion category gives a general indication of the state of the atmosphere with respect to its ability to disperse smoke. The categories are as follows: Very Poor (VP) or Poor (PO): 0-4 MPH winds, Fair (FA): 5-7 MPH winds, Good (GD): 8-9 MPH winds, Excellent (EX): ≥10 MPH winds. It is assumed that at least fair mixing is occurring in the evening prior to the onset of the nighttime inversion.

**NOTE:** Only used by WFO CAE and WFO CHS.

**ATMOSPHERIC DISPERSION INDEX (ADI):** A numerical index developed by Lavdas that incorporates stability and mixing height to determine dispersion. Stability class is determined using solar angle, ceiling and wind. The categories are as follows:

Very Poor (ADI 1-6): very frequent at night; represents the majority of nights in many locations.

Poor (ADI 7-12): stagnant at day, but near or above average at night.

Generally Poor (ADI 13-20): stagnation, if persistent, although better than average for a night value.

Fair (ADI 21-40): stagnation may be indicated if accompanied by persistent low wind speeds.

Generally Good (ADI 41-60): climatological afternoon values in most inland forested areas of the US fall within this range.

Good (ADI 61-100): typical case burning weather values are in this range.

Very Good (ADI > 100): but may indirectly indicate hazardous conditions.

NOTE: Early and late in each period, both day and night.

LOW VISIBILITY OCCURRENCE RISK INDEX (LVORI): A numerical index derived from ADI and relative humidity. It indicates the probability of visibility restriction caused by smoke and or fog, and is based on a study of traffic accidents in Florida. The categories are as follows:

- 1: Lowest proportion of accidents with smoke and/or fog reported (130 of 127,604 accidents, or just over 0.0010 accidents).
2. Physical or statistical reasons for not including in category 1, but proportion of accidents not significantly higher.
3. Higher proportion of accidents than category 1, by about 30 to 50 percent, marginal significance (between 1 and 5 percent).
4. Significantly higher than category 1, by a factor of 2.
5. Significantly higher than category 1, by a factor of 3 to 10.
6. Significantly higher than category 1, by a factor of 10 to 20.
7. Significantly higher than category 1, by a factor of 20 to 40.
8. Significantly higher than category 1, by a factor of 40 to 75.
9. Significantly higher than category 1, by a factor of 75 to 125.
10. Significantly higher than category 1, by a factor of 150.

NOTE: Early and late in each period, both day and night.

MINIMUM SURFACE VISIBILITY AND OBSTRUCTION (MIN VSBY): The minimum visibility at the surface, and the type of obstruction reducing it, if reduced. Only visibility values below 7 statute miles will be accompanied by an obstruction. Visibility of 7 to 10 miles is considered unrestricted.

NOTE: Only used by GSP, first two periods, early and late.

**INVERSION: BEGIN/END & BURNOFF TEMPERATURE:** Represents the temperature and time at which the morning inversion will burn off as well as the time it will set up in the evening. If the inversion is not surface-based (yet still at low levels, e.g. below 1000 ft), meteorological factors other than nighttime radiational cooling may be taking place and as such, inversion information may not be given ("Inversion" remains in the forecast through the day, which would be reflected by a low mixing height). Conversely, there will be situations when a low-level inversion does not develop at night and thus "NONE" will be noted. Other inversion notation includes CONT (for continued inversion), and TEMP/HHMM (when an inversion mixes out at local time HHMM).

**NOTE:** Used by WFO's ILM and GSP.

**INVERSION:** For daytime periods, this represents the time (in military time) at which the inversion (below 1000 feet) is expected to dissipate and for nighttime periods it represents when the inversion is expected to set up. Users should keep in mind that the inversion may not always be surface-based, but can still be below 1000 feet, especially during the morning burnoff and evening setup periods. Also, there will be situations when a low-level inversion does not develop at night, and thus "NONE" will be noted. This typically occurs when low-level winds are strong and the atmosphere is well-mixed such as during cold frontal passages. When an inversion is expected to continue through an entire period, the inversion will be noted as "CONT". This is most likely to occur in the winter when strong high pressure is in place.

**NOTE:** Only used by WFO CHS (and soon at WFO CAE).

**TRANSPORT WND:** Represents the transport wind, or the average wind direction and speed (MPH) from the surface to the top of the mixed layer (mixing height). Direction indicates where the wind is blowing from.

