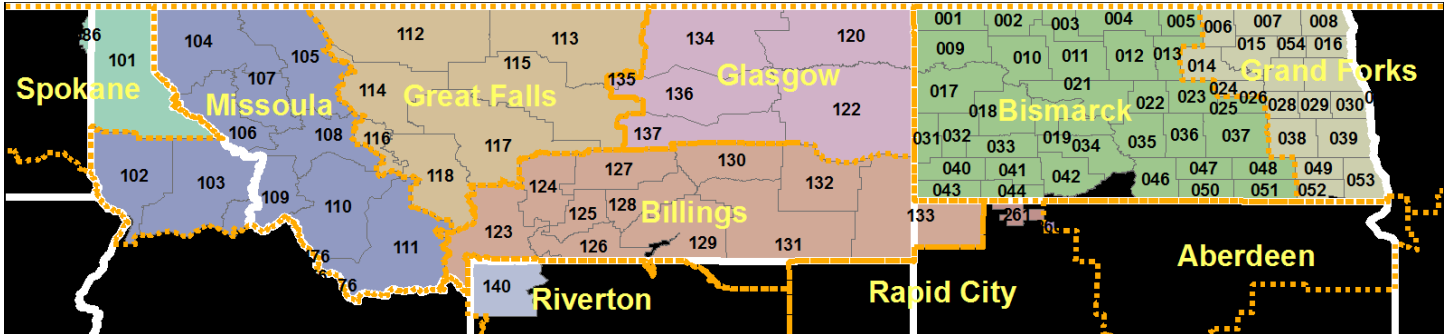


# Northern Rockies Annual Fire Weather Operating Plan

## 2022



[NWS Billings](#)  
[NWS Bismarck](#)  
[NWS Glasgow](#)  
[NWS Grand Forks](#)  
[NWS Great Falls](#)  
[NWS Missoula](#)  
[NWS Riverton](#)  
[NWS Spokane](#)  
[Northern Rockies Predictive Services](#)

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USDA Forest Service  
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Montana Sheriff's and Peace Officer's Assoc.

Date: 04/19/2022

Date: 04/19/2022

# **CHANGES**

TO THE

## **NORTHERN ROCKIES ANNUAL FIRE WEATHER OPERATING PLAN**

Following are changes to the common section of the National Weather Service Northern Rockies Annual Fire Weather Operating Plan.

- Updated contact information for the NR WIMS coordinator
- Otherwise, custodial updates

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For Local Information See Individual Office Sections

[Billings](#), [Bismarck](#), [Glasgow](#), [Grand Forks](#), [Great Falls](#), [Missoula](#), [Riverton](#), [Spokane](#), [NR GACC](#)





## **INTRODUCTION**

The Northern Rockies Fire Weather Operating Plan is a joint effort between land management agencies of the Northern Rockies Geographical Area, the Northern Rockies Predictive Services Unit (PSU) and the National Weather Service (NWS) offices in Billings, Bismarck, Glasgow, Grand Forks, Great Falls, Missoula, Riverton, and Spokane. The purpose of this plan is to coordinate the NWS and PSU products and services provided to the land management community. Representatives of the National Weather Service and the Northern Rockies Geographic Area will sign this document annually each spring.

This Operating Plan contains a "Common Section" and an "Individual Office Section." The Common section pertains to the products and services that are completed in a generally consistent and uniform manner. The Individual Office Section contains information unique to each office such as contact points, office location, and area maps.

## **FIRE WEATHER PRODUCTS**

National Weather Service (NWS) offices provide a suite of scheduled and unscheduled meteorological products to support land management agencies. Scheduled products may include daily planning forecasts, outlooks, discussions, and numerical forecasts. These are generally produced for spring burning, wildfire season and fall burning. Unscheduled products include fire weather watches, red flag warnings, and spot forecasts. These are available upon request 24 hours a day throughout the year.

The Predictive Services Unit (PSU) will provide daily, medium-range, and long-range fire weather, fire danger, and resource outlooks for use in tactical and strategic planning. These outlooks will complement forecast products provided by the NWS.

The Billings, Bismarck, Glasgow, Grand Forks, Great Falls, Missoula, Riverton, and Spokane NWS offices will issue detailed forecasts to fire control agencies in the area encompassing Montana, North Dakota, portions of north central Idaho, northwest South Dakota, and extreme northwest Wyoming. The descriptions of the fire weather districts can be found in the individual sections for each office. Agencies served include: USDA Forest Service, Bureau of Land Management, Bureau of Indian Affairs, National Park Service, United States Fish and Wildlife in Montana and Idaho, Divisions of Environmental Quality, the States of Montana and Idaho, and county and local agencies.

## FORECAST TYPES

1. [Morning and Afternoon Planning Forecasts](#)
2. [Spots](#)
3. [Red Flag Warnings and Fire Weather Watches](#)
4. Updates to all scheduled products as conditions warrant
5. [Numerical Forecasts for NFDRS](#)
6. [Smoke Dispersion Graphics](#)

## FORECAST DISSEMINATION

- Narrative forecasts, numerical forecasts, forecast updates, Red Flag Warnings, and Fire Weather Watches will be available on the Internet and will also be entered into the Weather Information Management System (WIMS).
- Spot Forecasts will be disseminated via the Internet; backup will be phone and fax.

## OFFICE BACKUP

<b>Office Primary Backup Secondary Backup</b>		
Billings	Glasgow	Riverton
Bismarck	Grand Forks	Aberdeen
Glasgow	Billings	Great Falls
Grand Forks	Bismarck	Duluth
Great Falls	Missoula	Glasgow
Missoula	Great Falls	Spokane
Riverton	Cheyenne	Billings
Spokane	Pendleton	Missoula

Following are the Internet sites for each office:

<http://weather.gov/billings>  
<http://weather.gov/bismarck>  
<http://weather.gov/glasgow>  
<http://weather.gov/grandforks>  
<http://weather.gov/greatfalls>  
<http://weather.gov/missoula>  
<http://weather.gov/riverton>  
<http://weather.gov/spokane>  
<https://gacc.nifc.gov/nrcc>

## FORECAST ELEMENT DESCRIPTIONS

**Headlines:** This section is included when critical weather elements are expected during the forecast period. These elements include Fire Weather Watches, Red Flag Warnings, thunderstorms, significant precipitation, unusually low humidities, gusty winds, etc.

**Weather Discussion:** The weather discussion provides an understanding of the general weather pattern and its impact on expected weather. The discussion will accentuate the most important portions of the forecast such as the problem of the day and important features of the next couple days.

**General Weather:** Expected sky cover and precipitation events are the primary elements given in the general weather. It may also highlight elements such as dry thunderstorms, winds, temperatures, and humidities that are particularly significant to field personnel.

**Lightning Activity Level (LAL):** This is a scale of lightning or thunderstorm activity in a specific area or over a forecast zone. The LAL is outlined in [USDA Forest Service General Technical Report INT-39 \(October 1977\)](#).

**Chance of Wetting Rain (CWR):** A percentage will be used to indicate the likelihood of a wetting rain occurring in a specific area (or over a forecast zone). Wetting rain is defined as 0.10 inches or more of rain over a major portion of the forecast zone. Chance of wetting rain (CWR) given on a spot forecast indicates the probability of receiving 0.10 inches or more of rainfall over the smaller scale area concerned.

**Temperatures:** The expected daily high and low temperature will be forecast in the range of values i.e., "Highs today 82-92."

**Humidity:** The expected daily minimum and nighttime maximum humidities will also be forecast in a range of values, i.e., Minimum RH 15-25%.

**Slope/Valley Winds:** Also known as surface winds, these are 10 minute average sustained winds measured at 20 feet above the average vegetation (standard Remote Automated Weather Station, RAWS) located at the lower elevations in a forecast zone (valley floor to mid-slope). Because these may be highly variable across a forecast zone, they will be quite general in the daily Fire Weather Planning Forecast.

**Ridge Top Winds:** These are the surface winds that would be measured by a standard RAWS located at the higher elevations (upper slopes and ridge tops).

**Mixing Height:** Mixing height is a forecast of the altitude in which the atmosphere will be well mixed. A mixing height forecasted in daytime periods will reflect the maximum height expected (early to late afternoon). A mixing height forecasted in nighttime periods will reflect the lowest height expected. Mixing height information will be given in Above Ground Level (AGL) heights.

**Mixing Winds (also called Transport Winds):** A measure of the average wind speed and direction from the ground to the mixing height.

**Haines Index:** The Haines Index information will be included in the narrative forecasts. This index of basic lower atmospheric stability and moisture seems to correlate well with large fire growth. One note of caution, wind is not factored into the Haines Index. The Haines Index is categorized as follows:

<b>Haines Index</b>	<b>Category</b>
2 or 3	Very Low
4	Low
5	Moderate
6	High

**Extended Forecast and Outlook:** An extended forecast (3 to 7 days) will be included with every Fire Weather Planning Forecast. The outlook (from 8 to 10 or 14 days) is an optional element. An [extended outlook from 8 to 14 days](#) can also be found at the [Climate Prediction Center](#) homepage. The purpose of this guidance is to highlight major changes as well as general weather trends.

**Note:** For the [30/90-Day and Seasonal Outlooks](#), please go to the [Climate Prediction Center Homepage](#). These products are typically updated around the middle of the month.

## Area Forecast Discussion (AFD)

For a more detailed meteorological discussion than can be found in the discussion portion of the Fire Weather Forecast (FWF), use the Area Forecast Discussion (AFD) which is located under the Forecast/Outlook tab of the Western Region Fire Weather page. Riverton WY, Bismarck ND, and Grand Forks ND in Central Region have their AFDs posted on their Fire Weather page.

The Area Forecast Discussion (AFD) is a semi-technical product primarily used as a means to explain the scientific rationale behind a forecast and to summarize any watches, warnings and advisories in effect. The forecast insight provided in the AFD is beyond that which can be found in other NWS products, including the forecasters' confidence in various weather scenarios. The AFD consists of two primary sections: (1) a narrative description of forecast information and reasoning, and (2) a summary of public, marine and fire weather watch/warning/advisory issuances. The discussions focus on the most significant weather issues to affect a forecast offices' geographic area of responsibility during the 7-day forecast period. Emphasis is placed on those forecast periods where hazardous weather is possible.

There also may be a Fire Weather section added to the AFD. This will specifically address fire concerns and will be supplemental to the information in the main discussion.

Area Forecast Discussions for:

[Billings](#)

[Glasgow](#)

[Great Falls](#)

[Missoula](#)

[Riverton](#)

[Spokane](#)

[Bismarck](#)

[Grand Forks](#)

## Example AFD

ZCZC GTFAFDMSO  
FXUS65 KMSO 172048  
Area Forecast Discussion  
National Weather Service Missoula MT  
248 PM MDT Fri Aug 10 2013

.DISCUSSION...Southwest flow remains over the Northern Rockies as a large upper trough circulates along the northwest coast. Subtropical moisture continues to flow across Lemhi County and southwest Montana this evening, maintaining the threat of isolated thunderstorms through dark. Smoke, thick in places, will continue to be an issue tonight and early Saturday. The upper trough will send its first disturbance through the area Saturday. Convections will still be an issue over southwest Montana and Lemhi County, but the main concern is increasing southwest winds as the mid level flow increases. Stronger winds will develop on the ridges midday. But probably not mix down to the valleys until mid afternoon, then persist through the evening. One good aspect to this is that it should improve air quality to some extent.

Sunday through Friday, models seem to be more consistent with bringing a cold front into western Montana during the day on Sunday. The best shor of moisture looks to impact northwest Montana, but all of western Montana and north central Idaho should see some rain before Monday morning. The bad news is winds will be increasing with the front. On Monday, the trough moves to the east with some lingering precipitation. The Tuesday through Friday, western Montana and north central Idaho remain under a west to northwest flow with a few weak disturbances moving in the flow. This should keep temperatures cooler with some widely scattered light showers.

&&

.AVIATION...Showers and thunderstorms will impact aviation operations across Lemhi County and the Butte/Pintlar region through this evening. The main impact with there storms will be gusty and erratic winds. Terminals affected are KSMN and KBTM. Smoke will cause lowered visibility and ground obscurations throughout western Montana and portions of north central Idaho this evening through Saturday. Please see appropriate TAFs.

&&

.FIRE WEATHER...Will issue a watch for the winds Saturday, mainly through the central portions of the fire weather district. Believe stability to the north and in the Palouse will keep winds from increasing too much. Southwest Montana will get the winds, but the dewpoints should be pretty high tomorrow. Have included 110 in the watch due to slightly better drying and the currently going fires. Southwest Montana will see more drying Sunday along with another windy afternoon.

&&

.MSO WATCHES/WARNINGS/ADVISORIES...

MT...Fire weather watch from Saturday afternoon through Saturday evening  
for Bitterroot...Deerlodge/West Beaverhead...East Lolo...Salish and Kootenai  
Reservation...West Lolo.

ID...Fire weather watch from Saturday afternoon through Saturday evening  
for Clearwater/Nez Perce.

## FIRE WEATHER PLANNING FORECAST

The Fire Weather Planning Forecast (FWF) is prepared for use in operational planning decisions including fire danger assessment, firefighter safety, protection of the public and property, and resource allocation. It is a 7-day forecast but tends to focus on the short term, or next couple days. The FWF is a general zone-based product consisting of a short weather discussion combined with a few "public forecast" parameters (e.g. sky/weather, high and low temperatures) and several "fire weather" parameters (e.g. Lightning Activity Level, humidities, Haines Index). The parameters and format used in the FWF have been coordinated with area partners and may vary slightly between offices. Please see individual office sections for more detail.

FNUS5i KNNN DDHHMM  
FWFNNN

Fire Weather Planning Forecast for <name of area>  
National Weather Service City State  
Time-Date (example: 500 AM MDT Tue Aug 10 2012)

...HEADLINE... (REQUIRED for Red Flag Warnings and Fire Weather Watches  
...significant feature(s) at other times recommended)

DISCUSSION...(Concise, clear, non-technical explanation of the current  
and forecasted fire weather.)

---

SSZXXX-XXX>XXX-DDHHMM- (UGC/FIPS CODING)  
GEOGRAPHICAL DESCRIPTORS (Including land management governing units and  
optional fire weather zone numbers)  
Time-Date (example: 500 AM MDT Tue Aug 10 2012)

RED FLAG WARNING/FIRE WEATHER WATCH HEADLINE (as needed in each appropriate  
zone grouping)

.TODAY...  
\* Sky/Weather.....  
\* Max temperature.....  
\* 24 hr trend.....(Optional)  
\* Min humidity.....  
\* 24 hr trend.....(Optional)  
\* 20 foot wind.....(Optional - include sub-descriptors e.g.  
\* slope/valley...ridges/upper slopes...ridge  
\* top...etc.)  
\* Haines Index.....(Optional)



- \* Lal.....(Optional)
- \* Cwr.....(Optional)
- \* Mixing height.....(Optional)
- \* Mixing winds.....(Optional)

.TONIGHT...

- \* Sky/weather.....
- \* Min temperature.....
- \* 24 hr trend.....(Optional)
- \* Max humidity.....
- \* 24 hr trend.....(Optional)
- \* 20 foot wind.....(Optional - include sub-descriptors e.g.  
\* slope/valley...ridges/upper slopes...ridge  
top...etc.)
- \* Haines Index.....(Optional)
- \* Lal.....(Optional)
- \* Cwr.....(Optional)
- \* Mixing height.....(Optional)
- \* Mixing winds.....(Optional)

.TOMORROW...

- \* Sky/weather.....
- \* Max temperature.....
- \* Min humidity.....
- \* 20 foot wind.....(Optional - include sub-descriptors e.g.  
\* slope/valley...ridges/upper slopes...ridge  
top...etc.)
- \* Haines Index.....(Optional)
- \* Lal.....(Optional)
- \* Cwr.....(Optional)
- \* Mixing height.....(Optional)
- \* Mixing winds.....(Optional)

---

.EXTENDED

(Optional time period) Winds included days 3-5; days 6 and 7 if appropriate; other elements per locally established policy. May be in each zone segment versus this location; may optionally be presented as 12-hour periods.

---

=  
 \$\$  
 Forecast for next geographical descriptor and fire weather zone group.

---

.OUTLOOK FOR DAY MONTH DATE THROUGH DAY MONTH DATE (per local established policy - Days 8-14, 30 and 90 day outlooks when issued).

---

## **SMOKE DISPERSION FORECASTS**

Mixing height and mixing winds are optional elements in general forecasts during the spring burning period, wildfire season and fall burning period. Some offices may also provide a stand-alone smoke dispersion forecast at those times when a fire weather forecast is not being produced, i.e., early spring and late fall. A Clearing Index product may also be available, which combines mixing heights and mixing winds in a graphical based forecast. In addition, the Predictive Services meteorologists at the Smoke Management Unit compile data and provide forecast meteorological conditions and smoke dispersion on a daily basis Monday through Friday.

See individual NWS Office/Predictive Services sections to determine what smoke dispersion information is available.

## **NFDRS Forecasts**

National Fire Danger Rating System (NFDRS) forecasts are provided on a daily basis from late spring until the end of wildfire season.

Afternoon observations (1400 LDT) should be sent from the field to WIMS by 1415 LDT. These observations will generally be received in the Forecast Office by 1445 LDT.

The forecasts will then be sent to WIMS by 1545 LDT. Forecasted NFDRS indices should be available by 1615 LDT.

As of Dec 31<sup>st</sup>, 2020, the NWS NFDRS forecast product (FWM) is expanding from a single, 24-hour forecast period to 7 days of forecast data for select NFDRS stations. These forecasts are for expected conditions at 1400 LDT each day, out through 7 days. An example of the output, as well as an explanation of codes follows:

```
FCST, STATION#, YYMMDD, 13, WX, TEMP, RH, LAL1, LAL2, , WIND, , TX, TN, RHx, RHn, PD1, PD2, WETFLAG
```

```
FCST,101100,210311,13,1,52,46,1,1,,05,,53,32,71,37,0,0,N
FCST,101100,210312,13,0,53,40,1,1,,03,,54,31,73,39,0,0,N
FCST,101100,210313,13,0,56,38,1,1,,03,,56,33,68,37,0,0,N
FCST,101100,210314,13,1,60,37,1,1,,07,,60,38,63,36,0,0,N
FCST,101100,210315,13,2,53,50,1,1,,06,,63,41,69,33,1,1,N
FCST,101100,210316,13,2,51,51,1,1,,06,,53,38,76,47,0,0,N
FCST,101100,210317,13,2,55,45,1,1,,05,,55,38,72,45,0,0,N
```

FCST: Indicates individual site forecasts.

STATION#: NFDRS site number

YYMMDD: Date

13: Valid Forecast Time (Always 13 to indicate 1300 LST)

WX: Weather valid at 1300 LST tomorrow. Valid entries are:

0 clear  
1 scattered clouds (1/8 to 4/8)  
2 broken clouds (5/8 to 7/8)  
3 overcast clouds (more than 7/8)  
4 foggy  
5 drizzle  
6 raining  
7 snowing or sleet  
8 showers (in sight or at the station)  
9 thunderstorm  
(Categories 5, 6, 7 sets most NFDRS indices to 0.  
ERC is the exception)

TEMP: Temperature in degrees F valid at 1300 LST

RH: Relative humidity in percent valid at 1300 LST

LAL1: Lightning Activity Level 1400 LST to 2300 LST

LAL2: Lightning Activity Level 2300 LST to 2300 LST

WIND: Wind speed in mph valid at 1300 LST

TX: Maximum temperature from 1300 LST to 1300 LST tomorrow

TN: Minimum temperature from 1300 LST to 1300 LST tomorrow

RHx: Maximum RH from 1300 LST to 1300 LST tomorrow

RHn: Minimum RH from 1300 LST to 1300 LST tomorrow

PD1: Precipitation duration in hours 1300 LST to 0500 LST

PD2: Precipitation duration in hours 0500 LST to 1300 LST

WETFLAG Y or N: Indicates whether fuels will be wet at 1300 LST.

**Zone average trends can be used when enough observations are available for the zone area.  
Following is an example of a Zone Trend Forecast.**

ZONE,NO,YYMMDD,13,WX,TEMP,RH,LAL1,LAL2,WSPD,10HR,TX,TN,RHx,RHn,PD1,PD2,WETFLAG

FNUS85 KBOI DDHHMM  
FWMBOI

ZONE, 403, 011027, 13, 1, -3, 0, 1, 1, 0, 0, , , , , 0, 0, N  
ZONE, 404, 011027, 13, 0, 3, 0, 1, 1, 0, 0, , , , , 0, 0, N  
ZONE, 408, 011027, 13, 0, 4, -5, 1, 1, -3, 0, 89, 68, 75, 22, 0, 0, N

## SPOT FORECAST COMPARED TO DIGITAL DATABASE TOOLS

The National Weather Service is committed to making weather forecasts available in many different formats to help fire agencies make effective planning decisions. Some of these tools currently available are Point Forecast Matrices and the Activity Planner, and new tools will be introduced in the future. However, for site specific tactical decisions requiring weather input, the Spot Forecast is the only product that will ensure that a National Weather Service meteorologist has provided details based on the site characteristics (aspect, steepness, position on slope, etc.) and local observations to develop a more representative forecast.

## SPOT FORECASTS

Spot forecasts will be issued for wildfires, prescribed burns, or other incidents when requested. Requests for special forecasts should be made directly to the National Weather Service office serving your area. Whenever a spot forecast request is sent, a phone call to the weather office should be made to inform the forecaster of the request.

Please furnish the data indicated on the [Spot Forecast Request Form](#) to your local NWS office. This form can be found on the Fire Weather Section of each NWS office Homepage. Where access to the Internet is not available, [WS Form D-1, Spot Forecast Request Form](#), can be filled out and provided to your local National Weather Service office by fax or phone call.

Weather observations supporting a spot forecast request should be taken at the site of the incident, fire, or burn. The quality of the forecast will greatly depend on the accuracy of this observation. Observations taken the day of the planned burn are essential for a good forecast. In addition, if site observations from the previous day are available, please provide these to the forecaster.

If weather conditions develop which are not forecast and may threaten the success of the operations at the fire, the forecaster should be notified immediately. Timely feedback concerning the accuracy of forecasts will assist the forecaster greatly in the preparation of more accurate forecasts in the future.

## SPOT FORECAST FORMAT

1. Spot forecasts for wildfires will contain headlines (when a RFW is in effect), discussion, sky/weather, temperature, relative humidity, and wind. Some optional elements may be requested as well.
2. Prescribed fire spot forecasts will always include a discussion. In addition, these forecasts will contain weather elements chosen by the requester.