**VENT RATE:** Represents the ventilation rate (FT MPH), or the potential for the atmosphere to disperse smoke. It is computed by multiplying the mixing height by the transport wind. Ventilation rates are used to determine Burn Categories.

**WPA (Wind Profile Analysis):** Offices serving counties in North Carolina (GSP and ILM) may also include a wind profile analysis (March through May at GSP, year round at ILM), but will not include dispersion or burn category, since the values defining these elements differ from North Carolina to South Carolina.

At the bottom of the forecast for each forecast area (zone grouping), an extended forecast for days three through seven will be appended. This will include a forecast of winds and minimum relative humidity.

**Fire Weather Point Forecast Matrix (PFW)**

[NWS Greenville-Spartanburg, SC](#)

The Fire Weather Point Forecast Matrix (PFW) is a tabular-type product used by natural resource management personnel for decision support related to pre-suppression and other planning or resource management activities at or near a specific point. These points are predetermined by the customers, and are semi-permanent in nature, meaning they can be changed from time to time, but not on a daily basis.

#### **Product Overview and Issuance Criteria**

The PFW provides a detailed prediction of elements for three days out at 3-hour intervals, including smoke management parameters through day 2, and a more general 3 to 7 day forecast without smoke management parameters. The winds given in this forecast are not terrain corrected winds. The PFW is issued twice daily, once during the morning (between 3:00 and 6:30 AM), and the other during the afternoon (between 2:00 and 4:00 PM). For an example and information on decoding the product, click on [PFW Guide](#).

Note: Only issued by GSP and ILM.

### **Fire Weather Area Forecast Matrix (AFW)**

#### **[NWS Greenville-Spartanburg, SC](#)**

The Fire Weather Point Forecast Matrix (AFW) is a tabular-type product used by natural resource management personnel for decision support related to pre-suppression and other planning or resource management activities in a specific fire weather zone. These forecasts are produced for each individual fire weather zone, usually one county (example: Greenwood County), but in some cases a part of a county (example: Pickens Mountains), or parts of several counties (example: Great Smoky Mountains National Park, which is in Swain and Haywood Counties).

#### **Product Overview and Issuance Criteria**

The AFW provides a detailed prediction of elements for three days out at 3-hour intervals, including smoke management parameters through day 2, and a more general 3 to 7 day forecast without smoke management parameters. The winds given in this forecast are not terrain corrected winds. The AFW is issued twice daily, once during the morning (between 3:00 and 6:30 AM), and the other during the afternoon (between 2:00 and 4:00 PM). For an example and information on decoding the product, click on [AFW Guide](#).

Note: Only issued by GSP.

### **Site Specific Wildland Fire Forecasts (Spot Forecasts) (FWS)**

#### **Background**

Spot forecasts will be issued on request in support of wildfire and natural resource management. The forecasts are usually issued with a turn-around time of 30 to 60 minutes, unless the request is for the next day, in which case the fulfillment may be delayed until the date of ignition, depending on forecast workload and duty priorities. Requests can be submitted up to one day before a specified ignition time by utilizing the "NWS Spot" webpage available from each NWS office's website.

The spot forecast request page is nationally standardized, and prompts the customer for information about the location, elevation and size of the fire, as well as for observations and a contact phone number. Local, current observations are of critical importance, and allow the forecaster to modify the forecast based on elements such as wind speed and direction, temperature, and dew point. The customer can customize their request by selecting which elements they need and for which forecast periods. A "Remarks" section allows the customer to ask for additional forecast elements or time periods, highlight to the forecaster the most important element(s), and/or request a NOAA Hysplit Model trajectory forecast. Soon after the spot forecast request is submitted, the NWS will produce the forecast, and it will be made available from the same webpage. In case of an internet outage, the customer may fax in a request, using form [D-1](#).

## Content/Format

Spot forecasts typically cover three 12 hours periods (e.g., Today, Tonight, Tomorrow), but may cover few or more periods as the customer requests. Any forecast beyond day two will typically be an outlook.

The FWS format is specified in [National Weather Service Directive 10-401](#). There are essentially two FWS formats available: (1) narrative, and (2) tabular. The narrative format is generally in 12 hours blocks out to around 36 hours. The tabular format can provide detailed information on the individual parameters in 1, 2 or 3 hour increments. Due to a nationwide agreement between the NWS and various state and federal forestry agencies, the narrative format must be used to satisfy spot forecast requests for wildfires.

FWS's will be **headlined** for **Red Flag Warnings** or **Fire Weather Watches**. The forecast will then begin with a meteorological discussion, and will include any of the following information as designated by the requesting customer: sky/weather, temperature, relative humidity, wind direction and speed (20 ft, 2min), mixing height and transport wind. Additional elements such as inversion times, Atmospheric Dispersion Index (ADI) and Low Visibility Occurrence Risk Index (LVORI) may also be requested.

## National Fire Danger Rating System (NFDRS) Forecasts (FWM)

### Issuance



NFDRS forecasts will be issued for any predetermined site from which an NFDRS observation is received, provided the observation is received on time, is complete, and is deemed accurate. The land management agencies will determine which observation sites (normally RAWS sites) will be NFDRS sites. Initiation of NFDRS forecasts for a new site will be coordinated with the NWS, and the agency requesting new NFDRS service will provide the NWS with information about the site location.

## Contents

The format of the NFDRS Forecast is specified in [National Weather Service Directive 10-401](#). The NFDRS forecast will be a forecast of the next day observation at 1300 LST. The forecast will include expected state of weather, temperature, relative humidity, wind speed and direction ( to 16 points) at 1300 LST. The forecast also includes the expected lightning activity level for the next day and a half, the 24 hour maximum and minimum temperature and relative humidity, the 24 hour precipitation duration, and whether fuels will be wet (wet flag) at 1300 LST.

## Procedures

The land management agencies are responsible for taking, quality controlling, transmitting and archiving the NFDRS observations. Observation must be received at the NWS in a timely manner. Forecasts will only be prepared for predetermined sites, and only from those sites for which an observation has been received. The NWS will prepare and transmit the NFDRS forecasts no later than 4 PM. Although the data cutoff time for ingest into the NFDRS software is 7 PM, preliminary calculations based on the forecast are used by the land managers to make staffing decisions at shift briefing time (4 PM).

## **Fire Weather Watch and Red Flag Program (RFW)**

### **Criteria**

A Red Flag event is defined as a combination of high (or greater) fire danger and critical weather elements. For South Carolina, the two or more of the following weather criteria must be occurring or expected, in addition to high (or greater) fire danger. Wind criteria are for 10 meter, 2 minute average wind. A 10% reduction must be applied to the criteria when comparing against the FWF wind, which is a 20 ft 2 minute average wind.

Relative Humidity of 25% or less.

Sustained wind of 20 mph or greater, or gusts to 30 mph or greater.

Dry lightning.

A significant wind shift during times of active fire suppression.

Fire danger will be assessed by the land management agencies, and will be obtained from them by the National Weather Service.

If Red Flag criteria are occurring, or expected within 12 hours, a Red Flag Warning must be issued. A Fire Weather Watch will not be issued within 12 hours of an expected event, nor will it be used in lieu of a Fire Danger Statement for sub Red Flag criteria.

If Red Flag criteria are expected, between 12 hours and 24 hours, either a Red Flag Warning or Fire Weather Watch will be issued. The Red Flag Warning will remain in effect until the conditions abate or are no longer expected. The Fire Weather Watch will be upgraded to a Red Flag Warning within 12 hours of criteria being met, or will be cancelled.

If Red Flag criteria are expected within 24 to 72 hours, a Fire Weather Watch will be issued, and will remain in effect until the watch is upgraded to a Red Flag Warning, or conditions are no longer expected to develop.

Collaboration between the NWS and the land managers the day before an expected or possible event is critical. Normally, WFO CAE will lead the coordination with the SCFC and USFS anytime there are any concerns within the state, but individual WFO's need to make CAE aware of problems in their area.

## **Contents**

The format of the Red Flag Warning and Fire Weather Watch is specified in [National Weather Service Directive 10-401](#). A Red Flag Warning or Fire Weather Watch will begin with a headline stating which product is in effect, the area the product covers, and the meteorological reason why the product was issued.