The spot page user guide can be found at the following location.  
[https://www.wrh.noaa.gov/wrh/UsersSpotGuide2019\\_2.0.pdf](https://www.wrh.noaa.gov/wrh/UsersSpotGuide2019_2.0.pdf)

## SPOT FORECAST EXAMPLE

FNUS7i KXXX DDHMM  
FWSXXX

Spot Forecast FOR (location or name of burn)

NATIONAL WEATHER SERVICE (CITY STATE)  
TIME-DATE (500 AM MDT Tue Aug 10 2012)

Forecast is based on request time of <time-date>. If conditions become unrepresentative, contact the National Weather Service.

...HEADLINE (as needed for red flag warning/fire weather watches)...

DISCUSSION...

.TODAY...

Sky/weather.....  
Max Temperature..... Max xx  
Min Humidity..... Min xx%  
20 foot winds..... xx mph  
Optional elements..... Cwr, Smoke dispersion, etc., as  
requested by users

.TONIGHT...

Sky/weather.....  
Min Temperature.....Min xx  
Max Humidity.....Max xx%  
20 foot winds.....xx mph  
Optional elements.....Cwr, Smoke dispersion, etc., as  
requested by users

.TOMORROW...

Sky/weather.....  
Max Temperature.....Max xx  
Min Humidity.....Min xx%  
20 foot winds.....xx MPH

Optional elements.....Cwr, Smoke dispersion, etc., as requested  
by users

\$\$

## **WARNING PRODUCTS**

### **FIRE WEATHER WATCHES and RED FLAG WARNINGS**

These products will be issued if red flag conditions are expected, in conjunction with critically dry fuels. However, a RFW may still be issued without critically dry fuels with an exceptionally strong weather event. The Predictive Service meteorologists and the National Weather Service program managers will work in conjunction to assess the status of the fuels as fire season progresses.

A **FIRE WEATHER WATCH** will be issued if a significant potential exists for red flag conditions... generally 18 to 96 hours in the future. Fire Weather Watches will be available in WIMS and the Internet. Coordination with the Predictive Services Unit is recommended as well as a call to their office during business hours (406-329-4703/4875) upon issuing a RFW.

They will often be issued in conjunction with the routine morning or afternoon forecasts. However, a Watch may be issued at any time with the use of a Red Flag Statement (RFW) and the Fire Weather Forecast (FWF) update. The area(s) affected, the time of the expected onset of the conditions, and an explanation of those conditions will be included in the Watch.

Fire Weather Watches will be cancelled if and when subsequent meteorological information indicates the red flag conditions are no longer a threat. This cancellation will be sent by a Red Flag Statement (RFW).

A **RED FLAG WARNING** will be issued when red flag conditions are imminent or already occurring. Red Flag Warnings will be available in WIMS and the Internet.

The issuance of a Red Flag Warning denotes a high degree of confidence that weather and fuel conditions consistent with local Red Flag Event criteria will occur in 48 hours or less. Longer lead times are encouraged when confidence is very high or the fire danger situation is critical. The warning will be issued by a new statement (RFW) and reflected in the headline of the fire weather forecast. The affected area, the valid time of the warning, and a description of the expected severe fire weather conditions will be included. Fire weather watches and red flag warnings are coordinated with the Predictive Services Unit.

A Red Flag Statement (RFW) will be used to cancel a Red Flag Warning and the Fire Weather Forecast (FWF) will be updated.

## Red Flag Conditions:

Red Flag Conditions constitute any change in weather that would result in a significant increase in fire danger. This may include (but not limited to):

- Increased thunderstorm activity.
- Strong winds with low humidities.
- Abrupt change in wind speed and direction due to the passage of a cold front.

Please check individual office sections for detailed red flag criteria.

### RED FLAG WARNING BULLETED FORMAT

URGENT-RED FLAG WARNING

Natioanl Weather Service City State

234 PM MDT Tue Aug 10 2012

WAZXXX-310445-

/O.NEW.KXXX.FW.A.0001.100331T1800Z-100402T0300Z/

Fire Weather Zone Name(s)-

234 PM MDT Tue Aug 10 2012

...Red flag warning in effect from Wednesday afternoon through Thursday evening for strong winds and low relative humidity for fire weather zone xxx...

\* AFFECTED AREA...This warning is for fire weather zone XXX.

\* TIMING...Winds will increase Wednesday morning and become strong by Wednesday afternoon, continuing through early Thursday evening. Meanwhile, relative humidities will plummet Tuesday afternoon and remain low through Wednesday with poor overnight recoveries Tuesday night.

\* WINDS...Southwest winds of 15 to 25 mph with gusts to 45 mph can be expected.

\* RELATIVE HUMIDITY...Humidities between 10 to 15 percent can be expected.

\* IMPACTS...The strong winds and low humidity will combine to result in severe fire weather conditions in areas where fuels are dry.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

A red flag warning means that critical fire weather conditions are imminent or occurring.

**Public Watches, Warnings and Statements:** Watches, warnings, and statements of potential severe or unusual weather events that are not directly related to fire weather are also issued by NWS offices. These statements, however, may still contain weather information significant to field personnel. Therefore, it would be beneficial to stay in tune with public weather forecasts.

GRAPHICAL/GRID BASED PRODUCTS

### **National Digital Forecast Database (NDFD)**

The National Weather Service provides an enhanced forecast tool called the [National Digital Forecast Database \(NDFD\)](#). This database contains forecasted weather parameters on a 2.5 to 5 kilometer resolution grid. The NDFD extends through 7 days and is updated continuously by the NWS Forecast Offices. There are a number of different ways that information can be accessed from the NDFD, ranging from viewing colorized maps on the Internet to importing the data into applications that have been developed for use by land management agencies.

Actual NDFD fire weather forecast elements can be viewed graphically at :

<http://www.weather.gov/forecasts/graphical/sectors/northrockiesFireDay.php#tabs>

Information on the NDFD can be found at: <https://vlab.ncep.noaa.gov/web/mdl/ndfd>

For users who may be considering accessing NDFD information for use in other applications should check the information at: <https://vlab.ncep.noaa.gov/web/mdl/ndfd-information-links>



## **iNWS**

Interactive NWS (iNWS) allows National Weather Service partners, such as fire managers, to receive NWS messages through SMS, mobile-enabled webpages, as well as email. Subscribers can choose which NWS products (fire weather, severe weather, hydrologic, etc.) they wish to be alerted to and also allows the user to define specific alert areas (whether by city, point or draw polygon) of interest. Alerts will only be sent when an alert falls within the configured area of interest. If you are interested in using this service, please visit the iNWS website (<http://inws.ncep.noaa.gov/>) and click register to get started.

For questions relating to this service or assistance with setting up your account, please contact your local fire weather program manager for further details.

## **METEOROLOGICAL SERVICES**

### **Briefings**

Predictive Services or NWS meteorologists may be asked to provide briefings to agency decision-makers. The briefings usually consist of a short-term weather discussion of critical weather patterns and a longer-term discussion of trends during the next several days. These are designed to provide tactical (operational) and strategic (planning) information as needed for land managers.

Briefing schedules are determined by management priorities and therefore will vary with season, and fire activity. These briefing schedules and conference bridge phone numbers will be provided as needed.

### **Fire Weather Briefing Conference Calls**

The National Weather Service Offices within the Northern Rockies Geographical Area may offer fire weather briefings via conference calls for local land managers. The briefings include an informational package containing data such as satellite images, weather observations, and forecast model data.

Please refer to your local servicing office's individual section, or contact that office, to determine if Fire Weather Briefing Conference Calls are available.

### **Social Media**

The National Weather Service offices use social media tools such as Twitter, Facebook and YouTube to engage the public and our partners in conversation around important weather, water, and climate issues. At times, fire weather concerns may be addressed through these venues, in addition to other already established means. For guidance on how these tools are used locally, additional information may be available in your local office's individual section.

## **Incident Meteorologist (IMET)**

Onsite weather support to large wildfires, prescribed fires, and other major incidents is available. The ordering process for Incident Meteorologists (IMETs) and supporting equipment is detailed in Chapter 20 of the [National Interagency Mobilization Guide](#). Conditions of these dispatches are in the [National Interagency Agreement for Meteorological and Other Technical Services](#). When ordering an IMET for a prescribed burn, specify 1) that the request is for a US Forest Service Prescribed Fire project; and 2) expected number of days the IMET will be deployed.

What Type of Prescribed Fire Projects are Suitable for IMET Support? IMET support for prescribed fire is primarily for high-complexity projects such as those that are larger in size, have potential to impact significant values, and may be longer in duration than the typical moderate or low complexity projects. In some cases, the servicing NWS office may suggest IMET support for those locations that have a history of inconsistent or challenging forecast accuracy.

Coordination between Incident Meteorologists (IMETs) and the responsible Weather Forecast Office (WFO) entails direct telephone calls, NWS Chat, and on an as needed basis, conference calls. Within NWS Chat, the nrccfirechat room is the preferred chat room for discussion as it provides a secure and non-public means of collaboration. It allows for multiple IMETs and multiple WFOs to maintain a more fire centric stream of conversations. Detailed weather coordination discussion in wfochat chat rooms in NWS Chat is discouraged due to the public nature of the room. NWS offices in the Northern Rockies will be logged into nrccfirechat via NWS Chat at all times and IMETs serving in the area are strongly urged to do the same as communications permit.

In the event several IMETs are dispatched within a WFO's area of responsibility and the WFO determines collaboration needs to be increased beyond use of NWS chat, the WFO may host a conference call at a predetermined time with the IMETs in the field to coordinate the details of the forecast. In addition to the IMETs and the responsible WFO, this call may involve representatives of the National Weather Service outside the WFO and representatives of the Geographical Area Coordination Center (GACC).

## **Liaison**

The Fire Weather Program Leaders (FWPL's) will visit a portion of their fire weather districts annually for familiarization, liaison, and program coordination. FWPL's are open to discuss any forecast problems, proposed prescribed burning plans in respect to weather needs, and any weather anomalies peculiar to their area. Ample notification will be provided prior to any visitation. Alternatively, FWPLs may choose to host agencies at their office or hold workshops to share information about fire weather services.

## Training

Fire Weather forecasters are available for training courses, workshops, and seminars. When requesting a forecaster for these events, please give as much advance notification as possible. Per Diem and travel costs will be billed to the requesting Agency, as outlined in the [IMET/Fire Weather Reimbursable Handbook](#) or in the [National Interagency Agreement for Meteorological and Other Technical Services](#). For the assistance of a forecaster, please contact the Fire Weather Program Manager of your local servicing office.

There is a need for advanced notice for NWS participation with training or meetings. The longer lead time to plan (several months ideally with 3 weeks as a minimum) the better chance the office will be able to provide the service. The NWS Union Negotiated Agreement provides rules for scheduling of Bargaining Unit employees that limits modification of the work schedule in the short term. In cases where an office cannot provide the requested service, every effort will be made to find a backup meteorologist from a neighboring NWS office or the Predictive Services Unit.

## NOAA Weather Radio Broadcasts

The NWS offices provide continuous broadcasts of public weather forecasts and warning information via NOAA Weather Radio (NWR), however, fire weather products are not included. The reception varies and is limited to line-of-sight. The information received over the NWR should be used ONLY as a supplement to the fire weather products prepared for your area. Listed in the table below are NWS Weather Radio Transmitters and their transmission frequency. A coverage map can be found at the following [link](#).

Standard Nationwide NWR Frequencies (MHz) are:

162.400      162.425      162.450      162.475      162.500      162.525      162.550

Frequency	Area Covered
162.550 MHZ	Baker, MT
162.500 MHZ	Belgian Hill, MT
162.550 MHZ	Billings, MT
162.550 MHZ	Boise, ID
162.500 MHZ	Bonnars Ferry, ID
162.500 MHZ	Bozeman, MT
162.425 MHZ	Broadus, MT

162.525 MHZ	Browning, MT
162.550 MHZ	Butte, MT
162.550 MHZ	Circle, MT
162.525 MHZ	Dayton, WA
162.400 MHZ	Dickinson, ND
162.475 MHZ	Dillon, MT
162.475 MHZ	Ekalaka, MT
162.525 MHZ	Forsyth, MT
162.400 MHZ	Glasgow, MT
162.475 MHZ	Glendive, MT
162.525 MHZ	Glentana/Opheim
162.450 MHZ	Grangeville, ID
162.450 MHZ	Grant Village, WY
162.550 MHZ	Great Falls, MT
162.450 MHZ	Hardin, MT
162.400 MHZ	Havre, MT
162.400 MHZ	Helena, MT
162.500 MHZ	Jordan, MT
162.550 MHZ	Kalispell, MT
162.550 MHZ	Lewiston, ID
162.500 MHZ	Lewistown, MT
162.525 MHZ	Livingston, MT
162.475 MHZ	Malta, MT
162.475 MHZ	McCall, ID
162.400 MHZ	Miles City, MT
162.400 MHZ	Missoula, MT
162.475 MHZ	Plentywood, MT

162.550 MHZ	Pocatello, ID
162.550 MHZ	Poplar, MT
162.550 MHZ	Rapid City, SD
162.450 MHZ	Ryegate, MT
162.450 MHZ	Scobey, MT
162.475 MHZ	Sheridan, WY
162.400 MHZ	Spokane, WA
162.400 MHZ	Twin Falls, ID
162.550 MHZ	Williston, ND
162.400 MHZ	Winnett, MT

## **WIMS STATION ID CONTACT**

All Remote Automated Weather Stations (RAWS) have been assigned numbers to be used as the identification number when entering into the Weather Information Management System (WIMS). If a new station is established, or a present station moved, a new identification number should be requested from Steven Ippoliti (406-329-4703), the Northern Rockies Geographic Area RAWS Coordinator.

The request should include:

- Station Name,
- Type of Station,
- State,
- County,
- Latitude/Longitude,
- Legal (township, range, section),
- Elevation, and
- Operating Agency

# Interagency Agreement

**INTERAGENCY AGREEMENT**  
for  
**METEOROLOGICAL and OTHER TECHNICAL SERVICES**  
among the  
**Bureau of Land Management**  
**Bureau of Indian Affairs**  
**Fish and Wildlife Service**  
**National Park Service**  
of the  
United States Department of the Interior  
and the  
**Forest Service**  
of the  
United States Department of Agriculture  
and the  
**National Weather Service**  
of the  
National Oceanic and Atmospheric Administration  
United States Department of Commerce

BLM Agreement No. L17PG00263  
BIA Agreement No. 2017-BIANIFC-IAA-001  
FWS Agreement No. FF09R22000-17-IA003  
FS Agreement No. 17-IA-11132543-020  
NPS Agreement No. G9560170081  
NWS Agreement No. 17-IA-11132543-020

## I. INTRODUCTION.

Fire management and suppression in the Nation's wildlands is an on-going concern to the American public and to the Department of the Interior's Bureau of Land Management, Bureau of Indian Affairs, Fish and Wildlife Service, and National Park Service, and the Department of Agriculture, Forest Service, as well as to the Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service. Considerable cooperation and coordination among these agencies exists, which is critical to the success of fire management, suppression, and safety. This Agreement is among the National Weather Service, hereinafter referred to as "NWS," and the federal wildland fire management agencies, hereinafter referred to collectively as the "Wildland Fire Agencies."

The NWS is legally mandated to issue weather forecasts and warnings for the protection of life and property. In accordance with this mandate, the NWS will maintain a cadre of trained Incident Meteorologists (IMET) to meet the needs of the Wildland Fire Agencies under the terms of this agreement. The Wildland Fire Agencies recognize this mandated function of the NWS and the critical importance of the IMETs' role in the incident command structure. The NWS IMET program has a

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long history of being an integral component to Wildland Fire Agencies' incident operations and planning, and the agencies anticipate there will be a continuing demand for NWS IMETs and other technical services in the future due to the increasing numbers of complex fire events and natural disasters. The Wildland Fire Agencies are responsible for the stewardship and/or protection of lands owned or held in trust by the United States. The Wildland Fire Agencies have statutory authority to coordinate with state agencies for wildland fire protection and Stafford Act response via cooperative agreements.

The Wildland Fire Agencies are also responsible for ensuring that incident command team position qualifications and practices are consistent, standardized and reviewed in terms of currency and relevance. An interagency alliance involving essential aspects of fire weather products and services is crucial to the success of the Wildland Fire Agencies' missions.

## **II. AUTHORITIES.**

- A. The Coast and Geodetic Survey Act (33 U.S.C. § 883d and § 883e).
- B. Organic Act of 1890 (15 U.S.C. § 313).
- C. National Climate Program Act (15 U.S.C. § 2901 *et seq.*).
- D. Federal Land Policy and Management Act of 1976 (43 U.S.C. § 1701 *et seq.*).
- E. National Park Service Organic Act of August 1916 (16 U.S.C. § 1).
- F. National Wildlife Refuge Administration Act of June 27, 1998 (16 U.S.C. § 668dd).
- G. National Indian Forest Resources Management Act of 1990 (25 U.S.C. § 3101 *et seq.*).
- H. Forest Service Organic Act of 1897 (16 U.S.C. 551 *et seq.*)

## **III. PURPOSE.**

The intent of this Agreement is for NWS to provide Wildland Fire Agencies with accurate and timely meteorological and fire danger information which is required to manage resources effectively and efficiently. Another key purpose of this Agreement is to identify the products and services that will be exchanged between the NWS and Wildland Fire Agencies. These products and services are designed to meet the needs of the public and the Wildland Fire Agencies related to the protection of life and property, cost containment and efficiency, and the enhancement of ecosystem health. It is also the purpose of this Agreement to set forth the general terms and conditions under which services will be requested by the Wildland Fire Agencies within the above-cited authorities.

## **IV. OBJECTIVES.**

The objectives of this Agreement are:

- A. Identify the products and services to be exchanged between the NWS and the Wildland Fire Agencies;
- B. Continue and maintain interagency relationships; and

C. Define the roles and responsibilities of the NWS and the Wildland Fire Agencies.

**V. RESPONSIBILITIES.**

The responsibilities and services listed are not all-inclusive, but are meant to provide the overall scope of products, services, and activities exchanged or requested by the respective agencies. All services undertaken by the NWS and the Wildland Fire Agencies under this Agreement are subject to the authorities cited in this agreement and the availability of appropriated funds. These services are further defined in the National Fire Weather Annual Operating Plan (AOP) developed separately from this Agreement, but incorporated by reference as supplemental to this Agreement.

**A. The NWS agrees to provide:**

1. Non-reimbursable basic (routine) meteorological services in support of wildland fire suppression activities. Examples include: daily fire weather forecasts, spot forecasts, briefings, fire danger weather forecast, etc.
2. Reimbursable non-routine Weather Forecast Office (WFO) in support of fire suppression services including, but not limited to, on-site meteorological support consultations and technical advice that are required to fulfill the primary purpose of this agreement. These non-routine services are set apart from the daily and usual forecast information provided by the WFO.
3. Other reimbursable technical services in support of fire suppression including, but not limited to, Burned Area Emergency Rehabilitation (BAER) Teams, forecasting support for Long Term Fire Analyst (LTAN) input on wildland fires, and other services that qualify as a geophysical science and meet interagency position standards during critical events of national significance, such as Air Resource Advisors. Supply of other technical services must have the approval of the applicable NWS Region, and be requested via normal resource ordering process. Resource orders are processed by dispatchers, service personnel, and logistics coordinators to document the request, ordering or release of resources, and the tracking of those resources on an incident.
4. As needed, similar weather-related or technical services in support of non-suppression wildland fire projects or activities, such as prescribed fires, burned area rehabilitation/stabilization, or instructor-led training when requested by a Wildland Fire Agency. These services are reimbursable, but require separate, written agreement(s) to address funding and billing/payment between NWS and the requesting agency. Services provided for these types of projects or activities are supplemental to this agreement and should be consistent with the authority, qualifications, and terms of this agreement. Resource orders are optional.

**B. Wildland Fire Agencies agree to provide:**

1. Operational support for IMETs or other technical specialists on incidents consistent with guidance and policies provided by the National Interagency Mobilization Guide and the Interagency Incident Business Management Handbook.
2. Wildland fire weather program management, including but not limited to, maintenance of the RAWS observation network, the Wildland Fire Management Information (WFMI) system, National Fire Danger Rating System, and other Agency systems that support wildland fire



weather.

3. Reimbursement to the NWS for activities under section V.A.2 and V.A.3 of this agreement associated with on-site meteorological and other technical services/support includes the following:
  - a. Costs incurred by the NWS employee's duty station as a direct result of an order. This cost is primarily NWS IMET duty station overtime, associated employer contributions, and differential pay incurred as a direct result of the IMET dispatch.
  - b. Costs above base salary including overtime incurred by the NWS employees. This includes associated employer contributions and differential pay incurred as a direct result of the order.
  - c. After completion of a 14 day assignment and return to the home unit, two mandatory days off will be provided (administrative leave). The days off must occur on the calendar days immediately following the return travel in order to be charged to the incident. Pay entitlement, including administrative leave, for a paid day(s) off cannot be authorized on the individual's regular day(s) off at their home unit. This practice is consistent with the policies in the Interagency Incident Business Management Handbook, <http://www.nwcg.gov/pms/pubs/large.html#iibmh>, for federal employees. The provision of administrative leave is considered important to and assists with maintaining proper work-rest periods.
  - d. Costs for logistical and weather observation support required by NWS personnel at on-site operations.
  - e. Telecommunication service costs that will be computed annually based on the average prorated percentage rate of use, as applicable, and/or otherwise attributable to the Wildland Fire Agencies. The Wildland Fire Agencies will split the prorated cost annually according to the National Wildfire Coordination Group (NWCG) cost distribution rate, and billings/payments will be obligated and administered at the national level annually via separate reimbursable agreement for telecommunication services.
  - f. Hardware replacement for items that are damaged or fail due to on-site incident conditions.
  - g. All travel costs and lodging expenses for federal employees as authorized pursuant to the policies in the Interagency Incident Business Management Handbook, <http://www.nwcg.gov/pms/pubs/large.html#iibmh>.
  - h. Agency-owned or privately-owned four-wheel drive SUV, pickup or similar rental vehicle to travel to an incident with equipment as required by IMET position in accordance with Chapter 20 of the National Mobilization Guide..
  - i. Miscellaneous office supplies necessary to accomplish on-site support.