## **Procedures**

Whenever the meteorological criteria for a Red Flag event are occurring or expected to occur within 72 hours, the NWS office will contact the land management agencies to obtain a determination of fire danger. If the combined fire danger rating and meteorological criteria warrant a Red Flag product, the NWS and land management agencies will reach a consensus on whether to issue the product, and for which areas at which times. Fire Weather Watches and Red Flag Warnings will be aired on NOAA Weather Radio.

## **SC Red Flag Fire Alert**

A Red Flag Fire Alert will be issued by the South Carolina Forestry Commission (SCFC) with the meteorological input from the NWS Forecast Office in Columbia. The Alert will be issued when conditions that support potentially destructive forest fires are worsening. It will continue in effect until the SCFC cancels it.

The NWS office in Columbia, South Carolina, will transmit Red Flag Fire Alerts for all of South Carolina, as a cooperative service to the SCFC. These will be delivered under the product header, Rangeland Fire Danger Statement. The text will be preformatted, with the body of the alert written by the SCFC. The SC Red Flag Fire Alert will be aired on NOAA Weather Radio.

## **SC Burn Ban**

A SC Burn Ban will be issued by the South Carolina Forestry Commission (SCFC). The Ban will continue in effect until the SCFC cancels it.

The NWS office in Columbia, South Carolina, will transmit the Burn Ban for all of South Carolina, as a cooperative service to the SCFC. This will be delivered under the product header, Rangeland Fire Danger Statement. The text will be preformatted, with the body of the alert written by the SCFC. The SC Burn Ban will be aired on NOAA Weather Radio.

## **Fire Danger Statements**

The NWS will issue a Fire Danger Statement when fire danger and/or fire occurrence is high, and weather conditions are near critical levels. Under these circumstances, land management agencies may request that the NWS issue a Fire Danger Statement or Blow-Up Alert. These statements will be issued in coordination with the requesting agency and will only be issued with their approval. The NWS will use the Special Weather Statement (SPS) for these issuances, with the headline "...Fire Danger Statement...", and the following call to action statement: "Please refer to your local burn permitting authorities on whether you can burn today. If you do burn...you are advised to use extreme caution." Fire Danger Statements will be aired on NOAA Weather Radio.

The following criteria will be used for Fire Danger Statements:

RH within 5% of Red Flag Criteria (30% or lower)

And

ASOS wind speeds or gusts within 5 MPH of Red Flag Criteria (sustained 15 MPH or gusts to 25 MPH)

And

Low fuel moisture as determined by land managers.

These criteria may be waived at the request of the land managers, typically for unusual or dangerous situations.

## **Participation in Interagency Groups**

The NWS and its customers will meet from time to time, for the purpose of reviewing the operational relationships agreed to in this plan, and as partners in other interagency meetings.

Meetings may be between one NWS office and all of its customers from several states, a state meeting of all NWS offices and fire weather customers within South Carolina, or a meeting conducted by a customer group with the NWS offices invited either individually or collectively.

Customers may at times invite NWS representatives to serve on an interagency group at either the state or national level. These groups may serve a variety of purposes, such as program review, service evaluation, scientific advisory, or joint decision making.

## **Special Services**

Special fire weather services are those services that are uniquely required by land management agencies and go beyond the normal forecast operations of the NWS. Special services include Incident Meteorologist (IMET) deployment using the All Hazards Meteorological Response System (AMRS), station visits, weather observer training, participation in user agency personnel training, outreach and other pertinent meteorological services.

There are a variety of ways that NWS personnel can be requested by land management agencies. Most requests can be made through the Fire Weather Program Leader or Meteorologist-in-Charge at the appropriate NWS Forecast Office. IMET support, for large wildfires, major all hazards incidents or other significant weather sensitive events (such as those with a Presidential or FEMA Declaration) should be placed through the South Carolina Interagency Coordination Center.

Typically, special services require NWS personnel to be away from the Forecast Office and will require user agencies to reimburse the NWS for expenses such as overtime, travel and per diem. For IMET support, reimbursable expenses include overtime, travel, per diem, equipment maintenance and transportation of the IMET and equipment.

For short term incidents or events, NWS personnel will provide temporary on-scene services when possible until either the short term incident or event ends, or the formal request for an IMET has been approved and the IMET arrives on-scene. Costs associated with NWS personnel on short term incidents will generally be covered by the personnel's home office with no reimbursement required by the land management agency.

Reimbursement of costs for special services will be as outlined in the [Interagency Agreement for Meteorological Services](#)

## **Advanced Technology Meteorological Unit (ATMU) Services**

The Advanced Technology Meteorological Unit (ATMU) is a modularized and mobile system of equipment used by an Incident Meteorologist (IMET) for data collection and product preparation. The ATMU is a national resource. There are 25 ATMUs cached around the country, mostly in the western states. The nearest [ATMU cache](#) to South Carolina is London, KY, where two are maintained.

The ATMU consists of two (2) modules. The first module contains a theodolite with tripod, a belt weather kit, Pibal weather balloons, a nozzle and regulator for a helium tank, and office supplies and miscellaneous expendables. Its volume is 13.8 cubic feet and it weighs 122 pounds.

The second module, known as the AMRS, contains a laptop computer, a satellite dish for obtaining weather data, and a printer. This module is also a national resource, but is located at the National Weather Service offices that have an IMET on station. The volume of the satellite dish is 13.8 cubic feet, and it weighs 122 pounds.

Requests for the ATMU, AMRS, and IMET should be made through the local Interagency State Coordination Center. Typically, the IMET nearest the incident will be deployed. However, during times of limited resources, IMETs from other areas of the country may be called. This decision will be made by the Special Meteorologist to NIFC (SMN) in conjunction with the MIC and IMET from the affected offices.

The mobilization of the ATMU, AMRS and the IMET is coordinated through the local State Interagency Coordination Center, the Southern Area Interagency Fire Cache, and the Southern Area Coordination Center (SACC). Demobilization is initiated at the incident, and coordinated through the Coordination Centers previously mentioned. For more specific information, reference the Southern Area and the National Interagency Mobilization Guides.

The requesting agency is 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, free of standing water or condensation, and must be heated and/or cooled sufficiently to allow efficient operation of equipment. Power (120V AC) must be provided for the ATMU's electrical equipment and priority telephone access during certain short periods each day must be made available.

Upon arrival at the incident and after going through the appropriate check-in procedures, the IMET will:

1. Brief the Fire Behavior Analyst (FBAN), Planning Section Chief (PSC), and the Incident Commander (IC) on current and expected weather as it affects the fire.
2. Establish a schedule with the IC and the FBAN for written forecasts and formal briefings.
3. Request a briefing of the fire situation and potential behavior problems from the FBAN. As time and resources permit, incident management should arrange for

an aerial inspection trip for the meteorologist and should provide the forecaster with current fireline maps. If possible, the IMET should be assigned a radio with the fireline frequency.

4. Arrange for a schedule of observations from key points around the fire and from nearby lookouts and fire danger stations, in cooperation with the FBAN and PSC. On large fires, some personnel (at least two) should be permanently assigned to this duty. On smaller fires, this information can be provided by Division Supervisors equipped with belt weather kits.

## **Fire Weather Training**

NWS meteorologists will be available to assist in user-oriented training, such as at fire behavior schools (e.g. S-290), and weather related courses. Requests should be made through the Meteorologist-in-Charge as early as possible after dates for such training have been determined.

## **Other Special Services**

Other special services include weather station visits by user agency personnel, weather observer training, and course development work. These activities would typically be at the full expense of the requesting agency unless other arrangements have been made.

## **Communications**

The primary means of communication used by the NWS is Advanced Weather Interactive Processing System (AWIPS). Products transmitted through AWIPS include: pre-suppression forecasts, Fire Weather Watches, Red Flag Warnings, Fire Danger statements, and NFDRS station forecasts.

Spot forecasts will be disseminated to the requesting agency by means of the internet, with telefax (FAX) as a backup. Anytime a request for a spot forecast is made by fax, the requesting agency must include a FAX number. A voice number should also be included in the event problems or questions arise with the request, the forecast, or the transmission.