## **VI. JOINT RESPONSIBILITIES:**

NWS and Wildland Fire Agencies shall jointly prepare, as warranted, National and Geographic Area specific AOPs for Fire Weather Services. AOPs will be executed separate from this Agreement, but carried out as an extension of the authority and terms of this Agreement. AOPs will set forth procedures and establish costs at Geographical Area Coordination Centers (GACC), National Interagency Fire Center (NIFC), or WFO level. AOPs developed at the National, GACC, and/or local levels shall not conflict with the terms of this Agreement or the procedures of the Mobilization Guides, and shall include specifications for:

- A. Shared responsibilities of all participants including, but not limited to weather briefings, training, and product/service verification as outlined in Geographic Area specific AOPs;
- B. Procedures for documenting, monitoring and evaluating fire weather products, briefings and services delivered;
- C. Provision for monitoring and evaluating advances in science and technology;
- D. Provision for efficient means for technology transfer;
- E. Provision for participation in fire weather research, development and application activities;
- F. Provision that the NWS and Interagency Wildland Fire Agencies will work together at the National level to review IMET qualifications and standards annually, and will include changes, as appropriate, in the National Annual Operating Plan, and applicable National Wildfire Coordinating Group (NWCG) qualification documents;
- G. Provision that NWS and Wildland Fire Agencies will work together to ensure fire agency decision makers receive consistent products and services;
- H. Provision that the NWS and Wildland Fire Agencies will jointly develop and share meteorological methodologies and procedures;
- I. Requirements related to participation in weather briefings and conference calls with GACCs, NIFC, Multi-Agency Coordination Groups, NWS offices and IMETs as outlined in Annual Operating Plans;
- J. Provision of fire weather expertise in accident/incident investigations;
- K. Provision that the NWS forecast offices and Wildland Fire Agencies' websites establish specific links to both NWS and Predictive Services products;
- L. Participation in the following interagency groups -
  1. **Pre-season:**
    - a. Ensure that appropriate levels of communication are taking place prior to start of fire season.
    - b. Make updates to and disseminate (agency) points of contact list separate from this agreement and as warranted.
    - c. Address training needs and scheduling classes, as needed.
    - d. Update operational procedures documents, as needed and appropriate.
  2. **Post-season:**

Conduct a post season meeting either on site or by teleconferencing or by other means to review the coordinated actions of the prior season and share any “lessons learned” and suggested improvements to the overall process.

- M. Participation in a meeting or teleconference annually to review the status of the current year operations and determine necessary changes (This review shall include estimating the costs for such changes and determining the recommended services and responsibilities among the partnering agencies in the development of the AOP.);
- N. Maintenance of procedures for obtaining services, on-site support, other non-routine services and payment can be found in the Geographical Area and National Mobilization Guides (An electronic copy of the *National Mobilization Guide* ~~(aka “Red Book”)~~ can be viewed via [www.nifc.gov](http://www.nifc.gov) by selecting “National Interagency Coordination Center.” Then select the “Policy” and “Reference Material” links to National Mobilization Guide.); and <sup>SPB</sup>
- O. Establishment of separate agreements or other appropriate arrangements between the requesting and servicing entities for requesting participation and providing reimbursement for NWS employees to serve as instructors in National Wildfire Coordinating Group (NWCG) and other courses. Reference the National Fire Weather Annual Operating Plan for additional information;

#### **VII. AVAILABILITY OF APPROPRIATED FUNDS.**

The signatory agencies enter into this Agreement under the authority of the Coast and Geodetic Survey Act (33 U.S.C. §883d and § 883e), and their respective organic and appropriation acts. 33 U.S.C. §883d and § 883e authorizes NOAA to enter into agreements, with, and to receive and expend funds made available by, any State or subdivision thereof, any Federal agency, or any public or private organization, or individual, for surveys, investigations, and research in geophysical sciences.

The ability of the individual signatory agencies to carry out their respective responsibilities under this Agreement is subject to their respective funding procedures and the availability of appropriated funds. Should any signatory agency encounter budgetary shortfalls or limitations that may affect the activities to be carried out under this Agreement, that signatory agency will provide timely notification to the other signatory agencies in writing. The Wildland Fire Agencies’ funding is identified as no-year funding.

The signatory agencies recognize that, given the current administrative process for payments for fire suppression activities, it is not feasible to obligate the full amount of funds that may be required pursuant to this Agreement because this Agreement does not constitute a binding obligation under 31 U.S.C. § 1501, and because this Agreement cannot anticipate the specific goods or services for which payment will be requested, the individual payment amounts, or the responsible jurisdictional wildland fire management agency in each future case. This information can only be provided by Resource Orders executed when the goods or services are requested.

At the same time, the signatory agencies recognize that Resource Orders are insufficient to constitute a binding obligation under the statute because there is no evidence of intent to be bound, no authorized signatures are present, and no legal authorities are cited; however, these requirements are satisfied by this Agreement. The two documents, when taken together, contain all the elements

required for an obligation under the statute. Therefore, the signatory agencies agree this Agreement shall automatically be incorporated by reference into any Resource Orders issued under it for NWS services and products, and that an obligation of funds will occur by the responsible agency at the time the NWS presents a copy of this Agreement and the Resource Orders for payment.

#### **VIII. TRANSFER OF FUNDS.**

- A. Billing and collection procedures will follow the Intra-governmental Payment and Collection (IPAC) system process.
- B. Wildland Fire Suppression Activities: Obligation of funds and reimbursement of expenditures under this subsection are under the Coast and Geodetic Survey Act (33 U.S.C. §883d and §883e). This Agreement is automatically incorporated by reference into any Resource Order that is issued under it, thus constituting a binding obligation. The Wildland Fire Agencies will take appropriate steps to ensure the funds will be available when the obligations are recorded. This will occur when the applicable Wildland Fire Agency receives a completed Reimbursable Expense Report form (Exhibit A) from the NWS.
  1. Each expense report package must be endorsed and include:
    - a. A copy of the resource order and supporting documentation for expenditures.
    - b. Agency required data elements in accordance with Treasury Financial Manual direction, such as Agency Location Code (ALC), Treasury Account Symbol (TAS), Business Partner Network Number or DUNS, and Business Event Type Code (BETC).
    - c. Applicable overhead assessment for indirect costs consistent with NOAA financial policy. Indirect cost rates vary by NWS geographic location. Generally, indirect cost rates will range from 13% to 18%, with a maximum of generally 22%. NWS waives indirect costs by the maximum amount allowed under NOAA policy. The NWS will annually provide a table of applicable overhead rates, stratified by NWS originating office, as an appendix to this Agreement through the National Annual Operating Plan.
    - d. Identification (name and phone number) of NWS financial contact.
  2. It is the responsibility of the funding agency/office to develop and process a unilaterally signed funding document, or as otherwise authorized through the individual agencies' policies, to obligate funds. It is also the responsibility of the funding agency/office to:
    - a. Conduct any required verification of costs, authorization of expenditures and reconciliation of payment;
    - b. Provide the document number of the funding obligation, required agency data elements and billing instructions to the NWS office that provided the service; and
    - c. Provide information to NWS regarding which payment center to send the IPAC billings to for processing;
  3. IPAC billings are to be submitted to the appropriate payment center by the NWS within ninety (90)-days of completion of service.
- C. Non-Suppression Wildland Fire Projects/Activities: Activities requested under this heading are referenced in Section V.A.4 and are accomplished supplemental to this Agreement via a separate,

written interagency agreement and/or funding order to address obligation, billing and payment terms.

- D. **All-Hazard Emergency Incident Activities:** The National Response Framework and the applicable Emergency Support Function (ESF) policies and procedures govern activities implemented as Presidentially-declared disasters and emergencies under the Stafford Act. The Forest Service is the primary agency coordinator for the Wildland Fire Management Agencies for ESF-4 Firefighting. As a Support Agency listed under the ESF-4 and subtasked by the Forest Service, the Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service will bill the Forest Service utilizing the billing process defined in VIII-B above.

Outside the scope of this Agreement, the Department of Homeland Security, Federal Emergency Management Administration (FEMA) may issue Mission Assignments (MAs) directly to the National Weather Service. These MAs and all associated obligations, billings, and payments are processed separately from this Agreement. .

#### **IX. TERM OF AGREEMENT.**

This Agreement will become effective upon full execution of the final signature by the identified signatory agencies. The period of performance is from October 1, 2017 to September 30, 2022. The Agreement shall be reviewed by all signatory agencies to determine its suitability for renewal, revision, or termination in accordance with Section XI. If this Agreement is extended, the extension must be in writing, and approved and signed by authorized signatories for the agencies.

Upon full execution, this Agreement supersedes and replaces the previous agreement that was executed by the parties on September 28, 2012; referenced as NWS Agreement No. NOAA-NWS-2013-F0001, BLM L12PG00326, BIA A12PG00142, FWS FF09R22000-D-1001A, FS 12-IA-11130206-067, NPS R9560120150.

#### **X. TERMINATION AND SEVERABILITY.**

Any signatory agency may terminate their participation in this Agreement by written notice to all other signatories at any time before the date of expiration upon thirty (30) days written notice of such termination. Full credit shall be allowed for each affected signatory agency's expense and all non-cancelable obligations properly incurred up to the effective date of termination. The remaining signatories may continue the provisions of this Interagency Agreement as long as the NWS remains a signatory.

Nothing herein is intended to conflict with current Department of Commerce, U.S. Department of Agriculture or Department of Interior directives. If the terms of this Agreement are inconsistent with existing directives of any of the signatory agencies entering into this Agreement, then those portions of the Agreement that are determined to be inconsistent shall be invalid but the remaining terms and conditions not affected by the inconsistency shall remain in full force and effect. At the first opportunity for review of the Agreement, all necessary changes will be accomplished either by an amendment to this Agreement or by entering into a new agreement, whichever is deemed expedient to the interest of all signatory agencies.

**XI. RESOLUTION OF DISAGREEMENT.**

Should disagreement arise on the interpretation of the provisions or implementation of this Agreement, the dispute shall be resolved pursuant to the Business Rules for Intragovernmental Transactions delineated in the Treasury Financial Manual (TFM) Volume 1, Part 2, Chapter 4700, Appendix 10: (Resolving Intra-governmental Disputes and Major Differences).

**XII. MODIFYING THE AGREEMENT.**

Any signatory agency may initiate the modification of this Agreement to incorporate any changes that are mutually agreed to by the participants. Such modifications shall be in writing and shall identify the specific activities, the total amount of funds applicable to the modification, as appropriate, and any other pertinent details of the modification. The Bureau of Land Management is designated as the agency responsible for all administrative oversight and preparation of modifications to this Agreement. The modification(s) shall not take effect until documented and signed by authorized signatories for the agencies.

**XIII. PRINCIPAL CONTACTS.**

The Points of Contact are responsible for coordinating an annual review of the currency and adequacy of this Agreement among the signatories, and/or their designees. Changes to the Points of Contact can be made by written notification to the participating signatory agencies.

National Weather Service:

National Fire Weather Program Manager  
Heath Hockenberry  
National Weather Service  
3833 South Development Ave.  
Boise, ID 83705  
208/334-9862 – Office  
heath.hockenberry@noaa.gov

Interagency Wildland Fire Agencies:

National Predictive Services  
Edward Delgado  
National Interagency Fire Center  
3833 South Development Ave.  
Boise, ID 83705  
208/387-5451- Office  
edelgado@blm.gov

**XIV. DEFINITIONS.**


See NWCG Glossary of Fire Weather Terminology ([www.nwcg.gov/pms/pubs/glossary](http://www.nwcg.gov/pms/pubs/glossary))

**XV. SIGNATORY.**

This Agreement shall be effective with and upon full execution of the final signature by the identified signatory agencies.

  
\_\_\_\_\_  
Andrew Stern,  
Analyze, Forecast and Support Office  
DOC, NOAA, National Weather Service

9/25/17  
Date

  
\_\_\_\_\_  
Grant Beebe, Acting Deputy Assistant Director  
Fire and Aviation (Boise)  
DOI, Bureau of Land Management

9-6-17  
Date

  
\_\_\_\_\_  
Jeff Worthley, Contracting  
DOI, Bureau of Land Management- Fire and Aviation


9/11/17  
Date

  
\_\_\_\_\_  
Chris Wilcox, Chief  
Branch of Fire Management  
DOI, Fish and Wildlife Services

9/6/17  
Date

  
\_\_\_\_\_  
Reah Reedy, Administrative Officer  
DOI, Fish and Wildlife Services

9/6/17  
Date

  
\_\_\_\_\_  
Aaron Baldwin, Director  
Branch of Fire Management  
DOI, Bureau of Indian Affairs

9/7/17  
Date

  
\_\_\_\_\_  
Linda Tatum, Associate Director, Budget and Planning  
DOI, Bureau of Indian Affairs

8/31/17  
Date



  
\_\_\_\_\_  
William Kaage, Chief  
Branch of Wildland Fire  
DOI, National Park Service

8/31/17  
Date

  
\_\_\_\_\_  
Sheila Wallace, Agreements Specialist  
DOI, National Park Service

8/31/17  
Date

  
\_\_\_\_\_  
Lawrence Sutton, Director, Operations  
Fire and Aviation Management  
USDA, Forest Service

09/13/17  
Date

  
\_\_\_\_\_  
Danielle L. Bohn, Agreements Specialist  
USDA, Forest Service

9-12-17  
Date



## WEATHER TERMINOLOGY

In general, terms used in fire-weather discussion and summaries are plain language 'dictionary' words. There are, however, a few terms which have a meteorological connotation not covered by the standard dictionary definition. These are defined below:

**Advection:** The transfer of atmospheric properties by horizontal movement of air. Most commonly used in reference to transfer of warmer or colder air.

**Dry Thunderstorm:** A lightning storm accompanied by less than a wetting rain, 0.10 inch precipitation or less, often with very gusty winds.

**Front:** (cold, warm, or stationary) A zone of temperature and density discontinuity between two air masses.

**Gradient:** (pressure gradient) Change of value of the atmospheric pressure per unit of distance. The greater the change per unit of distance, the stronger the gradient, and the stronger the winds.

**High:** An area of high-atmospheric pressure delineated by closed isobars.

**Instability:** (unstable air mass) A state in which the vertical distribution of temperature is such that an air particle, if given either an upward or downward impulse, will tend to move away with increasing speed from its original level. Thunderstorm development would be an example of an unstable air mass.

**Low:** (depression, cell, disturbance) An area of low atmospheric pressure delineated by closed isobars (lines of equal pressure).

**Low Aloft:** (cold low, cold low aloft, upper-level low) Same as low above, except occurring in the upper atmosphere and characterized by moist, unstable and abnormally cooler temperatures aloft.

**Ridge:** (high-pressure ridge) An elongated area of relatively high atmospheric pressure.

**Ridge Aloft:** The same as ridge but occurring in the upper atmosphere. When a ridge is strong and persistent, it is often associated with warm and dry subsiding air.

**Stability:** (stable air mass) A state in which the vertical distribution of temperature is such that an air particle will resist displacement from its level. An inversion is an example of a very stable condition.

**Subsidence:** (subsiding air) A descending motion of air in the atmosphere.

**Temperature Inversion:** (inversion) A layer in which the temperature increases with altitude.

**Thermal low:** (heat low) A low pressure system caused by intensive heating at the earth's surface. Not associated with frontal systems. Occurs under high-pressure aloft and remains stationary.

**Trough (Trough):** An elongated area of relatively low atmospheric pressure. The axis of a trough is the trough line. Fronts are often located in the trough line at the surface.

**Upper-level Trough:** (upper trough, trough aloft) A pressure trough existing in the upper atmosphere.

## LIGHTNING ACTIVITY LEVEL GUIDE

The lightning activity level guide for observers describes clouds, storm and lightning frequency criteria for classifying lightning events. Because the objective is to describe the lightning activity, lightning counts take precedence over the cloud-storm-rain narrative description. For instance, if the clouds should fit the LAL 3 descriptive criteria, but the lightning averages three cloud-to-ground discharges per minute, the LAL should be classified as a 4.

Also included in the lightning activity level guide for observers is the relative frequency of occurrence of the various LAL. For instance, LAL 6 is a rare event not likely to occur on more than 1 or 2 percent of the lightning days.

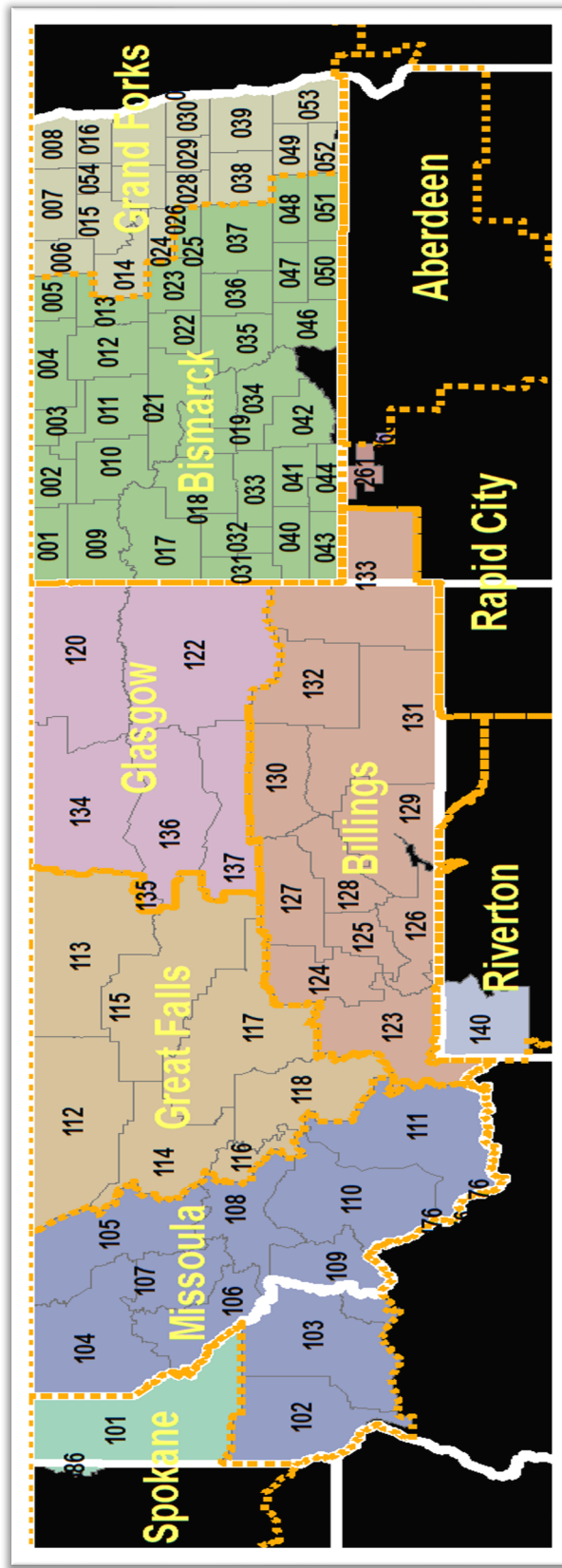
The observation of lightning (the LAL) should include what has happened within a 25 to 30-mile radius of the station.

The fire weather observer must obtain as much information as possible from all available sources to insure an accurate LAL observation. The fire weather forecaster has other sources of information on thunderstorm activity, and therefore, should be consulted if there is confusion over the selection of an LAL.