Public products produced by the National Weather Service are available over NOAA Weather Radio (NWR). As of January 31, 2012, the following NWR transmitters service [South Carolina: \(map\)](#)

Site, Call Sign, Frequency, NWS Office:

BARNWELL, KHC29, 162.500, COLUMBIA, SC  
BEAUFORT, WXJ23, 162.450, CHARLESTON, SC  
CHARLESTON, KHB29, 162.550, CHARLESTON, SC  
CHERAW, WXK90, 162.450, COLUMBIA, SC

COLUMBIA, WXJ20, 162.400, COLUMBIA, SC  
CONWAY/MYRTLE BEACH, KEC95, 162.400, WILMINGTON, NC  
CROSS, WXM93, 162.475, CHARLESTON, SC  
FLORENCE, WXJ22, 162.550, WILMINGTON, NC  
GEORGETOWN, WNG628, 162.500, WILMINGTON, NC  
GREENVILLE, WXJ21, 162.550, GREENVILLE/SPARTANBURG, SC  
KIRKSEY, KHC28, 162.425, GREENVILLE/SPARTANBURG, SC  
ORANGEBURG, KHA35, 162.525, COLUMBIA, SC  
ROCK HILL, KHC27, 162.425, GREENVILLE/SPARTANBURG, SC  
SUMTER, WWG77, 162.475, COLUMBIA, SC

AUGUSTA, GA, W XK54, 162.550, COLUMBIA, SC  
CLAYTON, GA, KXI81, 162.450, GREENVILLE/SPARTANBURG, SC  
SAVANNAH, GA, KEC85, 162.400, CHARLESTON, SC  
TOCCOA, GA, WWH24, 162.425, GREENVILLE/SPARTANBURG, SC  
WAYNESBORO, GA, WXM88, 162.425, COLUMBIA, SC

CHARLOTTE, NC, WXL70, 162.475, GREENVILLE/SPARTANBURG, SC  
SAINT PAULS, NC, WXL50, 162.475, WILMINGTON, NC  
BADIN, NC, WWF60, 162.425, RALEIGH/DURHAM, NC

Other means of communications may be utilized upon mutual agreement with user agencies.

# **Wildland Fire Agency Responsibilities**

## **Operational Support and Predictive Services**

### **Program Management**

The wildland fire agencies will oversee the fire weather observation program, including the siting and maintenance of the observing equipment, fire weather training of their personnel, and the proficiency of their personnel in the use of the NWS Spot software.

## Monitoring, Feedback and Improvement

Land management agencies will monitor the quality and timeliness of NWS fire weather products, and provide feedback the NWS in order to improve services to the agencies.

## Technology Transfer

The wildland fire agencies may, from time to time, advise the NWS of new technologies being implemented to monitor meteorological or fuel parameters, or to improve communication, coordination, training, or reference. Wildland fire agency personnel may, with prior arrangement, visit an NWS office to acquire a knowledge of NWS technologies used in the monitoring of weather, or the preparation of products.

## Agency Computer Resources

Internet will be the primary method of obtaining the Fire Weather Forecast, Red Flag Warning, Fire Weather Watch, and for both requesting and receiving a Spot Forecast. As a backup method, a request can be made to the weather service for a product to be faxed to the customer agency. NFDRS observations will be entered into WIMS, and forecasts and calculations based on these observations will be received by WIMS, or by internet via a WIMS website.

## Fire Weather Observations

Fire weather observation stations provide the specialized weather observations for fire weather forecasts, wildfire control and suppression, and various other land management operations. These stations were selected very carefully in each state and federal district. Sites were chosen to represent homogeneous weather conditions across a district. Stations may either be manned sites operated by land management agencies, or unmanned, Remote Automatic Weather Stations (RAWS) maintained by any of the federal or state land management agencies in the area.

All observation stations are assigned a 6-digit identification/location number. The first two digits indicate the state, the second two digits indicated the county, and the last two digits indicated the consecutively-assigned station number for that county. Land managers who wish to have a number assigned to a station should contact the GACC meteorologist at SACC in Atlanta.

RAWS stations are also assigned an 8 character alphanumeric identifier based on satellite transmission time (the DCP number, issued by the National Environmental Satellite Service (NESS)).

Observations from a satellite telemetered RAWS will automatically flow into WIMS via the NESDIS ID. The RAWS owner may enter WIMS and manually change a recorded observation (a type R ob) to an observed observation (a type O ob), to enter the state of



the weather. Otherwise, software will automatically employ the Nelson Algorithm to determine the state of the weather, and the observation will remain a type R. Any observation for which no 1300 LST data is available will use the 1200 LST data, and will remain a type R observation, with no state of the weather encoded.

Even with automated state of the weather in observations, the responsibility still rests with the RAWS owner to ensure that observations are being transmitted, recorded, and archived properly in WIMS. Automation has greatly simplified the daily process, however there is still the need for observations to be checked for integrity and consistency. Managing the NFDRS model parameters will still be manual process in WIMS. Automation of state of the weather has helped streamline the WIMS collective that is distributed to the NWS via AWIPS. NFDRS forecasts are based on RAWS observations that appear on the daily collective.

Sensor failure will often result in erroneous or (at best) suspicious values. If the NWS becomes aware of such a situation, it is prudent to contact the station owner. Similarly, if a station owner becomes aware of sensor failure, he should relay that information to the appropriate NWS office. It is that stations owner's responsibility to make sure that their station is and remains in good working order and that repairs are made in a timely manner. Owners of NFDRS stations can still (and should) correct any errors in their respective observations.

## On - Site Support

The user agencies are also responsible for maintaining observation site equipment. NWS personnel may accompany the user on maintenance trips or for annual inspection visits, which could also serve as liaison with the users.

## Training

The responsibility of training land management agency employees will be that of the agencies themselves. However, the NWS will be available to assist when requested to do so. Any expenses incurred by the NWS will normally be charged to the user agency, unless other arrangements have been made.

# Joint Responsibilities

Joint responsibilities include the following:

## Meetings Between the NWS Offices and the Land Management Agencies

At least one statewide meeting should be attempted each year, usually coordinated by the NWS State Liaison Office in Columbia. Individual NWS offices normally conduct a meeting with all of their customers, from all affected states, either each year or every other year.

## **Maintenance and Revision of the SC Annual Operating Plan**

The AOP should be revised each year by the end of January, with cooperation and participation from each NWS office and land management agency.

## **Agreements on Services Provided**

Agreements are normally reached at statewide meetings, but may be achieved by a series of local meetings or by other means such as telephone or e-mail. NWS offices and land managers should be aware of the ripple effect an agreement might have on other NWS offices or customers.

## **Training**

Land management agencies and the NWS collaborate on training of personnel in each other's fields of expertise, operations, and equipment. Visits to offices and work centers, as well as field job sites can meet part of these training requirements.

## **Service Evaluation**

Services provided by the NWS, and delivery of observations and information from the land management agencies to the NWS in support of these services, shall be under constant evaluation by both parties.

## **Numbering and Archiving of Observation Stations**

The GACC, when requested to do so by a land management agency, shall assign a station ID number for fire weather observation platforms.

The land management agency will provide the station name, location (county, latitude, and longitude), and elevation to the GACC meteorologist.

The GACC meteorologist will assign the number and assist the station owner in establishing a station catalog in WIMS.

The numbering convention uses a six digit number, starting with 38 (for SC). The following two digit number designates the county, and the counties are numbered from 01 in the northwest, to 46 in the southeast. Due to a past mistake made in numbering,

the far southeastern portion of the state does not follow the convention to the letter, but the traditional number have been preserved in the master map.

The GACC meteorologist is responsible for maintaining a database of RAWS stations in his area. This information can be provided to the NWS regional program manager upon request.

The master list for the state will be the list included in the appendix of this operating plan, which will be updated at least annually with any new or changed stations. A copy of the county numbering map for the state of SC will be kept on file at the GACC and each NWS office serving SC.

## **Effective Dates on the AOP**

The effective dates of this South Carolina Annual Operating Plan will be from January 1 through December 31 of the current calendar year. This plan will be subject to review and revision by all signatory parties each year, or more frequently as operations warrant.

The plan will be available on the fire weather homepage of each NWS office in SC. A copy will be forwarded to NWS Eastern Region Headquarters by Jan 31 of the current year. NWS Eastern Region will forward a copy to NIFC and NWS Headquarters.

## **Signature Page**

**The following signatories have accepted this Annual Operating Plan for South Carolina, dated January 31, 2015. Terms and conditions in this plan are subject to review by the National Weather Service and the land management agency customers on at least an annual basis, or more frequently as operations require.**

John Tomko, Fire Weather Program Leader, NWS Greenville-Spartanburg, SC

## **Appendices**

**Interagency Agreement for the Meteorological Services in Support of Agencies with Land and Fire Management Responsibilities [\(Click Here\)](#)**

**Fire Weather Zone Maps**

Fire weather zones in South Carolina will consist of individual counties or groups of counties. These groupings will be dictated by meteorological conditions, may change with each forecast issuance, and may contain counties in adjacent states served by the forecast office. Normally, zone groupings are associated with climatologically homogeneous areas, even with current meteorological reasoning taken into account.