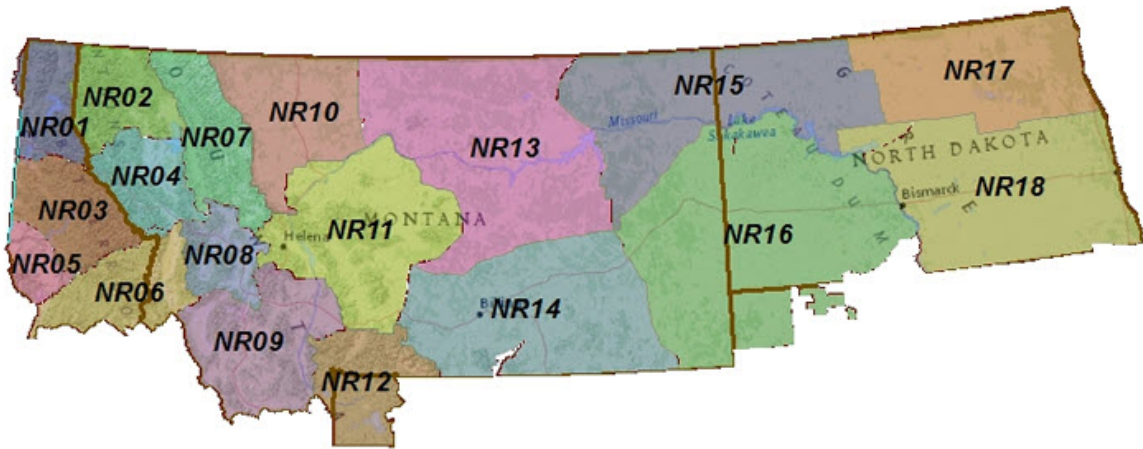
### Lightning Activity Level Guide for Weather Observers

LAL	Cloud & Storm Development	Individual Storm Cell Cloud to Ground Lightning Discharge (cg)			% of T-storm Days
		Countsc g/5 min	Countsc g/15 min	Avg.cg/ min	
1	No T-storms	-	-	-	--
2	Cumulus clouds are common but only a few reach the towering cumulus stage. A single thunderstorm must be confirmed in the observation area. The clouds produce mainly virga, but light rain will occasionally reach the ground. Lightning is very infrequent.	1-5	1-8		10
3	Towering cumulus covers less than two-tenths of the sky. Thunderstorms are few, but two to three must occur within the observation area. Light to moderate rain will reach the ground, and lightning is infrequent.	6-10	9-15	1-2	35
4	Towering cumulus covers two to three-tenths of the sky. Thunderstorms are scattered and more than three must occur within the observation area. Moderate rain is common and lightning is frequent.	11-15	16-25	2-3	35
5	Towering cumulus and thunderstorms are numerous. They cover more than three-tenths and occasionally obscure the sky. Rain is moderate to heavy and lightning is frequent and intense.	>15	>25	>3	18
6	Similar to LAL 3 except thunderstorms are dry.				<2

# Map of NWS Fire Weather Zones



## Map of Northern Rockies GACC PSAs



### Northern Rockies Predictive Service Areas (PSAs)

(Click on PSA # for particular ERC, 1000-hr, and 100-hr Fuel Moisture graphs)

<u>PSA #</u>	<u>PSA NAME</u>
NR01	Northern Idaho Panhandle
NR02	Northwestern Montana
NR03	Southern Idaho Panhandle
NR04	Western Montana
NR05	Camas Prairie of Idaho
NR06	North Central Idaho & Bitterroot/Sapphire Mountains
NR07	Glacier NP & Wilderness Areas
NR08	Southwest Montana, West of Continental Divide
NR09	Big Hole - Southwest Montana, East of Continental Divide
NR10	Northern Front Range
NR11	West Central Montana
NR12	South Central Montana & Yellowstone NP
NR13	Northern Plains & Missouri Breaks
NR14	Southern Montana (Big Horn/Powder River)
NR15	Northeast Montana & Northwest North Dakota
NR16	Southeast Montana & Southwest North Dakota
NR17	Northeastern North Dakota
NR18	Southeastern North Dakota

# Spot Request Form

WS FORM D-1 (1-2005) (Supersedes Previous Editions)		<b>SPOT REQUEST</b> (See reverse for instructions)				U.S. Department of Commerce NOAA National Weather Service						
<b>Please call the NWS Weather Forecast Office (WFO) when submitting a request and also after you receive a forecast to ensure request and forecast were received.</b> <b>Please provide feedback to WFO on forecast.</b>												
1. Time†		2. Date		3. Name of Incident or Project			4. Requesting Agency					
5. Requesting Official			6. Phone Number			7. Fax Number		8. Contact Person				
9. Ignition/Incident Time and Date		12. Reason for Spot Request (choose one only) <input type="radio"/> <b>Wildfire</b> <input type="radio"/> <b>Non-Wildfire</b> Under the Interagency Agreement for Meteorological Services (USFS, BLM, NPS, USFWS, BIA) <input type="radio"/> <b>Non-Wildfire</b> State, tribal or local fire agency working in coordination with a federal participant in the Interagency Agreement for Meteorological Services <input type="radio"/> <b>Non-Wildfire</b> Essential to public safety, e.g. due to the proximity of population centers or critical infrastructure.					13. Latitude/Longitude:					
10. Size (Acres)							14. Elevation (ft, Mean Sea Level) Top:                      Bottom:					
11. Type of Incident <input type="radio"/> <b>Wildfire</b> <input type="radio"/> <b>Prescribed Fire</b> <input type="radio"/> <b>Wildland Fire Use (WFO)</b> <input type="radio"/> <b>HAZMAT</b> <input type="radio"/> <b>Search And Rescue (SAR)</b>							15. Drainage					
		16. Aspect		17. Sheltering <input type="radio"/> <b>Full</b> <input type="radio"/> <b>Partial</b> <input type="radio"/> <b>Unsheltered</b>								
18. Fuel Type: <u>  </u> Grass <u>  </u> Brush <u>  </u> Timber <u>  </u> Slash <u>  </u> Grass/Timber Understory <u>  </u> Other _____ Fuel Model: 1,2,3    4,5,6,7    8,9,10    11,12,13    2,5,8												
19. Location and name of nearest weather observing station (distance & direction from project):												
20. Weather Observations from project or nearby station(s): (Winds should be in compass direction e.g. N, NW, etc.)												
Place		Elevation	†Ob Time	20 ft. Wind		Eye Level Wind.		Temp.		Moisture		Remarks (Relevant Weather, etc)
				Dir	Speed	Dir	Speed	Dry	Wet	RH	DP	
21. Requested Forecast Period Date		22. Primary Forecast Elements (Check all that are needed) (for management ignited wildland fires, provide prescription parameters):					23. Remarks (other needed forecast elements, forecast needed for specific time, etc.)					
Start _____		Sky/Weather _____ Temperature _____ Humidity _____ 20 ft Wind _____ Valley _____ Ridge Top _____ Other (Specify in #23) _____										
End _____												
Forecast needed for:												
<input type="radio"/> Today <input type="radio"/> Tonight <input type="radio"/> Day 2 <input type="radio"/> Extended												
24. Send Forecast to: ATTN:		25. Location:					26. Phone Number: Fax Number:					
27. Remarks (Special requests, incident details, Smoke Dispersion elements needed, etc.):												
EXPLANATION OF SYMBOLS: † Use 24-hour clock to indicate time. Example: 10:15 p.m. = 2215; 10:15 a.m. = 1015 Indicate local standard time or local daylight time												

**WS FORM D-1, January 2005 INSTRUCTIONS:**

**I. Incident Personnel:**

1. Complete items 1 through 27 where applicable.

a. Example of weather conditions on site:

13. Weather Observations from project or nearby station(s):											
Place	Elevation	†Ob Time	20 ft. Wind		Eye Level Wind.		Temp.		Moisture		Remarks <i>(Relevant Weather, etc.)</i>
			Dir	Speed	Dir	Speed	Dry	Wet	RH	DP	
Unit G-50	1530'	0830	NW	6-8	NW	3-5	32		72		Observations from unit RAWS station, 50% cloud cover.

b. If the incident (HAZMAT, SAR) involves marine, put the wave/swell height and direction in the Remarks section.

2. Transmit in numerical sequence or fax to the appropriate Weather Forecast Office. (A weather

forecaster on duty will complete the special forecast as quickly as possible and transmit the forecast and outlook to you by the method requested)

3. Retain completed copy for your records.

4. **Provide feedback to NWS utilizing separate page.** Be sure to include a copy of the spot forecast

with any feedback submission including forecaster's name. Feedback to NWS personnel is imperative to assist with future forecasts. Remember, feedback on correct forecasts is equally as

valuable as feedback on incorrect forecasts! If spot forecast is significantly different than conditions on site, a second forecast may be required.

**II. ALL RELAY POINTS should use this form to insure completeness of date and forecast. A supply of this form should be kept by each dispatcher and all others who may be relaying requests for forecasts or relaying completed forecasts to field units.**

**III. Forms are available from your local National Weather Service Weather Forecast Office. They may also be reproduced by other agencies as needed, entering the phone number and radio identification if desired.**

***NOTICE: Information provided on this form may be used by the National Weather Service for official purposes in any way, including public release and publication in NWS products. False statements on this form may be subject to prosecution under the False Statement Accountability Act of 1996 (18 U.S.C. § 1001) or other statutes.***

# NWS Billings

## 2022 NWS Billings Weather Office

NOTE: This information describes Billings Fire Weather support for the Northern Rockies Geographic Area. Most of the information is the same for the Rocky Mountain Area support. There are a few differences, especially for Red Flag Criteria. Please refer to the Rocky Mountain Area operation plan for Billings Fire Weather support to portions of northern Wyoming.

### Location

The National Weather Service (NWS) office in Billings, Montana is located on the west end of Billings near Interstate 90 exit 446. The mailing address is:

National Weather Service  
2170 Overland Avenue  
Billings, MT 59102-6455

### Contact Information

Keith Meier  
Meteorologist In Charge  
[keith.meier@noaa.gov](mailto:keith.meier@noaa.gov)

Cory Mottice  
Warning Coordination Meteorologist  
[cory.mottice@noaa.gov](mailto:cory.mottice@noaa.gov)

Dan Borsum  
Incident Meteorologist  
Fire Weather Program Leader  
[dan.borsum@noaa.gov](mailto:dan.borsum@noaa.gov)

Shawn Palmquist  
Incident Meteorologist  
Assistant Fire Weather Program Leader  
[shawn.palmquist@noaa.gov](mailto:shawn.palmquist@noaa.gov)

Nickolai Reimer  
Assistant Fire Weather Program Leader  
[nickolai.reimer@noaa.gov](mailto:nickolai.reimer@noaa.gov)

### Contact Information and Internet Addresses

Office: (406) 652-0851      Fax: (406) 652-3214

General Weather Information: <https://weather.gov/Billings>  
Fire Weather Information: <https://weather.gov/wrh/fire?wfo=byz#>  
Spot Forecasts <https://weather.gov/spot>

### Operational Hours

The office is staffed 24x7x365 with meteorologists certified to handle Fire Weather requests. Additional staff are usually available to support multiple requests in a timely manner. The office has two (2) certified Incident Meteorologists (IMET) available for onsite support to large wildfires, prescribed fires, and other major incidents.

### Fire Weather Forecast Issuance Times (Dates may be adjusted according to user needs)

Early spring thru June (for prescribed burn support)	Mornings	Daily	0700
July thru September (for wildfire support)	Mornings	Daily	0700



October thru November (for prescribed burn support)

Afternoons Daily 1530  
Mornings Daily 0700

## Forecast Services

Fire Weather Forecasts, site specific Spot Forecasts, Red Flag Warnings, and Fire Weather Watches will generally follow the format as defined in the **Fire Weather Products Section** of the **Northern Rockies Annual Operating Plan**. These products are issued on a routine basis through the season. Smoke Dispersion information is available upon request for verbal briefings or through spot requests. Additional Smoke Dispersion information is available in the form of the Clearing Index, on the Fire Weather webpage.

Non-routine or unscheduled products may be issued at any time as weather conditions can and do change rapidly. The various affected dispatch offices in the Billings Fire Weather district will be alerted by telephone should this need occur.

## Red Flag Criteria

Anytime the forecaster foresees a change in weather that would result in a significant increase in fire danger.

### For Very High or Extreme Fire Dangers:

1. Scattered dry thunderstorms. (A lightning storm accompanied by less than a wetting rain, 0.10 inch precipitation or less, often with very gusty winds).
2. Increased thunderstorm activity, wet or dry, during an extremely dry period.
3. A combination of low relative humidity and increasing strong or gusty surface winds, or abrupt change in direction due to the approach and passage of a cold front, squall line, or other weather phenomena other than isolated thunderstorms.

### Red Flag conditions may occur with High Fire Danger:

(Generally requires much lower RH and stronger wind thresholds than Very High or Extreme Fire Danger)

### Note: Red Flag criteria for humidity and winds for Wyoming fire zones 274 and 284

(Rocky Mountain Area) are explicit with regards to winds and relative humidity and are as follows:  
Relative Humidity of 15% or less in combination with winds gusting to 25 mph or greater.

## Determining if Red Flag Criteria is Met:

### June through October:

#### **Very High or Extreme Fire Danger:**

Red Flag Warnings for Winds and RH will be considered verified when sustained winds are observed at 15 mph or higher, or Gusts of 25 mph or higher, combined with an RH of 20 percent or lower for three observations within, or near the border of, a given zone. The three observations can be from one sensor or multiple sensors, but must encompass 3 separate hours out of a consecutive 8 hour period.

#### **High Fire Danger:**

Red Flag Warnings for Winds and RH will be considered verified when sustained winds are observed at 25 mph or higher, or Gusts of 40 mph or higher, combined with an RH of 15 percent or lower for three observations within, or near the border of, a given zone. The three observations can be from one sensor or multiple sensors, but must encompass 3 separate hours out of a consecutive 8 hour period.

### **November through May:**

General guidelines will be considered during “non fire season” periods as opposed to strict usage of Fire Danger Ratings. The greater threat during this period is for rangeland and grass fuels to be dry and available for consumption whereas forested areas may not be as stressed. Consideration will be given to recent precipitation and dryness trends including extended periods without snow cover and a lack of recent moisture (example: less than .10 previous 5 days).

Should unseasonal dryness be present, Red Flag Warnings for winds and relative humidity will be considered verified when sustained winds are observed at 40 mph or higher, or Gusts of 58 mph or higher, combined with an RH of 40 percent or lower for 3 observations within, or near the border of, a given zone. The three observations can be from one sensor or multiple sensors, but must encompass 3 separate hours out of a consecutive 8 hour period.

Events that do not meet these criteria may warrant the issuance of a Rangeland Fire Danger Statement (see below).

### **Rangeland Fire Danger Statements (RFD)**

During the spring, fall and winter months, open burning can become a concern for local safety officials when dry and windy conditions are expected but Red Flag criteria will not be met. In order to support county officials for these sub Red Flag warning level events, a RFD will be issued to provide information on rangeland and/or grassland fire potential. This will assist local officials in planning local open burning restrictions and bans. The RFD will be event driven; issued only when a combination of dead fuels, dry weather, gusty winds, above normal temperatures and low relative humidity combine to produce grassland fire concerns.

Here is an example of a RFD.

FIRE DANGER STATEMENT  
NATIONAL WEATHER SERVICE BILLINGS MT  
900 AM MDT WED NOV 16 2016

MTC009-171500-  
INLCUDING THE CITIES OF... RED LODGE...BRIDGER...JOLIET  
900 AM MDT WED NOV 16 2016

...ELEVATED FIRE WATHER CONDITIONS EXPECTED FRIDAY AFTERNOON AND EVENING...

WEATHER CONDITIONS WILL BE FAVORABLE FOR RAPID FIRE SPREAD IN WILDLAND GRASSES.

TIMING: FRIDAY AFTERNOON AND EVENING.

RELATIVE HUMIDITY: 20 TO 30 PERCENT.

WIND: WEST 20 TO 30 MPH.

TEMPERATURE: 80 TO 85 DEGREES...UP TO 20 DEGREES ABOVE NORMAL.

FUELS: AN EXTENDED DRY PERIOD AND LACK OF SNOW COVER HAS RESULTED IN DRY DEAD GRASSES  
ACROSS THE REGION.

FIRE AND EMERGENCY OFFICIALS SHOULD BE AWARE THAT WEATHER CONDITIONS WILL BE FAVORABLE  
FOR THE DEVELOPMENT OF SIGNIFICANT WIND-DRIVEN GRASS FIRES.

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## **Fire Weather Briefings and Notification Emails**

If conditions warrant, weekly fire briefings will be scheduled. Briefings will be a recap of climate trends over the past week, a detailed look at the next 7 days (precip, temps, humidity, winds,etc) and the 8-14 day outlook. Additional briefings can be held as requested.

If briefings are held, notification and briefing details will be disseminated to users through phone calls and emails. Emails may periodically be sent to provide overviews of upcoming weather events which will have high fire impacts.

If you are not receiving these emails please contact the National Weather Service.

## **Support of Land Management and State and County Fire Restriction Coordination**

The National Weather Service office in Billings participates in fire restriction calls (as needed) for south central and eastern Montana. We support these calls by providing briefings to the agencies a few days ahead of the calls so fire personnel and county elected officials have weather information to support restrictions decisions. On the calls, we summarize the information and are ready to answer any questions or concerns.

## **Training Services**

The office has a cadre of meteorologists that may be available to handle fire weather training requests. Refer all training requests or technical support questions to the Warning Coordination Meteorologist or those listed in the **Contact Information** section.

## **Agencies Served**

The Billings National Weather Service Office serves a diverse variety of Federal and State users in Montana, a small portion of northwest South Dakota and north central Wyoming. The Federal Agencies include:

**1. United States Forest Service**

Custer

Gallatin

Bighorn (WY)

**2. Bureau of Land Management**

Billings...Casper and Miles City Offices

**3. Bureau of Indian Affairs (Reservations)**

Crow

Northern Cheyenne

**4. National Wildlife Refuges**

Lake Mason

Hailstone

Halfbreed

**5. National Park Service**

Bighorn Canyon National Recreation Area

Little Bighorn National Battlefield

**6. Wilderness Areas**

Lee Metcalf

Absaroka Beartooth

**7. Montana Department of Natural Resources and Conservation**

Multiple State Lands Offices

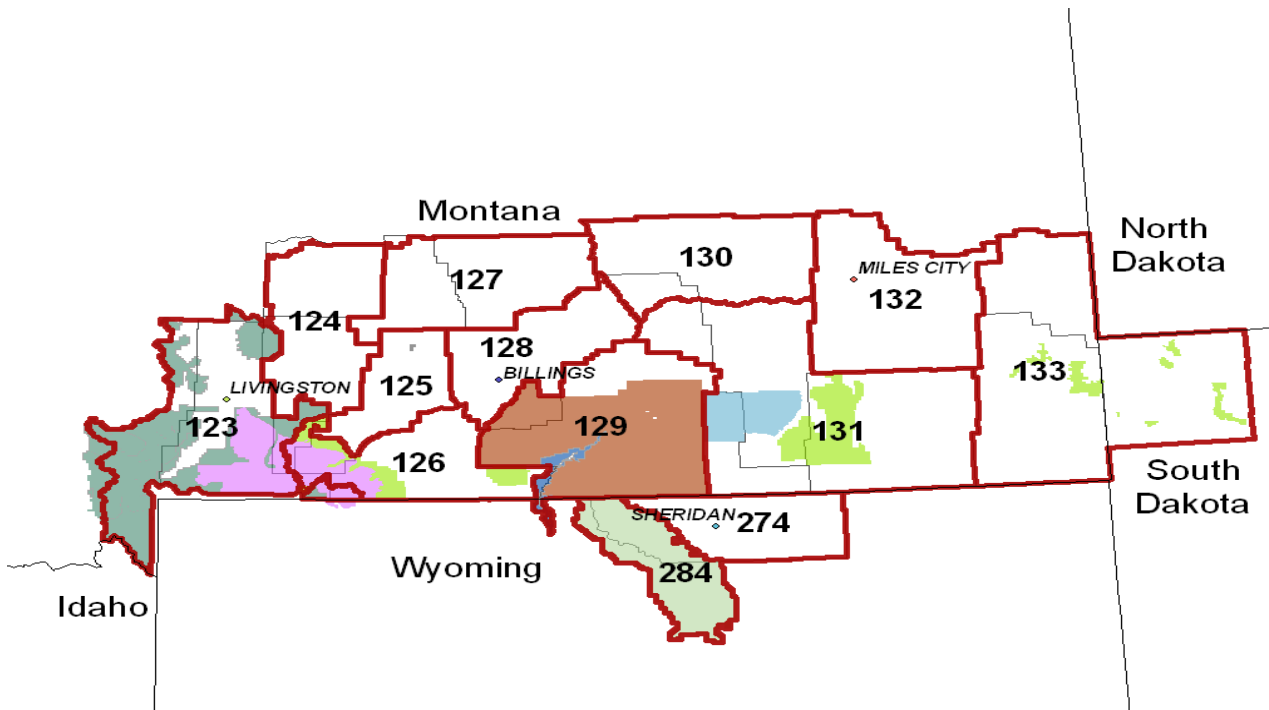
**8. Sheridan County Wyoming Fire Protection Districts**

**Counties Served**

Big Horn, Carbon, Carter, Custer, Fallon, Golden Valley, Musselshell, Park, Powder River, Rosebud, Stillwater, Sweet Grass, Treasure, Wheatland, Yellowstone and Harding (South Dakota) Gallatin (Portion that contains the Gallatin National Forest) and Sheridan, WY along with portions of Big Horn WY, Washakie WY and Johnson WY which are within the Bighorn NF boundaries.

**Fire Weather Zones**

The Billings Fire Weather District covers Region 1 Zones 123 through 133 and Region 2 Zones 274 (Sheridan County) and 284 (Bighorn National Forest). This covers most of the southern half of Montana, Harding County in western South Dakota, and portions of North Central Wyoming.



### Forecast Zone Descriptions

**Zone 123:**

South Central Montana includes all the Gallatin National Forest, Lee Metcalf Wilderness Lands, Butte District of the BLM, and Montana state lands. The area starts at the point where Montana, Idaho, and the Yellowstone National Park share a common point south of West Yellowstone, Montana, then north along the western portion of the Gallatin National Forest, including the Lee Metcalf Wilderness, through Bozeman, and north along the forest boundary to Sixteen Mile Creek along the Meagher and Gallatin County border, then east along the Meagher, Gallatin and Park county border, then around the Crazy Mountain portion of the Gallatin National Forest boundary to the Sweet Grass County border, then south to the Gallatin Forest boundary, then east and south along the Gallatin and Custer National Forests boundaries to the Montana and Wyoming state border, then west to the Yellowstone National Park boundary, then following the Yellowstone National Park boundary to the beginning point south of West Yellowstone, Montana.

**Zone 124:**

South Central Montana including portions of the Miles City District of the BLM, and Montana state lands. The area consists of Wheatland Sweet Grass counties in Montana, excluding portions of the Gallatin National Forest and the Lewis and Clark National Forest within those counties.

**Zone 125:**

South Central Montana including portions of the Miles City District BLM, Montana state lands, the Hailstone National Wildlife Refuge, and the Halfbreed Lake National Wildlife Refuge. The area is bounded on all sides by Stillwater County in Montana, excluding that portion of the Custer National Forest within Stillwater County.

**Zone 126:**

South Central Montana area that includes portions of the Custer National Forest, Miles City District of the BLM, and Montana state lands. This area begins where the Western boundary of the Custer National Forest, Beartooth Ranger District, intersects the Montana State border east of Cooke City, Montana near Mt. Rearguard, then follow the boundary between the Gallatin and Custer National Forests north around the Custer National Forest boundary to the Carbon County border, then follow the county border between

Carbon, Stillwater, and Yellowstone counties east to the Crow Indian Reservation, then south and east along this border to the Bighorn Canyon National Recreation Area, then south along the western boundary of the Bighorn Canyon Recreation Area to the Montana state border, then west along the state border to the initial point.

**Zone 127:**

South Central Montana area that includes Miles City District of the BLM, Montana state lands, and Lake Mason National Recreation Refuge area. The area is bounded by the county borders of Golden Valley and Musselshell Counties and excludes portions of the Musselshell Ranger district of the Lewis and Clark National Forest in northern Golden Valley county.

**Zone 128:**

South Central Montana area includes portions of the Miles City District of the BLM, and Montana state lands. The area is defined as that portion of Big Horn County north of the Crow Indian Reservation, and Yellowstone County excluding that portion of the Crow Indian Reservation within Yellowstone County.

**Zone 129:**

South Central Montana area that includes the Crow Indian Reservation in Montana and the entire Bighorn Canyon National Recreation area in Montana and Northern Wyoming. The area begins at the point where the Montana State border and Crow Indian Reservation coincide North of Sheridan, Wyoming, then follows the border of the Crow Indian Reservation North, West and South to the Carbon County border, then south to the eastern border between the Crow Indian Reservation and the Pryor mountain portion of the Custer National Forest, then east to the Bighorn Canyon National Recreation Area, then south along the western boundary of the Bighorn Canyon Recreation Area boundary to the Montana state border, then west along the state border to U.S. Highway 310, then south to U.S. Highway 14a, then east along this highway to the western border of the Bighorn Canyon Recreation Area, around the southern border of the Recreation area back to U.S. Highway 14a, then north along the eastern border of the Recreation area to the Montana state border, then east back to the initial point.

**Zone 130:**

Southeastern Montana including portions of the Miles City District of the BLM, and Montana state lands. The area begins where the Yellowstone River enters Treasure county, then north along the Treasure county border to the Rosebud county border, then follow the Rosebud county border to where the Yellowstone River exits Rosebud county, then west along the middle of the Yellowstone River to where the Yellowstone River enters Treasure county.

**Zone 131:**

Southeastern Montana including the Northern Cheyenne Indian Reservation, Ashland Ranger District of the Custer National Forest, portions of the Miles City District of the BLM, and Montana state lands. The area begins where the Yellowstone River enters Treasure county, then east along the middle of the Yellowstone River to the Custer county border, then south and east along the Custer county border to the Carter county border, then south along the Carter county border to the Montana state border with Wyoming, then west along the Montana/Wyoming border to the southeast corner of the Crow Indian Reservation, then north along the eastern border of the Crow Indian Reservation to the northern border of the Northern Cheyenne Indian Reservation, then east along the Northern Cheyenne Indian Reservation to the Rosebud county border, then north along the Rosebud county border to the Treasure county border, then north along the Treasure county border to where the Yellowstone River enters Treasure county.

**Zone 132:**

Southeastern Montana including portions of the Miles City District of the BLM, and Montana state lands within Custer County, Montana.

**Zone 133:**

Southeastern Montana and a portion of northwestern South Dakota including the Sioux Ranger District of the Custer National Forest and portions of the Miles City District of the BLM, and state lands in both Montana and South Dakota. The area boundary consists of Fallon and Carter counties in Montana, and Harding county in northwestern South Dakota.

**Zone 274:**

Sheridan County in Wyoming except the portion that is covered by the Bighorn National Forest.

**Zone 284:**

Area consists of the entire Bighorn National Forest in Wyoming.

**RAWS Stations Reference List:**

A listing of RAWS stations that have provided recent weather data within the Billings area of responsibility can be found at the link (portable RAWS will show up on this list):

[http://mesowest.utah.edu/cgi-bin/droman/raws\\_ca\\_monitor.cgi?rawsflag=2&state=BYZfwz](http://mesowest.utah.edu/cgi-bin/droman/raws_ca_monitor.cgi?rawsflag=2&state=BYZfwz)

# NWS Glasgow

## National Weather Service Glasgow Fire Weather 2022 Annual Operating Plan

### Location

The National Weather Service in Glasgow, Montana is located across the street from the Glasgow International Airport. The mailing address is:  
National Weather Service  
92 Airport Road  
Glasgow, MT 59230

### Important Phone Numbers and Office Information

24 Hour Fire Weather Desk: (406) 228-9622  
Administrative line: (406) 228-2850  
Fax (406) 228-9627

Internet <http://www.weather.gov/glasgow>  
Fire Wx Site <https://www.weather.gov/wrh/fire?wfo=ggw#>

Tanja Fransen Meteorologist in Charge Email: <a href="mailto:tanja.fransen@noaa.gov">tanja.fransen@noaa.gov</a>	Brandon Bigelbach Fire Weather Program Manager Email: <a href="mailto:Brandon.Bigelbach@noaa.gov">Brandon.Bigelbach@noaa.gov</a>
Patrick Gilchrist Warning Coordination Meteorologist Incident Meteorologist Email: <a href="mailto:patrick.gilchrist@noaa.gov">patrick.gilchrist@noaa.gov</a>	

Office wide account to share photos or hazard reports:  
[ggw.wxreport@noaa.gov](mailto:ggw.wxreport@noaa.gov)

### Area and Agencies Served

The Glasgow Fire Weather District covers Zones 134 through 137 and Zones 120 and 122 in Northeast Montana. The Glasgow NWS office will issue detailed forecasts to fire control agencies in the area encompassing northeast Montana Agencies served include:

1. Bureau of Land Management  
Lewistown District  
Miles City District
2. Bureau of Indian Affairs  
Fort Peck Reservation
3. US Fish and Wildlife Service  
Bowdoin Refuge  
Charles M. Russell Refuge (Fort Peck, Jordan, Sand Springs and Lewistown)  
Hewitt Lake Refuge



Lamesteer Refuge  
Medicine Lake Refuge  
War Horse Refuge

4. Montana Department of Natural Resources and Conservation  
Northeast Land Office (Lewistown)  
Southeast Land Office (Miles City)

5. County and local agencies



## Forecast Zone Descriptions

### **ZONE 134: NORTHERN VALLEY AND NORTHERN PHILLIPS COUNTIES**

This area consists of Phillips and Valley Counties in Northeast Montana north of Beaver and Willow creeks excluding portions of the Fort Belknap Indian Reservation lands in Phillips County, and excluding portions of Fort Peck Indian Reservation in Valley County. This also includes portions of the Lewistown District of the BLM, Montana state lands, and National Wildlife Refuge lands.

### **ZONE 135: THE LITTLE ROCKIES**

This zone is defined on the north by the Fort Belknap Indian Reservation boundary; on the west by the Phillips County line; to the south by the CMR boundary; and to the east by highway 191. This zone includes the portions of the Lewistown District of the BLM, and Montana state lands.

### **ZONE 136: THE LOWER MISSOURI RIVER BREAKS INCLUDING THE CHARLES M RUSSELL NATIONAL WILDLIFE REFUGE**

This zone is defined on the north by Beaver and Willow creeks; on the west by highway 191 and the western CMR boundary; on the south by Dovetail creek, the middle fork of Lodge Pole creek and Big Dry creek; and on the east by the eastern CMR boundary. This zone includes the entire CMR NWR north and south of the Missouri river, as well as portions of the Lewistown and the Miles City Districts of the BLM, and Montana state lands.

### **ZONE 137: SOUTHERN PETROLEUM AND SOUTHERN GARFIELD COUNTIES**

This area consists of Petroleum and Garfield Counties in northeast Montana south of Dovetail creek, the middle fork of Lodge Pole creek and Big Dry creek. This also includes portions of the Lewistown District and the Miles City district of the BLM, and Montana state lands.

### **ZONE 120: FORT PECK INDIAN RESERVATION**

Northeast Montana includes the Fort Peck Indian Reservation, portions of the Lewistown District of the BLM, and Montana state lands, and National Wildlife Refuge Lands. This area consists of Daniels, Sheridan, and Roosevelt Counties, including all of the Fort Peck Indian Reservation within Valley County.

### **ZONE 122: McCONE/RICHLAND/DAWSON/PRAIRIE/WIBAUX COUNTIES**

Zone 122 in Northeast Montana includes portions of the Miles City District of the BLM, and Montana state lands, and National Wildlife Refuge Lands. The area consists of McCone, Richland, Dawson, Prairie, and Wibaux Counties.

## **FORECAST SERVICES**

### **Routine Forecasts**

Morning Fire Weather Planning Forecasts are issued between 0330 and 0400, 7 days a week during fire season, usually March to November. Afternoon Fire Weather Planning Forecasts are issued between 1430 and 1500, 7 days a week during peak fire season, usually July, August, and September. Forecasts will be updated when needed. The exact dates these forecasts are issued are dictated by user needs. Partners can always contact those listed in this plan to get forecasts started sooner, ending later etc.

Since zones 134, 135, 136, 137 and 122 have elevations that fall into the High Level and Mid-Level Haines index categories; two Haines index values will be provided. The correct Haines Index can then be applied to the appropriate elevation of concern.

### **Non-Routine Products**

Spot forecasts will be issued upon request. Red Flag Warnings and Fire Weather Watches will be issued as needed. All products will be updated when there is a significant change in the weather and the product is no longer representative of conditions. The following conditions will be considered for Red Flag events when the fire danger is Very High or Extreme:

1. Scattered dry thunderstorms or increased thunderstorm activity, wet or dry, during an extremely dry period.
2. A combination of low relative humidity and increasing strong or gusty surface winds, or abrupt change in

direction due to the approach and passage of a cold front, squall line, or other weather phenomena other than isolated thunderstorms. See Red Flag Decision Chart below.

3. In coordination with customers, anytime the forecaster foresees a change in weather that would result in a significant increase in fire danger.

Northeast Montana has a history of very large fall and spring grass fires, which fall outside the “normal fire season.” A Fire Weather Watch and or Red Flag Warning will be issued to alert users when favorable fire weather conditions are present outside the “normal fire season.”

### **Fire Weather Briefings and Notification Emails**

Fire weather briefings are not routinely scheduled, but may be held or requested during periods of extreme fire weather. If briefings are held, notification and briefing details will be disseminated to users through email. Emails will also be periodically sent to provide overviews of upcoming weather events which will have high fire impacts. To be added to the notification list, contact Cory Mottice or Patrick Gilchrist.

### **Fire Weather Briefings for Local Restrictions Calls**

Fire weather briefings will be provided by the National Weather Service on an as needed basis for each scheduled restrictions call throughout the fire season. Determination of the need for the scheduled restrictions call will be made by the BLM office responsible. The briefing for the Miles City restrictions call will be provided by the Glasgow and Billings NWS offices on an alternating basis. The briefing for the Lewistown restrictions call will be provided by the Glasgow and Great Falls NWS offices on an alternating basis. If the observed fire weather, or fuels conditions favors one office over another in severity, that office may take the lead on the call on a more routine basis until the conditions become more uniform throughout the call area. Each NWS office will be present on the call, even if not leading the weather portion, in order to answer specific questions about their area that participants may have.

### **Grassland Fire Danger Index Graphic**

The National Weather Service Office in Glasgow, MT will issue a [grassland fire danger \(GFDI\) graphical forecast](#) on its \*experimental\* Graphical Hazardous Weather Outlook webpage on a twice daily basis. The purpose of this product is to provide a decision support tool to local fire wardens, chiefs, and county commissioners who must make the decision on whether or not to issue burn permits for public burning. Forecast elements used in the calculation of the GFDI include temperature, relative humidity, and wind. The GFDI does not incorporate Burning Index, ERC, or Rates of Spread, and relies solely on satellite derived greenness maps to account for fuel status.

The Graphical GFDI product will be posted to the web automatically by 0400 LDT and 1500 LDT daily, and may be periodically updated between those two times. The graphic will display the forecast grassland fire danger index for a 24 hour period (5am - 5am) starting with Day 1 (Today or Tomorrow, depending on what time of day the graphic is accessed) through Day 7. More detailed information on the representation of each color range of the GFDI can be found on the linked webpage below the image.



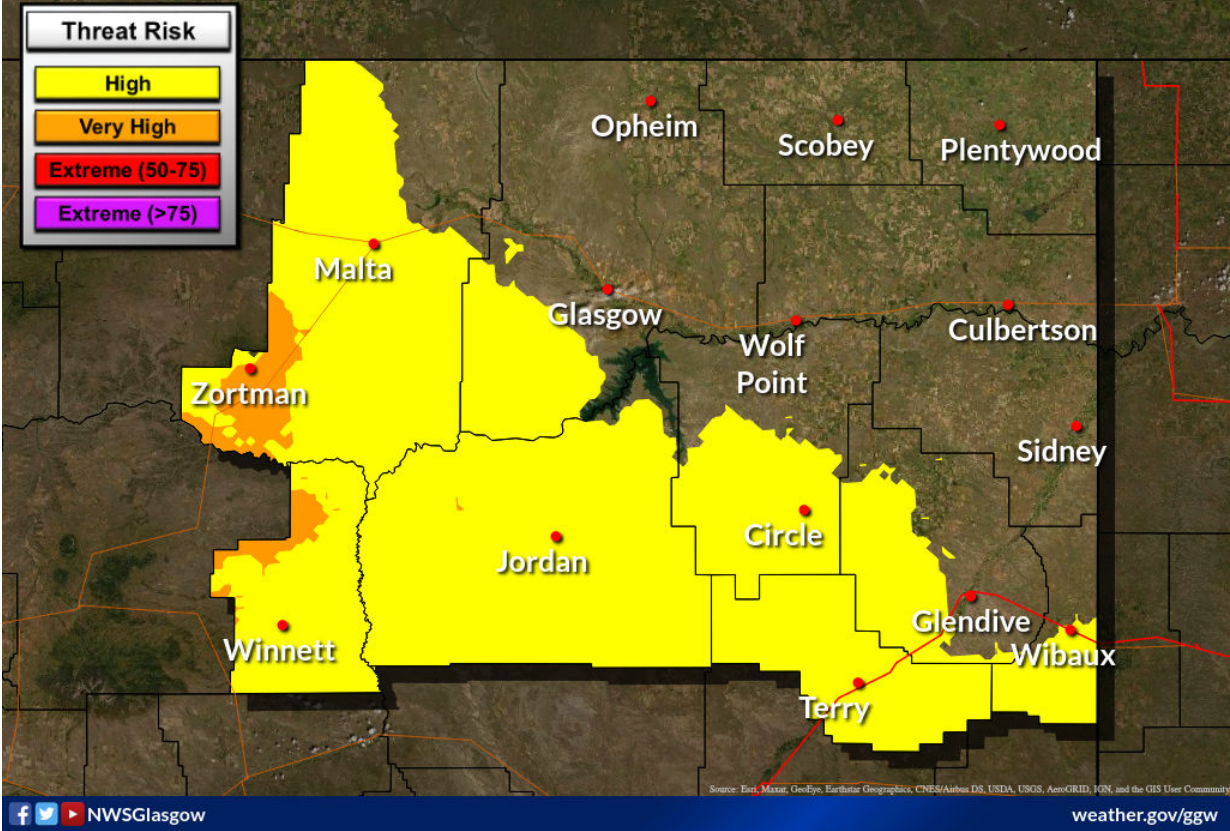
# Grassland Fire Danger Index (GFDI) for Tue/Tue Night

Weather Forecast Office  
Glasgow, MT



Valid 5 AM Tue Mar 01, 2022 to 5 AM Wed Mar 02, 2022

Issued Feb 28, 2022 3:29 AM MST



## Red Flag Decision Chart

The following chart is used as a guideline in the decision making process of a Red Flag Warning when relative humidity and wind are expected to be a factor. This chart is by no means an absolute, and there may be exceptions depending on the weather and fuel situation. Winds are sustained 10 minute averages as RAWS observations measure. Input from fire management officers on fuel conditions is greatly appreciated.

# RED FLAG DECISION CHART

## RELATIVE HUMIDITY

	40%	35%	30%	25%	20%	15%	10%	5%
5	NO	NO	NO	NO	NO	Poss	Poss	Prob
10	NO	NO	NO	NO	Poss	Poss	Prob	YES
15	NO	NO	NO	Poss	Poss	Prob	YES	YES
20'	NO	NO	Poss	Poss	Prob	YES	YES	YES
WIND	NO	NO	Poss	Poss	Prob	YES	YES	YES
MPH								
25	Poss	Poss	Poss	Prob	YES	YES	YES	YES
30	Poss	Poss	Prob	Prob	YES	YES	YES	YES
35	Poss	Prob	YES	YES	YES	YES	YES	YES
40	Prob	Prob	YES	YES	YES	YES	YES	YES

### Verification

In order to verify a Red Flag Warning, 2 observation sites in, or very near, a fire weather zone will need to hit red flag conditions as specified above for a combined 3 hours in an 8 hour period. When lightning activity is part of the warning, observed lightning coverage will also be taken into consideration.

### Eastern Montana Off Season Red Flag Warning Criteria

Off Season (Mid November through Early April) Red Flag Warning criteria are to be utilized from fall through the spring, prior to green-up, when the potential for large grassland fire development exists during periods of strong winds. Local fire community input is strongly encouraged in order to assess area fuels conditions during this period of limited data.

#### Criteria:

- Forecasters should consider how long it has been since significant snow and or rain fell across an area, as well as current fuel conditions.
- A combination of Strong Winds and Relative Humidity less than 25 percent
- Conditions persist for 3 hours or more in an 8 hour period

Red Flag Warnings will be issued in addition to and separate from High Wind Warnings.

### NFDRS Forecasts:

Point Forecasts for NFDRS issued between 1400 and 1500, 7 days a week in fire season. The locations for point forecasts include:

<u>WIMS ID</u>	<u>Location</u>	<u>Zone</u>
240807	Zortman Mine	135
240809	Manning Corral	136
240902	Bluff Creek	134
240903	King Coulee	136

241102	Medicine Lake	120
242303	Dry Blood Creek	137
242403	South Sawmill	136
242501	Poplar	120
244002	Big Sheep Mountain	122

**LIST OF REFERENCE RAWS STATIONS BY FIRE WEATHER ZONE**

<b>Zone</b>	<b>Station Name</b>	<b>WIMS #</b>	<b>County</b>	<b>Location</b>	<b>Elev</b>	<b>Aspect</b>
135	Zortman Mine	240807	Phillips	47 deg 55 min N 108 deg 33 min W	4660	Ridge
134	Bluff Creek	240902	Valley	48 deg 52 min N 106 deg 57 min W	2550	Flat
136	King Coulee	240903	Valley	47 deg 48 min N 107 deg 1 min W	2760	Ridge
120	Poplar	242501	Roosevelt	48 deg 8 min N 105 deg 4 min W	2223	Flat
120	Medicine Lake	241102	Sheridan	48 deg 29 min N 104 deg 29 min W	1975	Flat
137	Dry Blood Creek	242303	Petroleum	47 deg 15 min N 108 deg 22 min W	3140	Ridge S
136	Manning Corral	240809	Phillips	47 deg 42 min N 108 deg 29 min W	3080	Slope SW
136	South Sawmill	242403	Garfield	47 deg 34 min N 107 deg 32 min W	3230	Ridge W
122	Big Sheep	244002	Prairie	47 deg 1 min N 105 deg 49 min W	3150	Valley W-E
122	Pine Hill		Wibaux	46 deg 47 min N 104 deg 35 min W	2650	Slope E

# NWS Great Falls

## NWS Great Falls Fire Weather Services and Information

### Location

The National Weather Service Office in Great Falls is located at 5324 Tri-Hill Frontage Road, 1 mile southwest of I-15 exit 277 on Tri-Hill Frontage Road. The mailing address is:

National Weather Service  
5324 Tri-Hill Frontage Road  
Great Falls, Montana 59404-4933

### Contact Information

Fire Weather Line: 406-453-8429 Forecast Operations Line: 406-952-3790 Fax: 406-453-3812	
Donald Britton Meteorologist-in-Charge (MIC) <a href="mailto:Donald.Britton@noaa.gov">Donald.Britton@noaa.gov</a>	Robert Hart Warning Coordination Meteorologist (WCM) <a href="mailto:robert.hart@noaa.gov">robert.hart@noaa.gov</a>
Christian Cassell Incident Meteorologist Fire Weather Program Leader (FWPL) <a href="mailto:Christian.Cassell@noaa.gov">Christian.Cassell@noaa.gov</a>	Bob Hoenisch Incident Meteorologist Fire Weather Program Leader (FWPL) <a href="mailto:Robert.Hoenisch@noaa.gov">Robert.Hoenisch@noaa.gov</a>

### Websites

Great Falls area general weather information: <http://weather.gov/greatfalls>

Great Falls area fire weather information: <https://www.weather.gov/wrh/fire?wfo=tx>

Great Falls areas Fire Weather Decision Support Page: <https://www.weather.gov/tfx/firesupport>

National fire weather information: <https://weather.gov/fire>

### Operational Hours

NWS Great Falls is staffed 24 hours a day, 7 days a week with meteorologists trained in handling fire weather support requests.

### Fire Weather Services

Fire Weather Planning Forecasts, site specific Spot Forecasts, NFDRS Forecasts, Fire Weather Watches, and Red Flag Warnings will generally follow the format as outlined in the **Basic Fire Weather Forecast Services** section of the **Northern Rockies Fire Weather Operations Plan**. The Fire Weather Planning Forecast product will be issued on a routine basis through the fire season for various land and fire managers within the Great Falls Fire Weather District. The specific beginning/ending dates of these products vary slightly each year depending on fire season activity.

Non-routine products such as the Fire Weather Watch and Red Flag Warning will be issued when conditions warrant. Coordination between the Great Falls forecast office and the land/fire management agencies is of utmost importance to keep each other informed on fuel and weather conditions. The agency dispatch offices in

the Great Falls fire weather district will be alerted via telephone upon issuance of any Fire Weather Watch or Red Flag Warning.

### **Routine Product Issuance Times**

[Fire Weather Planning Forecasts](#) (Dates may be adjusted according to user needs)

Spring (April through June)	Mornings	Daily	0600-0630
Wildfire Season (July through September)	Mornings	Daily	0600-0630
	Afternoons	Daily	1500-1530
Fall (October thru November)	Mornings	Daily	0600-0630

[National Fire Danger Rating System \(NFDRS\) forecast product](#)

Daily 1500-1530

### **Spot Forecasts**

Spot forecasts are requested and disseminated via the national spot web page at <http://www.weather.gov/spot>. This system is interactive, and may be accessed by land/fire managers, fire crews and dispatchers. Users will be asked to specify their primary concerns on an individual project such as smoke dispersion, eye-level winds, afternoon relative humidity, etc. Forecasters will address these concerns and provide general fire weather information in the Spot forecast, providing a detailed, timely decision-making tool to our fire weather partners. For assistance on submitting and processing Spot requests, please contact NWS Great Falls. As a back-up to the website-based system, Spot requests can be submitted via fax (406 453-3812) or phone call (406-453-8429). When faxing requests, a call should be made to NWS Great Falls to give a heads-up and verify fax receipt.

### **Fire Weather Briefings and Email Notifications**

NWS Great Falls will offer fire weather briefings via conference call for local land/fire managers as conditions warrant or upon request. If briefings are held, notification and briefing details will be disseminated to users through email. Recorded briefings will be produced periodically to provide overviews and additional information on weather events anticipated to have high fire weather impacts. Emails are sent as needed to provide an overview of upcoming weather events and longer range outlooks. If you would like to be included on these emails, please contact one of our fire program managers.

### **Fire Restriction Coordination Calls**

NWS Great Falls participates in fire restriction coordination calls for the Lewistown, Helena and Great Falls restrictions group areas. A summary of current and forecast weather conditions is provided and we are available for any questions or concerns to support decisions being made concerning fire restrictions.

### **Training Services**

NWS Great Falls fire weather forecasters are available to support fire weather training requests such as S290, S390, pre-season refresher training and Engine Academies. Refer all training requests or technical support questions to our fire weather program managers or the meteorologist in charge. Please give as much advance notification as possible to ensure the availability of a forecaster.



## Social Media

NWS Great Falls uses social media tools such as Twitter, Facebook and YouTube to engage the public and our partners in conversation around important weather, water, and climate issues. At times, general fire weather concerns may be addressed through these venues:

Facebook <https://www.facebook.com/NWSGreatFalls/>  
Twitter [@NWSGreatFalls](https://twitter.com/NWSGreatFalls)  
YouTube <https://www.youtube.com/NWSGreatFalls/>

## Supported Agencies

The NWS Great Falls fire weather program serves a variety of federal, state and local users across north central and a portion of southwest Montana.