For a map of the SC fire weather zones, [click here](#).

For a map of the NWS offices serving SC, and the counties they serve, [click here](#).

## **Catalog of Fire Weather Observation Sites**

[\(Click here for map\)](#)

Name (Agency), County, Station Number, Latitude, Longitude,  
Elevation

ACE BASIN (USFWS), Charleston Co., 380102, 32.6583 N, 80.3989 W, 9'

ANDREW PICKENS (USFS), Oconee Co., 380102, 34.8083 N, 83.1275 W, 1669'

CAROLINA SANDHILLS NWR (USFWS), Chesterfield Co., 381201, 34.6520 N,

80.2792 W, 394'

CONGAREE NP (NPS), Richland Co., 382603, 33.4600 N, 80.4700 W, 150'

FORT JACKSON DOD FIRE TOWER (DOD), Richland Co., 382601, 34.0217 N, 80.8677 W, 540'

KINGS MOUNTAIN (NPS), Cherokee Co., 380601, 35.1456 N, 81.4022 W, 820'

LONG CANE (USFS), Edgefield Co., 382301, 33.9228 N, 82.1426 W, 383'

MARION 01 (SCFC), Marion Co, 382901, 34.1858 N, 79.3362 W, 93'

SANTEE NWR (USFWS), 383401, Clarendon Co., 33.5575 N, 80.4414 W, 78"

SAVANNAH NWR (USFWS), Jasper Co., 384201, 32.1694 N, 81.1144 W, 10'

SAVRAW (USFS/SRS), Barnwell Co., 383701, 33.3600 N, 81.6800 W, 310'

SAVRIV (USFS/SRS), Aiken/Barnwell Co., 383101, 33.3331 N, 81.5917 W, 275'

WALTERBORO (SCFC), Colleton Co., 384601, 32.9238 N, 80.6307 W, 24'

WAMBAW (USFS), Charleston, Co., 384102, 32.9742 N, 79.6686 W, 19'

WEIR TOWER (DOD), Richland Co., 382604, 34.0217 N, 80.8678 W, 548'

WHITMIRE (USFS), Union Co., 380902, 34.5380 N, 81.5619 W, 383'

WITHERBEE (USFS), Berkeley Co., 384002, 33.1611 N, 79.8292 W, 51'

## **Record of Changes to the AOP**

October 2006:

Noted in Services that the spot forecast format may be tabular.

January 2007:

Noted in Wildland Fire Agency Responsibilities the upcoming automation of R to O

type NFDRS observations.

Made detailed descriptions of forecast parameters in Services Provided by the National Weather Service, and made active links to each NWS office.

February 2008:

Added a call to action statement for the Fire Danger Statement.

January 2009:

Changed dispersion information for CHS, and added information about ADI and LVORI, under Service Provided by the National Weather Service.

January 2010:

Updated the National Interagency Agreement for Meteorological Services to the 2008 - 2012 version. Added a map of RAWS Stations. Corrected the location of some RAWS sites. Added information on the Fire Weather Point Forecast Matrix (PFW).

January 2011:

Added ACE BASIN RAWS, and corrected locations and elevations of several RAWS sites in Appendix. Added Minimum Visibility and expanded definition of mixing height in Planning Forecast section of Services.

January 2012:

Added section on the experimental AFW produced by WFO GSP, with a link to the AFW guide. Changed Wilmington, NC FPL from Ron Steve to Josh Weiss.

January 2013:

Change the Interagency Agreement link to the latest version. Made the 2013 AOP CMS compatible. Reviewed locations of RAWS sites, and added updated RAWS map.

January 2014:

Reorganized Red Flag Warning and Fire Weather Watch time criteria for easier comprehension. Added WFO ILM to list of offices issuing the PFW. Clarified criteria for Fire Danger Statements.

January 2015:

Made changes to dates of AOP. Updated links to NWR sites and maps. Added information on importance of weather observations for spot forecasts.

January 2016:

Made changes to list of Meteorologists in Charge due to recent retirements. Added state agreement on Mixing Height discrepancies.