1. **United States Forest Service:** [Helena-Lewis and Clark National Forest](#)
2. **Bureau of Land Management:** [North-central district/Lewistown Field office](#)  
[Upper Missouri Breaks National Monument](#)
3. **Bureau of Indian Affairs:** [Blackfeet, Fort Belknap and Rocky Boy's Reservations](#)
4. **National Wildlife Refuges and National Monuments:** [Benton Lake NWR](#), [Creedman Coulee NWR](#), [Black Coulee NWR](#), [Lake Thibadeau NWR](#)
5. **Wilderness Areas:** [Gates of the Mountains](#), [Bob Marshall Wilderness Complex](#)
6. **State of Montana:** [MT Dept of Natural Resources and Conservation \(DNRC\),](#)  
[Central and Northeast](#) land offices
7. **Counties:** Glacier, Toole, Liberty, Pondera, Hill, Blaine, Phillips, Teton, Fergus, Lewis & Clark, Chouteau, Powell, Cascade, Judith Basin, Wheatland, Meagher, Jefferson, Broadwater, Gallatin

## **RED FLAG CRITERIA**

One or more of the following weather conditions are considered for Red Flag when they occur in conjunction with Very High or Extreme fire danger conditions:

1. Scattered dry thunderstorms. These are defined as lightning storms accompanied by less than a wetting rain (0.10 inch precipitation or less), often producing erratic, gusty winds.
2. Increased thunderstorm activity, wet or dry, during an extremely dry period.
3. A combination of low relative humidity (RH) and strong or gusty surface winds, or abrupt change in wind direction due to the approach and passage of a cold front, squall lines, or other weather phenomena other than isolated thunderstorms. See the Red Flag Decision Chart below for additional details.
4. Anytime the forecaster foresees a change in weather that would result in a significant increase in fire danger.

### **Eastern Montana Off-Season Red Flag Warning Criteria**

Off-season Red Flag Warning criteria will be utilized during the fall through spring period (generally mid-November through early April), prior to green-up, when the potential for grassland fire development exists during periods of strong winds. Local fire community input is strongly encouraged in order to assess area fuel conditions during this period of limited data.

- Criteria:
- A prolonged period without snow cover
  - Significantly above normal temperatures
  - A combination of strong winds and relative humidity less than 30 percent
  - Conditions expected to persist for 3 hours or more in an 8-hour period

Note that Red Flag Warnings will be issued in addition to and separate from High Wind Warnings for applicable events.

## **RED FLAG VERIFICATION**

Red Flag Warnings for winds and low RH will be considered verified when sustained winds are observed at 15 mph or higher, or gusts of 25 mph or higher, combined with a RH of 20 percent or lower for three observations within, or near the border of, a given fire zone. The three observations can be from one sensor or multiple sensors, but must encompass 3 separate hours out of a consecutive 8-hour period.

## **RED FLAG DECISION CHART**

NWS Great Falls Fire Weather Forecasters utilize a Red Flag Decision Chart as a "first look" at the need for a Red Flag Warning, based on increasing wind and low RH. Typically Red Flag Warnings are issued when fire

danger is rated "VERY HIGH" or "EXTREME". However, there may be exceptions. This chart is by no means an absolute.

Winds here are the sustained 10-minute average (RAWS).



## RED FLAG DECISION CHART



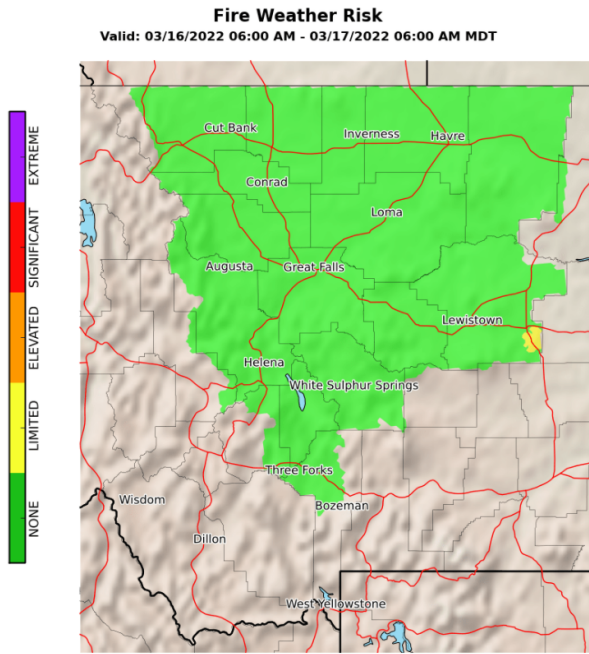
		RELATIVE HUMIDITY							
		40%	35%	30%	25%	20%	15%	10%	5%
W I N D  M P H	5	NO	NO	NO	NO	NO	Poss	Poss	YES
	10	NO	NO	NO	NO	Poss	Poss	YES	YES
	15	NO	NO	NO	Poss	Poss	YES	YES	YES
	20	NO	NO	Poss	Poss	YES	YES	YES	YES
	25	NO	Poss	Poss	YES	YES	YES	YES	YES
	30	Poss	Poss	YES	YES	YES	YES	YES	YES

### EXPERIMENTAL ENHANCED HAZARDOUS WEATHER OUTLOOK (EHWO)

The [Experimental Enhanced Hazardous Weather Outlook](#) is a decision support service that aids preparedness and response efforts prior to and during hazardous weather. This service provides decision makers with convenient access to potential weather hazard information by graphically depicting the risk of weather hazards out through seven days.

The fire weather risk category for the Enhanced Hazardous Weather Outlook is based primarily on predicted wind, humidity and temperature, and does not account for fuel moisture, effects from recent precipitation, snow cover or recently melted snow. Appropriate adjustments to the fire environment must be made.

Fire Weather Risk

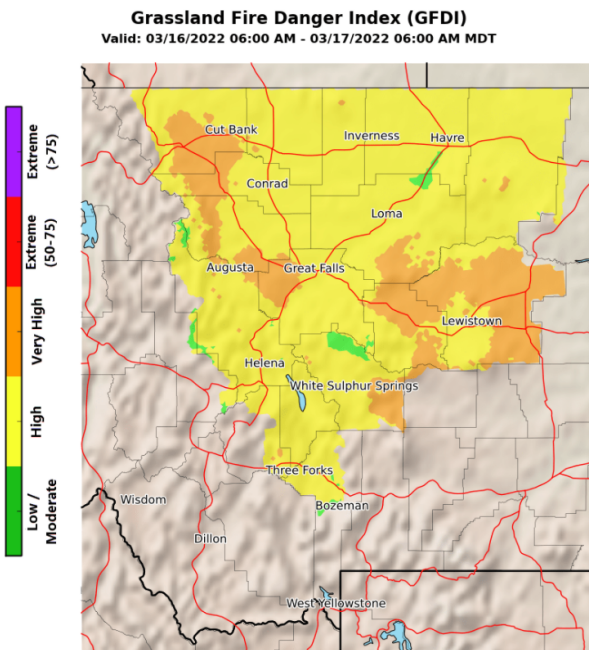


Hazard Risks (Click on color to display map)

24 Hr Hazard	Day 1	Tue	Wed	Thu	Fri	Sat	Sun
Spotter Outlook	■						
Tornado	■	■					
Hail	■	■					
Thunderstorm Wind	■	■					
Severe Thunderstorms	■	■	■	■	■	■	■
Excessive Rainfall	■	■	■	■	■	■	■
Lightning	■	■	■	■	■	■	■
Excessive Heat	■	■	■	■	■	■	■
Fog	■	■	■	■	■	■	■
NonThunderstorm Wind	■	■	■	■	■	■	■
Fire Weather	■	■	■	■	■	■	■
Grassland Fire Danger Index (GFDI)	■	■	■	■	■	■	■
Excessive Cold	■	■	■	■	■	■	■
Ice Accumulation	■	■	■	■	■	■	■
Snow Sleet	■	■	■	■	■	■	■

The grassland fire danger index (GFDI) category for the Enhanced Hazardous Weather Outlook is an experimental product provided as decision support tool to aid local fire wardens, chiefs, and county commissioners who must make decisions on whether or not to issue burn permits for public burning. Forecast elements used in the calculation of the GFDI include temperature, relative humidity, and wind. The GFDI relies solely on satellite derived greenness maps to account for fuel status. This tool is solely for use in grassland fuel types and does not include effects from snow cover or recently melted snow.

Grassland Fire Danger Index (GFDI)

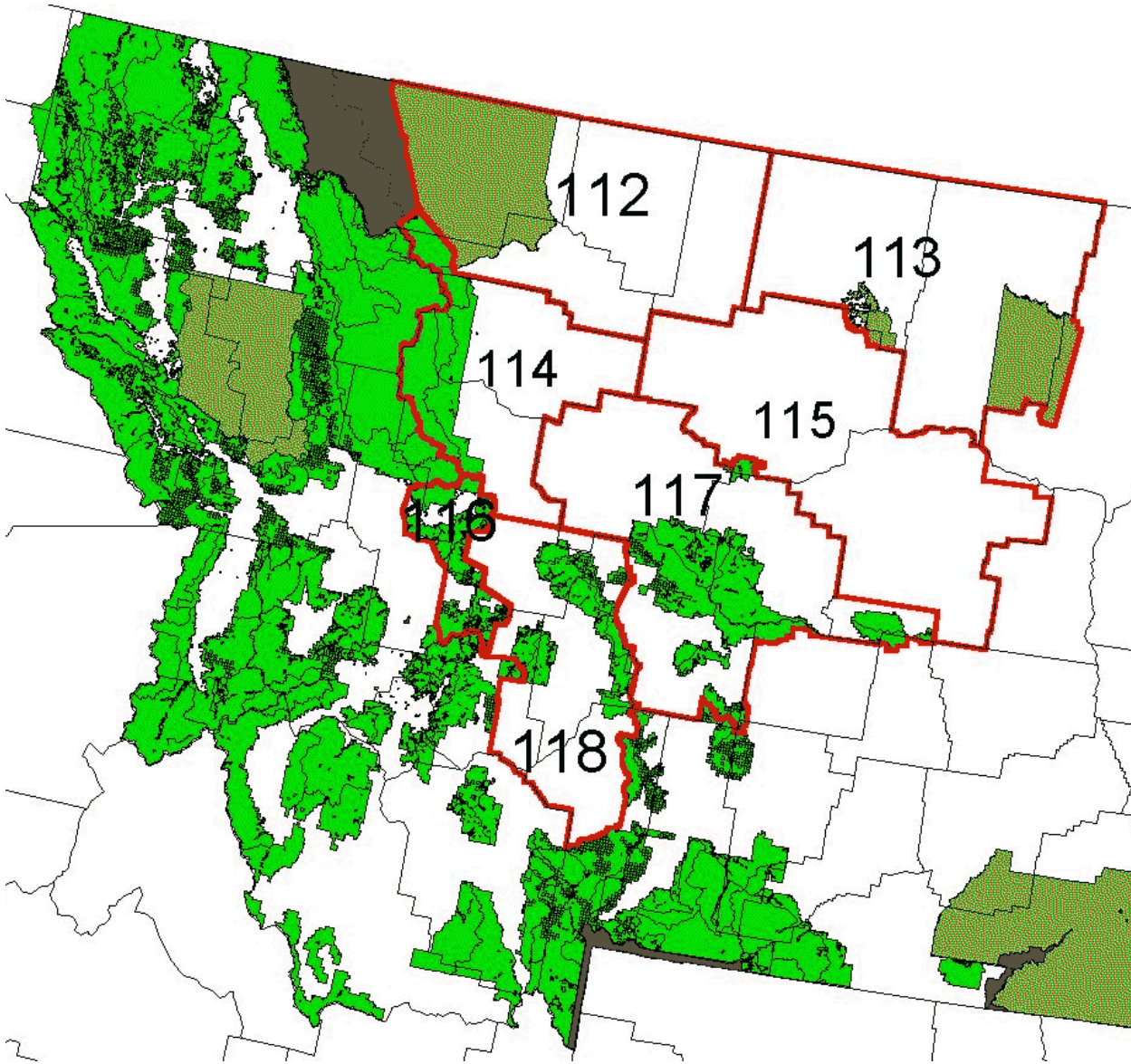


Hazard Risks (Click on color to display map)

24 Hr Hazard	Day 1	Tue	Wed	Thu	Fri	Sat	Sun
Spotter Outlook	■						
Tornado	■	■					
Hail	■	■					
Thunderstorm Wind	■	■					
Severe Thunderstorms	■	■	■	■	■	■	■
Excessive Rainfall	■	■	■	■	■	■	■
Lightning	■	■	■	■	■	■	■
Excessive Heat	■	■	■	■	■	■	■
Fog	■	■	■	■	■	■	■
NonThunderstorm Wind	■	■	■	■	■	■	■
Fire Weather	■	■	■	■	■	■	■
Grassland Fire Danger Index (GFDI)	■	■	■	■	■	■	■
Excessive Cold	■	■	■	■	■	■	■
Ice Accumulation	■	■	■	■	■	■	■
Snow Sleet	■	■	■	■	■	■	■

## Fire Weather District

The NWS Great Falls Fire Weather District covers zones 112 through 118 across north central and a portion of southwest Montana. The map of all wildland fire zones in Montana can be found here: [MT fire zones](#).



## NWS Great Falls Zone Descriptions

**Zone 112: Blackfeet Indian Reservation/Eastern Glacier County/Toole County/Liberty County/most of Pondera County**

This zone starts at the intersection of Glacier National Park (GNP)/Blackfeet Indian Reservation at the Canadian border. The western boundary follows south along the eastern GNP border and intersects and runs south along the eastern border of the Lewis and Clark National Forest (LCNF) until the Pondera/Teton county border. The zone then extends east from this border to include the remainder of Glacier and Pondera counties and all of Toole and Liberty counties.

**Zone 113: Hill and Blaine counties including the Rocky Boy's and Fort Belknap Indian Reservations**

This zone includes all of Hill County and the majority of Blaine County including all of the Rocky Boy's and Fort Belknap Indian Reservations. This zone however excludes the Upper Missouri National Wild and Scenic River along the southern edge of Blaine County.

**Zone 114: Lewis and Clark NF - Rocky Mountain District and portions of the Rocky Mountain Front**

The western boundary of this zone begins at the intersection of U.S. Highway 2/GNP/Blackfeet Indian Reservation and runs southwest along U.S. Route 2 until the Continental Divide. The western boundary continues southward along the Continental Divide to include all the western boundary of the Rocky Mountain District of the LCNF until the intersection of the Continental Divide and State Route 279. The northern boundary of the zone starts at the intersection of U.S. Highway 2/GNP/Blackfeet Indian Reservation and runs along the eastern forest boundary until the Pondera/Teton county line. From this point, the zone extends south and east to include all of Teton County and northern and central Lewis and Clark County. More specifically in Lewis and Clark County, the southern border extends due east from the intersection of MT State Route 279, along the 4700' parallel, to the Cascade County line.

**Zone 115: Chouteau/Fergus Counties**

This zone includes all of Chouteau County, but excludes the Highwood Mountains of the LCNF and the extreme southwest section of the Rocky Boy's Indian Reservation. The zone then extends southeast to include the majority of Fergus County including the Upper Missouri National Wild and Scenic River but excludes the LCNF northern and eastern boundaries, including the Big and Little Snowy Mountains.

**Zone 116: All Areas within the Helena and Lincoln Ranger Districts of the Helena National Forest (HNF), but excludes the Scapegoat Wilderness Area and Areas east of I-15**

This zone extends from the southern boundary of the Northern Rocky District of the LCNF and the southern boundary of the Scapegoat Wilderness Area southward to include all the HNF, including the Lincoln and Helena Ranger Districts west of Interstate 15.

**Zone 117: All of the Central and Eastern LCNF Areas, including Cascade, Meagher, and Judith Basin Counties**

This zone includes all of Cascade and Judith Basin counties, including a small portion of southern Chouteau County to include the Highwood Mountains (LCNF), and east to include the southwest portion of Fergus County specified in Zone 115. The zone then continues south through Meagher County with the western border being along the eastern edge of the HNF and the southern border being along the southern Meagher county line until the Crazy Mountains. The southern border of the zone includes the LCNF portion of the Crazy Mountains.

The southern zone boundary then finishes up along the Meagher/Wheatland county line where it intersects with the southern edge of the Little Belt Mountains (LCNF).

**Zone 118: Areas within the Helena NF east of Interstate 15, including the Townsend and Helena Ranger Districts**

This zone includes portions of southern Lewis and Clark County, western Meagher County, all of Broadwater County, eastern Jefferson County, and northwest Gallatin County.



## List of RAWS/NFDRS Stations by Fire Weather Zone

Zone	Station Name	WIMS #	County	Lat	Long	Elevation	Info
112	<a href="#">St. Mary</a>	240303	Glacier	48.70	113.40	4500	<a href="#">SRYM8</a>
112	<a href="#">Deep Creek BFA</a>	240308	Glacier	48.36	113.11	5340	<a href="#">DCRM8</a>
112	<a href="#">Browning BFA</a>	240307	Glacier	48.56	113.01	4384	<a href="#">BGRM8</a>
113	<a href="#">Fort Belknap</a>	240705	Blaine	48.33	108.72	2665	<a href="#">FBLM8</a>
113	<a href="#">Little Bull Whacker</a>	240704	Blaine	47.81	109.02	3100	<a href="#">LBCM8</a>
113	<a href="#">Rocky Boy</a>	240601	Hill	48.26	109.78	3800	<a href="#">RBCM8</a>
114	<a href="#">Benchmark</a>	241901	Lewis & Clark	47.49	112.87	5350	<a href="#">BEFM8</a>
114	<a href="#">Gates Park</a>	241909	Teton	47.79	112.94	6900	<a href="#">GPKM8</a>
114	<a href="#">Gleason</a>	241802	Teton	47.87	112.67	5200	<a href="#">GSNM8</a>
115	<a href="#">Armells Creek</a>	242205	Fergus	47.58	108.87	2820	<a href="#">ARMM8</a>
115	<a href="#">Judith Peak</a>	242208	Fergus	47.21	109.22	6428	<a href="#">JPKM8</a>
115	<a href="#">Little Snowy</a>	242207	Fergus	46.75	109.02	4975	<a href="#">LSNM8</a>
116	<a href="#">Lincoln</a>	241904	Lewis & Clark	46.97	112.64	4597	<a href="#">LNCM8</a>
117	<a href="#">Porphyry</a>	243402	Meagher	46.84	110.72	8232	<a href="#">PHYM8</a>
117	<a href="#">White Sulphur Springs</a>	243403	Meagher	46.53	110.89	5060	<a href="#">WSRM8</a>
117	<a href="#">Dearborn</a>	241910	Lewis & Clark	47.13	111.91	3518	<a href="#">DBOM8</a>
117	<a href="#">South Fork Judith</a>	242102	Judith Basin	46.72	110.41	6300	<a href="#">SFJM8</a>
117	<a href="#">Newlan Creek</a>	243404	Meagher	46.74	110.85	5635	<a href="#">NCRM8</a>
118	<a href="#">Helena</a>	241907	Lewis & Clark	46.72	112.00	3840	<a href="#">HRWM8</a>
118	<a href="#">Ginger</a>	243302	Broadwater	46.33	111.59	4370	<a href="#">GINM8</a>
118	<a href="#">Elkhorn</a>	243303	Broadwater	46.31	111.70	6010	<a href="#">EKHM8</a>

# NWS Missoula

## MISSOULA FIRE WEATHER – 2022

### Location

The National Weather Service Office in Missoula is located at the Missoula Fire, Science and Technology Center, 6633 Aviation Way, 1/4 mile west of the Missoula International Airport. The mailing address is:

**National Weather Service**  
6633 Aviation Way  
Missoula, MT 59808

### Phone Numbers

- Fire Weather desk: (406) 329-4716
- Office: (406) 329-4715/4840
- FAX: (406) 329-4842

### Contacts

Administrative	IMETs	NWS Missoula Fire Team
<b>Bruce Bauck</b> Meteorologist in Charge <a href="mailto:bruce.bauck@noaa.gov">bruce.bauck@noaa.gov</a>	<b>Bob Nester</b> Incident Meteorologist <a href="mailto:robert.nester@noaa.gov">robert.nester@noaa.gov</a>	<b>Trent Smith</b> North Central Idaho Liaison (Clearwater/Nez Perce NF) <a href="mailto:trent.smith@noaa.gov">trent.smith@noaa.gov</a>
<b>Jenn Kitsmiller</b> Fire Wx Team Leader <a href="mailto:jennifer.kitsmiller@noaa.gov">jennifer.kitsmiller@noaa.gov</a>	<b>Ryan Leach</b> Incident Meteorologist <a href="mailto:ryan.leach@noaa.gov">ryan.leach@noaa.gov</a>	<b>Jenn Kitsmiller</b> Northwest Montana Liaison (Flathead and Kootenai NF) <a href="mailto:jennifer.kitsmiller@noaa.gov">jennifer.kitsmiller@noaa.gov</a>
<b>Marty Whitmore</b> Warning Coordination Meteorologist <a href="mailto:marty.whitmore@noaa.gov">marty.whitmore@noaa.gov</a>	<b>Trent Smith</b> Incident Meteorologist Trainee <a href="mailto:trent.smith@noaa.gov">trent.smith@noaa.gov</a>	<b>Ryan Leach</b> West-central Montana Liaison (Lolo NF) <a href="mailto:ryan.leach@noaa.gov">ryan.leach@noaa.gov</a>
		<b>Alex Lukinbeal</b> Southwest Montana Liaison (Bitterroot and B-D NF) <a href="mailto:alex.lukinbeal@noaa.gov">alex.lukinbeal@noaa.gov</a>
		<b>Luke Robinson</b> Salish Kootenai Tribe Liaison <a href="mailto:luke.robinson@noaa.gov">luke.robinson@noaa.gov</a>



		<b>Joe Messina</b> DNRC Liaison <a href="mailto:joseph.messina@noaa.gov">joseph.messina@noaa.gov</a>
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**Internet Address:** <https://weather.gov/missoula>

**Operational Hours:** Twenty-four hour service is provided for routine and special fire weather products.

## TRAINING PROVIDED

Missoula Fire Weather Forecasters are available for training courses, workshops, seminars and other meetings requiring meteorological expertise. Training includes local and Regional courses such as S-290 and S-390, as well as pre-season refreshers for Hotshot crews, Smokejumpers, general firefighters, lookout personnel, etc. Please give as much advance notification as possible to ensure the availability of a forecaster.

All Training Requests should go through the appropriate Fire Weather Team Liaison, listed in the table above.

## FIRE WEATHER BRIEFINGS

NWS Missoula produces recorded fire weather briefings for local land managers.

Recorded briefings will be posted Sundays and Thursdays by 3:00 pm MDT/2:00 pm PDT year round. More frequent recordings may be produced during periods of increased wildfire activity. A live link to the briefing will also be placed beneath the discussion in the fire weather forecast (FWF). Fire weather briefings are also archived on our [YouTube channel](http://www.youtube.com/NWSMissoula) (<http://www.youtube.com/NWSMissoula>).

Land managers are encouraged to call NWS Missoula regarding specific weather and/or recorded briefing questions at (406)-329-4716

## SOCIAL MEDIA

NWS Missoula uses social media tools such as Twitter, Facebook and YouTube to engage the public and our partners in conversations about important weather, water, and climate issues, which at times may include information pertaining to fire weather. These tools will be used in addition to other sources already in use to inform the fire community of critical weather.

Facebook: <https://www.facebook.com/NWSMissoula>.

Twitter: <https://www.twitter.com/NWSMissoula>.

YouTube: <http://www.youtube.com/nwsmissoula>.

NWS Missoula also uses email as a way to keep in touch with our fire weather partners. Emails may be used to notify the fire community about potentially significant fire weather events and may be sent several days before traditional products such as watches or warnings would be issued. Emails may also be used to announce the start/end of the fire weather forecast, to advertise fire weather briefings (both live and recorded), and during the prescribed burning seasons to advertise potential burn windows. If you would like to be included on these emails, please send a message stating your name, agency and position to [jennifer.kitsmiller@noaa.gov](mailto:jennifer.kitsmiller@noaa.gov)

## AGENCIES SERVED

The National Weather Service Office in Missoula provides fire weather services to agencies in western Montana and west central Idaho. Agencies served include:

<a href="#"><u>USDA Forest Service Region 1</u></a>	<a href="#"><u>Lolo NF, Kootenai NF, Flathead NF, Beaverhead/Deerlodge NF, Clearwater / Nezperce NF, Bitterroot NF, Northern Rockies Coordination Center (NRCC)</u></a>
<a href="#"><u>Bureau of Land Management</u></a>	<a href="#"><u>BLM-Idaho, BLM-Montana</u></a>
<a href="#"><u>Bureau of Indian Affairs</u></a>	<a href="#"><u>Nez Perce Tribe of Idaho, Confederated Salish and Kootenai Tribe</u></a>
<a href="#"><u>Fish &amp; Wildlife Service</u></a>	<a href="#"><u>FWS-Montana, FWS-Idaho</u></a>
<a href="#"><u>National Park Service</u></a>	<a href="#"><u>Glacier NP</u></a>
<a href="#"><u>State of Montana</u></a>	<a href="#"><u>Department of Natural Resources and Conservation</u></a>
Counties (Montana)	<a href="#"><u>Beaverhead, Deer Lodge, Flathead, Granite, Lake, Lincoln, Mineral, Missoula, Powell, Ravalli, Sanders, Silverbow, Glacier, Madison, Jefferson</u></a>
<a href="#"><u>State of Idaho</u></a>	<a href="#"><u>Idaho Department of Lands, CPTPA</u></a>
Counties (Idaho)	<a href="#"><u>Clearwater, Idaho, Lewis, Nez Perce, Latah</u></a>

## ***ROUTINE PRODUCT ISSUANCE TIMES***

### ***General Forecast***

April - June	Morning	Daily	0700 MDT
July - September	Morning/ Afternoon	Daily	0700/1500 MDT
October - November	Mornings	Daily	0700 MDT

Specific dates of the above timeframes will be dictated by user needs.

### **Recorded Fire Weather Briefings**

Year Round	Sunday/Thursday	1500 MDT
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Briefings may be provided more frequently during periods of increased wildfire activity.

# ***National Fire Danger Rating System (NFDRS) Forecast Product***

Year Round

Daily

1530 MDT

## **FIRE WEATHER PLANNING FORECAST EXAMPLE**

ZCZC GTFFWFMSO  
FNUS55 KMSO 101059

Fire Weather Planning Forecast for Wrn Montana and N Cntrl Idaho  
National Weather Service Missoula MT  
459 AM MDT Fri Aug 10 2013

...Headline as Necessary...

DISCUSSION...

Idaho: This would be a short, non-technical description of the weather pattern and features over the next couple days in Idaho. It will focus on the main weather concerns in the short term.

Montana: This would be a short, non-technical description of the weather pattern and features over the next couple days in Montana. It will focus on the main weather concerns in the short term.

Extended...Occasionally the discussion may include information on the medium range (days 3-7). In these cases, a separate labeled paragraph like this will be added.

When a recorded briefing is available, a live link will be placed at the end of the discussion.

MTZ104-105-111345-  
Kootenai-Flathead/Glacier Park-  
459 AM MDT Fri Aug 10 2013

...Red Flag Warning in Effect From Noon Today to 9 PM MDT This Evening...

.Today...

- \* Sky/Weather.....Partly sunny. Areas of smoke. Isolated showers and thunderstorms this morning.
- \* Max Temperature.....77-83 valleys and 63-71 ridges.
- \* Min Humidity.....24-34 percent.
- \* 20-Foot winds.....
- \* Lower Elevation.....Variable less than 7 mph becoming southwest  
\* 15-25 mph with higher gusts in the late  
\* morning and afternoon.
- \* Ridge Top.....West 15-25 mph with higher gusts.
- \* Haines Index.....3 Very Low.
- \* LAL.....2.
- \* CWR (> 0.10 Inch)...10 Percent.

.Tonight...

- \* Sky/Weather.....Partly cloudy. Areas of smoke.
- \* Min Temperature.....42-50.
- \* Max Humidity.....80-90 percent valleys and 61-71 percent ridges.
- \* 20-Foot winds.....
- \* Lower Elevation.....Southwest 15-25 mph becoming west 5-10 mph  
\* in the late evening and early morning...  
\* then becoming downslope/downvalley 5-10 mph

\* early in the morning.  
\* Ridge Top.....West 15-25 mph decreasing to 10-15 mph  
\* after midnight.  
\* Haines Index.....2 very low.  
\* LAL.....1.  
\* CWR (> 0.10 Inch)...0 Percent.

.Saturday...

\* Sky/Weather.....Mostly sunny. Areas of smoke in the morning.  
\* Max Temperature.....82-89 valleys and 72-77 ridges.  
\* Min Humidity.....19-29 percent.  
\* 20-Foot Winds.....  
\* Lower Elevation.....Upslope/Upvalley 2-4 mph becoming south  
\* 5-10 mph in the afternoon.  
\* Ridge Top.....South 5-15 mph.  
\* Haines Index.....4 Low.  
\* LAL.....1.  
\* CWR (> 0.10 Inch)...0 Percent.

.Sunday...Partly cloudy. Lows 48-58. Highs 77-87. West winds to 10-15 mph.

.Monday...Partly cloudy. Lows 49-59. Highs 80-90. Southwest winds  
5-10 mph.

.Tuesday...Partly cloudy. Lows 50-60. Highs 85-95. Diurnal  
terrain winds to 10 mph.

.Wednesday...Partly cloudy. Slight chance of showers and thunderstorms.  
Lows 51-61. Highs 87-97.

.Thursday...Mostly cloudy. Slight chance of showers and thunderstorms.  
Lows 51-61. Highs 80-90.

\$\$

Forecast for next geographical descriptor and fire weather zone  
group.

## RED FLAG CRITERIA

One or more of the following conditions, in conjunction with Very High or Extreme Fire Dangers, will be considered for Red Flag events.

1. Increasing thunderstorm activity (scattered or widespread coverage).
2. A combination of low RH's and increasing surface winds. See the Red Flag Decision Chart below.

## RED FLAG DECISION CHART

Missoula's Fire Weather Forecasters utilize a Red Flag Decision Chart as a "first look" at the need for a Red Flag Warning, based on increasing wind and low RH. Typically Red Flag Warnings are issued when fire danger is rated "VERY HIGH" or greater. However, there may be exceptions. This chart is by no means an absolute.

# Winds/RH Category

		RELATIVE HUMIDITY							
		35%	30%	25%	20%	15%	10%	5%	
Sustained	20'	5	NO	NO	NO	NO	NO	NO	Poss
	WIND		NO	NO	NO	NO	Poss	Poss	YES
For Persistent Gusts add 10 MPH	MPH 10	NO	NO	NO	NO	Poss	Poss	YES	
	15	NO	NO	NO	Poss	Poss	YES	YES	
	20	NO	NO	Poss	Poss	YES	YES	YES	
	25	NO	Poss	Poss	YES	YES	YES	YES	
	30	NO	Poss	YES	YES	YES	YES	YES	

Expected over a significant portion of the zone for 2 or more consecutive hours.

Winds are sustained 10-minute average (RAWS). **Poss = Possible**

## FORECAST ZONE DESCRIPTIONS

### ZONE 102: PALOUSE/NEZ PERCE RESERVATION/HELL'S CANYON REGION

The northern boundary follows the southern portion of the Coeur d'Alene Indian Reservation and the Latah/Clearwater County lines. The eastern boundary originates at the intersection of the Little North Fork of the Clearwater (near the Clearwater County line) and the Clearwater/Nezperce National Forest boundary and runs south along the Forest boundary past Grangeville to the main Salmon River at Island Bar and continues south and west along the Idaho County border. The western boundary runs along the Snake River from the Coeur d'Alene Reservation to the Adams County line.

### ZONE 103: CLEARWATER/NEZ PERCE NATIONAL FOREST

This zone encompasses the entire combined Clearwater and Nezperce National Forests as well as the Gospel Hump and portions of the Selway Bitterroot Wilderness. Also included is the Floodwood State Forest in the vicinity of the Little North Fork of the Clearwater at the northern border of Clearwater County.

### ZONE 104: KOOTENAI NATIONAL FOREST/TALLEY LAKE DISTRICT (FNF)

The western and northern boundaries follow political lines along the Idaho-Montana and Canadian borders. The

eastern boundary follows the Kootenai National Forest boundary south to route 93 to the Flathead National Forest boundary, north of Whitefish, east of Columbia Falls and heading south along the Forest boundary to the Lake County line. The southern boundary follows the Lake County line and Flathead National Forest boundary to the intersection of route 2 which continues south along Forest boundaries to the State border. The State protected lands on the Fisher River District are also included within this zone.

**ZONE 105: FLATHEAD NATIONAL FOREST/GLACIER PARK/BOB MARSHALL AND MISSION MOUNTAIN WILDERNESS**

This zone starts at the intersection of the Kootenai/Flathead National Forests at the Canadian border running east and including Glacier National Park. The eastern boundary follows the Park border and intersects with the Continental Divide and runs south to the Flathead National Forest boundary. The southern boundary borders the Bob Marshall and Mission Mountain Wilderness lines. The western boundary follows the Mission Mountains and Swan range along the Forest boundary to north of Whitefish and west to route 93 to the Kootenai/Flathead National Forest boundary. This zone includes the Stillwater State Forest.

**ZONE 106: WESTERN LOLO NATIONAL FOREST**

This zone includes the Nine Mile, Superior, Plains/Thompson Falls and western portions of the Missoula District on the Lolo National Forest. It is bounded by the Idaho-Montana border (Bitterroot Mountains) and extends northeast along the Kootenai/Lolo National Forest boundary. Moving south, this zone follows the Salish & Kootenai Indian Reservation and Lolo National Forest interface to west of Evaro tracing the Forest boundary to Huson. Crossing I-90, this zone continues south along the Forest boundary until the intersection of route 12 and continues southwestward to the State border.

**ZONE 107: FLATHEAD RESERVATION**

This zone is bounded by the Lolo National Forest on the west and south and the Flathead National Forest on the east and north.

**ZONE 108: EASTERN LOLO NATIONAL FOREST /WELCOME CREEK AND SCAPEGOAT WILDERNESSES**

This zone includes all of the Lolo National Forest east of Missoula and south of route 12, up to the Bitterroot National Forest boundary. It also contains the Scapegoat and most of the Welcome Creek Wildernesses. The eastern boundary starts at the tri-section of the Bob Marshall Wilderness, Continental Divide and Scapegoat Wilderness and continues southeast to the Wilderness/Lincoln District boundary. This line continues south along the Helena National Forest boundary to the intersection with the Deerlodge/Beaverhead National Forest. The southern boundary runs west from this boundary to Deer Lodge then north along Interstate 90 to the intersection with the Philipsburg District line. State protection areas include Missoula, Clearwater, Garrison, and Anaconda.

**ZONE 109: BITTERROOT NATIONAL FOREST**

This zone includes the entire Bitterroot National Forest (in both Idaho and Montana) as well as the Frank Church River of No Return Wilderness and portions of the Selway-Bitterroot Wilderness. The Stevensville District represents the northern boundary for this zone which is approximately along the Ravalli County line.

**ZONE 110: DEERLODGE/ WESTERN BEAVERHEAD NATIONAL FOREST**

The western boundary runs between Lemhi Pass northward along the Idaho-Montana border to the intersection of the Ravalli and Beaverhead County lines. This boundary continues along the Forest boundary via the Anaconda-Pintlar range and Sapphire Divide past Skalkaho Pass and across Rock Creek into the Welcome Creek Wilderness. This boundary cuts north across the John Long Mountains and intersects with Interstate 90. This zone includes the eastern-most section of this wilderness area (Lolo National Forest) which is managed by

the Philipsburg District. The northern border follows Interstate 90 to Deerlodge, cuts east and runs along the Forest boundary, across the divide, and intersects with Interstate 15. The eastern boundary runs southerly and follows Interstate 15 through Butte and Dillon then along Route 41 to Clark Canyon Reservoir. The southern boundary extends west along Horse Prairie Creek to Lemhi Pass.

**ZONE EASTERN BEAVERHEAD NATIONAL FOREST  
111:**

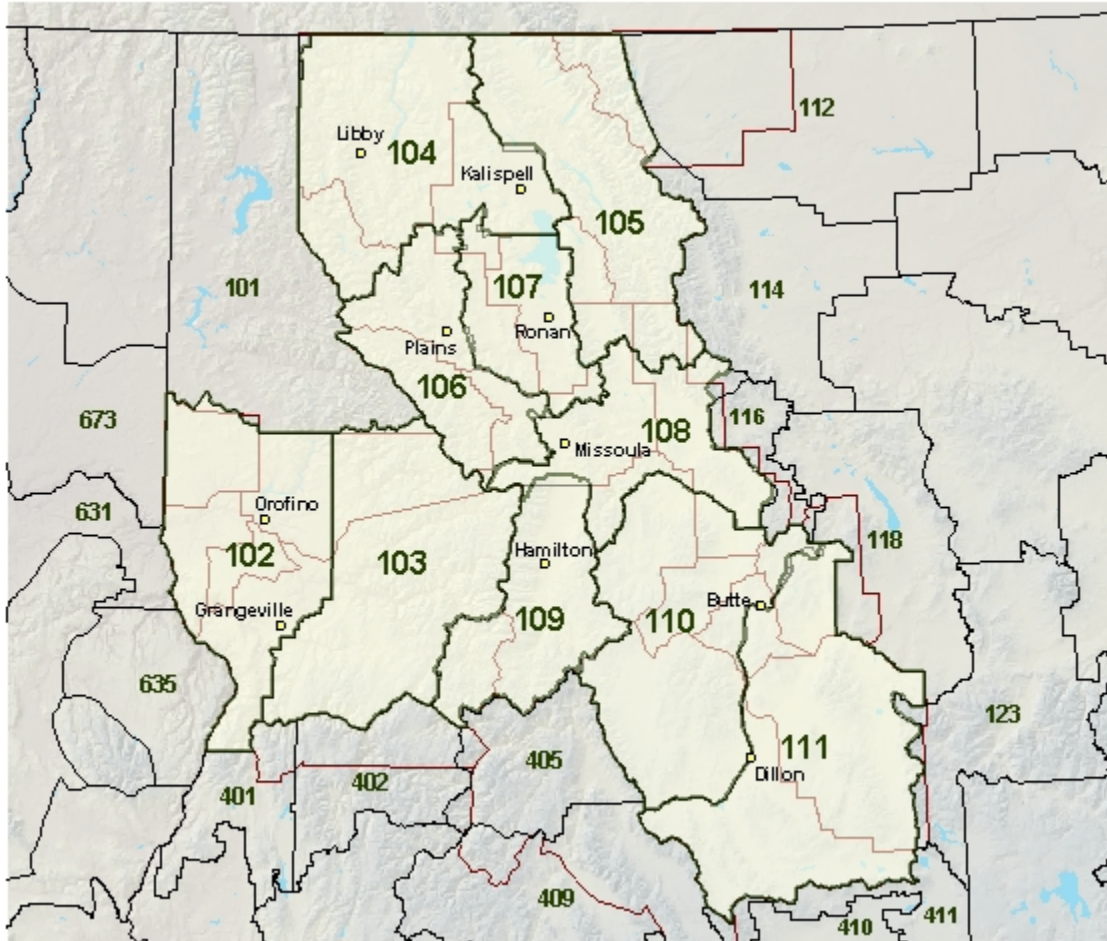
The southern boundary follows the Idaho-Montana border from Lemhi Pass along the Continental Divide (Centennial Mountains included) to Reynolds Pass. The eastern zone line continues along the Beaverhead/Gallatin National Forest boundary to north of Ennis where the Gallatin boundary intersects the Madison County line. The zone then follows the Madison County line to east of Whitehall and along the Deerlodge/Helena Forest boundary until Interstate 15 is intersected. The west boundary is identical to the east boundary of the Deerlodge/western Beaverhead National Forest zone.

## **WEATHER STATIONS**

A listing of RAWS stations that have provided recent weather data within the Missoula area of responsibility can be found at the following link (portable RAWS will show up on this list as well):

[MesoWest RAWS Stations](#)

## FIRE WEATHER DISTRICT



The Missoula Fire Weather District includes zones 102 through 111 in north-central Idaho and western Montana.



# NWS Riverton

## 2022 NWS Riverton Weather Office

NOTE: This information describes the Riverton Fire Weather support for the Northern Rockies Geographic Area.

### Location

The National Weather Service office in Riverton, Wyoming is located west of Central Wyoming Regional Airport.

The mailing address is:  
National Weather Service  
12744 West US Hwy 26  
Riverton, WY 82501

### Contact Information

Chris Jones  
Meteorologist in Charge / Fire Weather Team  
[chris.jones@noaa.gov](mailto:chris.jones@noaa.gov)

Jason Straub  
Fire Weather Team / IMET  
[jason.straub@noaa.gov](mailto:jason.straub@noaa.gov)

Noah Myers  
Fire Weather Team / IMET Trainee  
[noah.myers@noaa.gov](mailto:noah.myers@noaa.gov)

Office: (307) 857-3869 / (800) 211-1448  
Fax: (307) 857-3861

### Internet Addresses

General Weather Information: <https://weather.gov/riw>  
Fire Weather Information: <https://weather.gov/riw/fire>  
National Fire Weather Information: <https://weather.gov/fire>

### Operational Hours

The National Weather Service office in Riverton, Wyoming is staffed 24 hours a day with at least one meteorologist certified to handle Fire Weather requests. Additional staff is usually available enabling multiple requests to be handled in a timely manner.

## **General Fire Weather Forecast Issuance Times** (Dates may be adjusted according to user needs)

Once daily automated issuance (no discussion) November - April by 0700 MST/MDT.

Once daily issuance (with discussion) May and October by 0700 MDT.

Twice daily issuance (with discussion) June - September by 0700 MDT and 1500 MDT.

## **Forecast Services**

Fire Weather Forecasts, site specific Spot Forecasts, Red Flag Warnings, Rangeland Fire Danger Statements and Fire Weather Watches will generally follow the format as defined in the **Fire Weather Products Section** of the **Northern Rockies Annual Operating Plan**. These products are issued on a routine basis through the season. Smoke Dispersion information is available in the Fire Weather Forecasts and upon request for verbal briefings, through spot requests, and through point-and-click tabular data.

Non-routine or unscheduled products may be issued at any time as weather conditions can and do change rapidly. The affected dispatch offices in the Riverton Fire Weather District will be alerted by telephone should this need occur.

## **Fire Weather Briefings**

The National Weather Service in Riverton will offer fire weather briefings via conference calls on an event driven basis. A notification email will be sent whenever a briefing is issued from this address: [nws.riverton@noaa.gov](mailto:nws.riverton@noaa.gov). Please ensure this address is out of your “spam” list.

## **Red Flag Criteria**

These are Red Flag events when they occur with Very High, or Extreme Fire Dangers.

1. Widely scattered dry thunderstorms. (A lightning storm accompanied by less than 0.10 inch precipitation or less, often with very gusty winds, LAL6 ).
2. Increased thunderstorm activity, wet or dry, during an extremely dry period (Critical Lightning)
3. A combination of low RH's and increasing strong or gusty surface winds, or abrupt change in direction due to the approach and passage of a cold front, squall line, or other weather phenomena other than isolated thunderstorms, a Haines Index of 5 or 6.
4. Anytime the forecaster foresees a change in weather that would result in a significant increase in fire danger.

## **Red Flag Verification**

Red Flag Warnings for Winds and RH will be considered verified when sustained winds or frequent gusts of 25 mph or higher are observed, combined with an RH of 15 percent or lower for any three hours or more in a 12-hour period within a given fire weather zone.

## Rangeland Fire Danger Statement

These will be issued for near critical fire weather conditions. Either a) Fuels are not yet deemed critical on a more widespread basis but weather conditions would have met red flag criteria;, OR b) Weather conditions don't quite meet red flag criteria and fuels are critical.

1. No snow cover and less than 0.10" of precipitation in the last five days
2. Temperatures greater than or equal to 10F above normal
3. Wind sustained 15 mph or greater
4. Relative humidity less than 25%

## Agencies Served

The Riverton National Weather Service Office serves Yellowstone National Park in the Northern Rockies Area.

## Fire Weather Zones

The Riverton Fire Weather District covers Zone 140, Yellowstone National Park in extreme northwest Wyoming.

**List of Reference RAWS Stations by Fire Weather Zone:** (This list may be subject to change, please check periodically for updates.)

Zone	Station	WIMS #	County	Lat	Long	Elev
140	Cabin Creek	480118	Park	44.31	-110.15	8650'
140	Quadrant	480115	Park	44.93	-110.99	7900'
140	Soda Butte	480119	Park, MT	45.01	-110.04	8160'
140	Grebe	480120	Park	44.72	-110.51	7900'
140	Bechler	480101	Teton	44.15	-111.04	6400'

# NWS Spokane

## National Weather Service, Spokane Fire Weather Operating Plan 2022

### NEW For 2022:

- 1) New Fire Weather Zones for Eastern Washington.
    - a. All but one zone boundary changed in Eastern WA.
    - b. All zone numbers in Eastern WA have changed.
    - c. No changes to fire weather zone 101 in North Idaho.
    - d. NWS Pendleton will take fire weather responsibilities for portions of the Southern Cascades and Kittitas Valley.
    - e. NWS Spokane will take fire weather responsibilities for the foothills of the Blue Mountains, southern WA Palouse, and Snake River Valley in Washington State.
  - 2) Staff changes
- 

### LOCATION:

National Weather Service Office  
2601 North Rambo Road  
Spokane, WA 99224-9164

### HOURS:

Office hours at NWS Spokane for Fire Weather will be as follows:

Daily with 24 hour forecast and briefing coverage

### PHONE NUMBERS and E-Mail:

Fire Weather (509) 244-5031  
Public (509) 244-6395  
FAX (509) 244-0554

[andrew.brown@noaa.gov](mailto:andrew.brown@noaa.gov)

[ronald.miller@noaa.gov](mailto:ronald.miller@noaa.gov)

[stephen.bodnar@noaa.gov](mailto:stephen.bodnar@noaa.gov)

### STAFF:

<u>Name</u>	<u>Position</u>
Ron Miller	Meteorologist in Charge
Chad Shafer	Science and Operations Officer
Andy Brown	Warning Coordination Meteorologist
Todd Carter	ITO/IMET
Jon Fox	Senior Forecaster/IMET
Steve Bodnar	Senior Forecaster/Fire Weather Program Leader/IMET
Jeremy Wolf	Senior Forecaster
Greg Koch	Senior Forecaster
Char Dewey	Senior Forecaster

Miranda Solveig Cote Forecaster  
Robin Fox Forecaster  
Laurie Nisbet Forecaster  
Rocco Pelatti Forecaster  
Steven Van Horn Forecaster/IMET Trainee  
Joey Clevenger Forecaster  
Jennifer Simmons Forecaster  
Ken Daniel Forecaster  
Valerie Thaler Forecaster

## **COMMUNICATIONS:**

All forecasts are available on WIMS, and Spokane's home page. Customers who do not have access to WIMS, or Internet can still have forecasts faxed to them.

Internet Address:

<http://www.wrh.noaa.gov/otx>

<http://www.weather.gov/spokane>

<https://www.weather.gov/wrh/fire?wfo=otx>

# FIRE WEATHER WEBPAGE

<https://www.weather.gov/wrh/fire?wfo=otx&layer=fwx>

**Forecast Matrix for 48.1803 -120.3126**  
 For Planning Purposes Only. See SFDI for Official Forecast

	Sun Mar 14	Mon Mar 15	Tue Mar 16	Wed Mar 17	Thu Mar 18	Fri Mar 19
LAL	1	1	1	1	1	1
Min Humidity (%)	83	88	84	73	78	73
Max Wind Gust (mph)	17	23	18	21	25	28
Wind Direction*	W	NW	NW	SE	E	SW
Haines	4	2	2	2	2	2
Max Temperature (F)	31	25	32	31	33	33
Max Humidity (%)	85	88	75	83	83	78
Cloud Cover (at 1500') (%)	87	33	27	88	72	89
Probability of Precip (%)	41	3	0	7	55	53

	Values that Indicate Neutral or Suppressed Fire Conditions	Values that Indicate Elevated Fire Conditions	Values that Indicate Critical/Extreme Fire Conditions
LAL Criteria:	1	3, 4, 5	2, 6
Min Humidity Criteria:	≥ 23 %	18 to 22 %	≤ 15 %
Max Wind Gust Criteria:	≤ 9 mph	10 to 19 mph	≥ 20 mph
Wind Direction Criteria:	Criticality of wind direction highly dependent on burn operations and/or structures threatened. Direction matches timing of max gust.		
Haines Criteria:	≤ 4	5	6
Max Temp. Criteria:	Temperature thresholds available during locally defined periods.		
Max Humidity Criteria:	≥ 25 %	23 to 24 %	≤ 24 %
Cloud Cover Criteria:	≥ 40 %	≤ 35 %	
Probability of Precip Criteria:	≥ 50 %	≤ 40 %	

Three tabs found on the bottom of the map for a selected gridpoint. Gridpoint is defined as a 2.5km by 2.5km forecast point (ie, the green box illustrated on map)

Tab 1: Fire Weather Zone Forecast for the specified gridpoint

Tab 2: Color coded Fire Weather Matrix for the specified gridpoint.

Tab 3: Point Forecast Matrix for the specified gridpoint. (elevation listed)

## TRAINING PROVIDED

Spokane Fire Weather Forecasters are available for training courses, workshops, seminars and other meetings requiring meteorological expertise. Training includes local and regional courses such as S-290 and S-390, as

well as pre-season refreshers for Hotshot crews, Smokejumpers, burn bosses, general firefighters, lookout personnel, etc. Please give as much advance notification as possible to ensure the availability of a forecaster. Please send all training requests to [stephen.bodnar@noaa.gov](mailto:stephen.bodnar@noaa.gov).

## **WEATHER BRIEFINGS**

Internet based weather briefings are available from the Spokane office as needed. During peak fire season, normally mid June-early October briefings will be daily at 0900 PDT. These briefings will be recorded and should be available on the Fire Weather Page by 1000 PDT.

During Land Management season briefings are available by customer request and are usually held twice per week for planning purposes. To register for the webinars, please contact [stephen.bodnar@noaa.gov](mailto:stephen.bodnar@noaa.gov) to be added to the seasonal list or call 509-244-5031 to inquiry about registering. Phone briefings are available 24 hours per day by calling 509-244-5031.

## **SOCIAL MEDIA**

NWS Spokane has a Facebook page, Twitter account, and a YouTube channel. Information about current Fire Weather may be included in these social media feeds, but such information is intended as supplemental information for the general public; it is not intended to meet the specialized needs of the wildland firefighting community.

[www.twitter.com/NWSSpokane](https://www.twitter.com/NWSSpokane),

<https://www.facebook.com/NWSSpokane/>

<https://www.youtube.com/user/nwsspokane>

## **FORECAST DISTRICT:**

NWS Spokane has fire weather forecast responsibility for a large portion of protected lands in eastern Washington. Exceptions are the Blue Mountains area, the Yakama Indian Nation lands, the DOE Hanford Site, and portions of the Southeast Department of Natural Resources (DNR) land. These protected lands are the forecast responsibility of the National Weather Service Office Pendleton Fire Weather program.

WFO Spokane's eastern Washington fire weather area is divided into five districts. In addition, these forecast districts are subdivided into fifteen fire weather zones. See the map for general locations of districts and zones for eastern Washington. The fire weather zones are comprised of fire danger stations with similar weather and similar trends in weather changes. In 2022, new fire weather zones were established in Eastern Washington. These zones are in better alignment with fire danger rating areas.

NWS Spokane has forecast responsibility for the Central and Northern Idaho Panhandle. This district has one zone (101) covering the Idaho Panhandle National Forests, Idaho State Lands, and Coeur d'Alene Indian Agency lands.

## **Agencies Served:**

Land management agencies served by the Spokane Fire Weather Office include:

USFS....

Colville NF

Okanogan-Wenatchee NF

Idaho Panhandle NF

BLM....

Spokane District  
Coeur d'Alene District

BIA....

Confederated Tribes of the Colville Reservation  
Spokane Tribe of Indians  
Coeur d'Alene Tribe of Indians  
Kalispel Tribe of Indians

NWR...

Turnbull National Wildlife Refuge  
Columbia National Wildlife Refuge  
Kootenai National Wildlife Refuge  
Lake Pend Oreille Wildlife Refuge  
Sinlahekin Wildlife Refuge

Washington DNR...

Northeast Area Resource Protection Division  
Southeast Area Resource protection Division

Idaho...

Department of State Lands

NPS...

Lake Roosevelt National Recreation Area  
Lake Chelan National Recreation Area

## **FORECAST SERVICES:**

### **Fire Weather Watches and Red Flag Warnings**

Red Flag criteria for eastern Washington and Northern Idaho are as follows:

- **“Dry Thunderstorm” Red Flag criteria is defined as follows:**

**Abundant lightning in conjunction with sufficiently dry fuels.**



“Abundant” and “Sufficient” are locally defined and verified by NWS offices and their fire agency customers using the following GACC AOP-wide guidelines:

Abundant Lightning:

- 1) Number of lightning strikes that meet climatologically significant criteria, or
- 2) Areal coverage of lightning such as “Scattered” or  $\geq 25\%$

Sufficiently Dry Fuels:

- 1) ERC or BI values meeting climatologically significant percentiles or
- 2) Land management declaration

- **Dry and Windy:** Sustained surface winds exceeding a 10 minute average of 15 mph combined with relative humidity less than:
  - 15% in the Columbia Basin (zone 706 and 707)
  - 25% in the mountainous areas
  - 20% in the lower valley zones (zone 708 and 709)

This is typically (but not always) associated with a dry cold front passage.

These conditions must be verified by at least 2 observation sites (RAWS, METAR, DOT, Agrimet etc) for 2 consecutive hours. **For Idaho Zone 101 the criteria will be at least 2 observation sites for any 3 hours in an 8 hour period.** When using observation sites other than RAWS sites wind speeds will be converted to 10 minute averages.

Special consideration will be given whenever very hot temperatures are combined with very low relative humidity.

- **Hot, Dry, Unstable:** High Haines Index of 6 combined with low relative humidity, typically 15% or below.
- **Strong winds:** Winds that will overcome the environment no matter what the relative humidity.
- **An Unusually Unstable Atmosphere:** This would be associated with a strong thermal trough which typically forms along the east slopes of the Washington Cascades in conjunction with 850-700 vertical temperature change greater than 15°C. This Watch or Warning criteria is only good for PSA C1 which is the Central Cascade zones 696, 697, 698, and Cascade valley zones 704, 705.

The issuance of Red Flag Warnings will take into account fuel conditions, and will be coordinated with land management agencies and other applicable fire weather offices. Typically when 1000 hour fuels are at or below 11%, 100 hour fuels are at or below 8% and Live Fuels at or below 120%.

## SPOT FORECASTS

Detailed instructions for completing the Spot Request Form and access links are available on our Fire Weather Web page in the upper left hand corner or at:

[https://www.wrh.noaa.gov/wrh/UsersSpotGuide2019\\_2.0.pdf](https://www.wrh.noaa.gov/wrh/UsersSpotGuide2019_2.0.pdf)

**Valid times for spot forecasts will be twelve hours from forecast issuance.**

The spot forecast request web page available on the Spokane fire weather web page at:

<https://www.weather.gov/spot/request/>

**GEOGRAPHICAL AREA DESCRIPTIONS**

The National Weather Service Office in Spokane has fire weather forecast responsibility for protected lands in the northern and central part of eastern Washington and the northern and central Idaho Panhandle. Exceptions are the Blue Mountains area, the Yakama Indian Reservation, and portion of the Southeast Department of Natural Resources (DNR) protected lands. Forecasts for these areas are handled out of the National Weather Service office in Pendleton (see zone descriptions below).

WFO Spokane's eastern Washington fire weather area is divided into five districts. In addition, these forecast districts are subdivided into fifteen fire weather zones. See the map for general locations of districts and zones for eastern Washington.

**Central District:**

This district has three zones. Zone 696, Zone 697, and Zone 705. This district extends from Mission Ridge north to Sawtooth Ridge, and from the Cascade crest east to the Columbia River. It includes the northern part of the Wenatchee NF and Lake Chelan National Recreation Area. Lightning frequency averages around 10-15 storm-days per season. The Cascade rain shadow is very pronounced across this district with annual rainfall totals near 100 inches along the crest to 10 inches or less along the Columbia River. Winds tend to be stronger and more persistent with more pronounced day to day weather changes. These zones are typically impacted by marine pushes. This district contains some of the highest fire hazard areas in the Pacific Northwest.

**Northern District:**

This district has five zones. Zone 698 is the higher elevations of the North Cascades. Zones 699 and 702 make up the Okanogan Highlands and zones 703 and 704 are lower elevations zones within the Okanogan and Methow Valleys. This district extends across the north part of eastern Washington from the Cascade crest to the Columbia River on the east. It includes the Okanogan NF and three ranger districts from the Colville NF (Tonasket, Republic, and Three-Rivers). The district also contains land under the protection of Northeast Department of Natural Resources and Confederated Tribe of the Colville Indians. The marine influence is minimal in this district compared to the central districts due to its more continental location. Winds are generally lighter than central districts due to the complex topography. The exception is the Okanogan River Valley and Methow Valley. These valleys experience more pronounced diurnal wind cycles. Frontal systems will also channel strong winds through these valleys when aligned. Lightning activity though is greater, averaging about 15 storm-days per season. Annual rainfall varies from over 60 inches along the Cascade crest to less than 15 inches in the Okanogan Valley.

**Northeast District:**

This district has two zones: 700 and 701. The northeast district extends from the Columbia River to the Idaho border, and south to the Spokane and Little Spokane rivers. It covers the remainder of the Colville NF (Three Rivers and Newport-Sullivan districts) and The Spokane Tribes of Indians, as well as lands under the

jurisdiction of Northeast DNR. This district is normally wetter than the other districts since it extends into the western foothills of the Rocky Mountains. The southern portion closer to the Spokane River and in the vicinity of Deer Park is slightly drier and typically windier with receptive fuels earlier in the fire season. Lightning frequency is the greatest of any of the districts averaging 15-20 storm-days per season. Annual rainfall varies from over 60 inches per year near the Canadian Border to less than 20 inches on the south boundary.

### **Northern Columbia Basin District:**

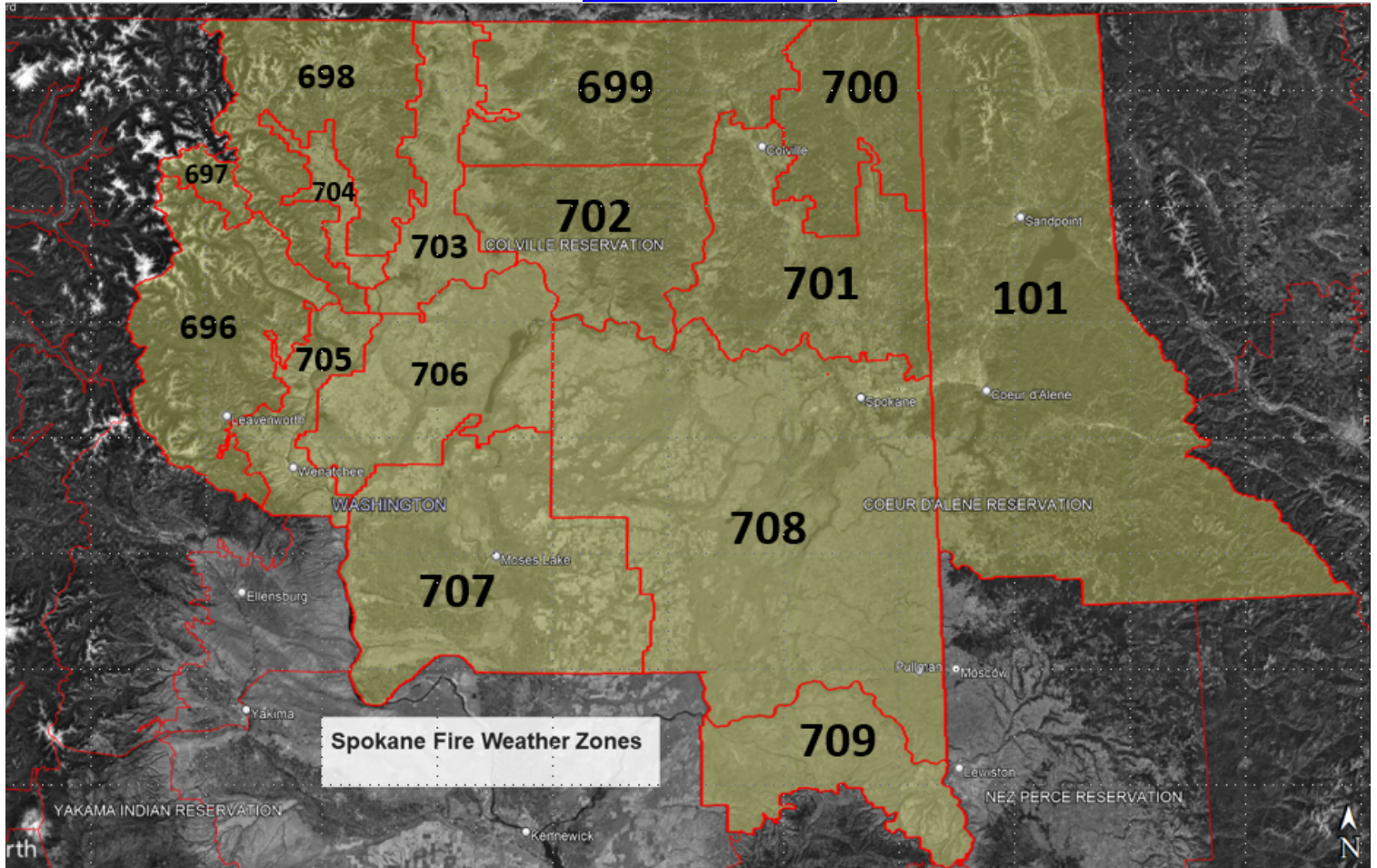
This district has four zones: 706, 707, 708, and 709. Pendleton weather office has responsibility for a large portion of Washington State DNR Southeast Region lands, Yakama IA, and DOE Hanford. The southern boundary follows county lines west to east across Grant and Adams Counties then bends south into the foothills of the Blue Mountains including eastern portions of Columbia County and finally through northern Garfield and Asotin Counties. The western part of the district boundary is the Columbia River following the Grant and Douglas County lines then wraps around Douglas County and traces back east along the Columbia River to the Spokane and Little Spokane Rivers to Idaho state line. Fuels in this district consist of mainly grass and sage with areas of mixed conifer developing for the northeast portion of zone 708 around Spokane and Davenport. Zone 706 mainly consists of the Waterville Plateau and extends east into northern Grant County including Banks Lake. This zone contains low ridges and coulees along with dry land farming. Zone 707 is also a mix of grass and sage along with a heavy concentration of irrigated farming. Zone 708 spans from dry grass and sage in the heart of the Columbia Basin to the onset of timber around Davenport, Spokane, and Mica Peak. This zone also includes the Washington Palouse to the south. Dry land farming is common throughout this zone. Zone 709 stretches west to east from Columbia County to Asotin County with the northern boundary following along the Snake River and southern boundary north of the Blue Mountains. The zone is primarily made up of grass with a heavy concentration of graze land and dry land farming. Most of the district is at fairly low elevations between 900 and 2,000 ft. The terrain rises near 3,000 ft or higher in eastern Zone 708 and southern 709. The highest point at Mica Peak is over 5000 feet. Higher elevations also exist on the Waterville Plateau. For example, Badger Mountain near Waterville is at 4,221 feet. Annual rainfall ranges from less than 10 inches in zone 707 to over 20 inches in eastern portions of 708. These are the some of the warmest and driest districts. Winds in some areas can be very strong. Lightning activity is the least of the districts, averaging about 6 storm-days per season.

### **Northern and Central Idaho Panhandle District:**

This District is part of Region 1 and has one zone. Northern and Central Idaho Panhandle Zone 101 - Northern and Central Idaho Panhandle. This zone includes...Idaho Panhandle National Forests, Coeur d'Alene Tribes of Indians, and Idaho State protected lands in the following counties: Boundary, Bonner, Kootenai, Benewah, Shoshone, and the northern part of Latah County where a part of the St. Joe District resides. Zone 101 is broken into three (3) separate zones the Northern zone, Central zone and Southern zone. The valleys receive over 20 inches of annual rainfall while over 60 inches can fall on the peaks. This area averages 12-15 thunderstorm days per season.

# NEW! - Spokane Fire Weather Forecast Zones

## Graphical Depiction of zone changes from 2021 to 2022 GIS Zone Shapefiles



ZONE #	ZONE NAME
696	East Washington Central Cascades
697	East Portion of North Cascades National Park/Lake Chelan National Recreation Area
698	East Washington North Cascades
699	Okanogan Highlands & Kettle Mountains
700	Selkirk Mountains of Northeast Washington
701	Foothills of Northeast Washington
702	Colville Reservation
703	Okanogan Valley
704	Methow Valley
705	Foothills of Central Washington Cascades
706	Waterville Plateau
707	Western Columbia Basin
708	Eastern Columbia Basin - Palouse - Spokane Area
709	Lower Palouse - Snake River

**NWS Spokane  
NFDRS  
Station Index**

ZONE	NAME	TYPE	WIMS ID	OWNER	LAT	LON	ELEV
696	Viewpoint	R	452128	USFS	47.85	-120.87	3760

696	Camp 4	R	452132	USFS	48.02	-120.23	3773
696	Dry Creek	R	452134	USFS	47.73	-120.54	3661
697	Stehekin	R	452121	NPS	48.34	-120.72	1230
698	Leecher	R	452020	USFS	48.25	-120	5019
698	First Butte	R	452006	USFS	48.62	-120.11	5500
698	Douglas Ingram Rdg	R	452035	USFS	48.12	-120.1	3460
699	Iron Mountain	R	452512	USFS	48.56	-118.62	4325
699	Lost Lake	R	452029	USFS	48.87	-119.06	3760
699	Peony	R	452038	USFS	48.59	-119.21	3600
699	Brown Mountain Ochd	R	452514	USFS	48.54	-118.69	3210
699	Owl Mountain	R	452513	USFS	48.94	-118.3	4400
699	Lane Creek	R	452511	USFS	48.61	-118.28	4500
700	Pal Moore Orchard	R	452915	USFS	48.39	-117.43	3120
700	Tacoma Creek	R	453413	USFS	48.49	-117.43	3300
700	Little Pend Oreille	R	453416	FWS	48.27	-117.43	2020
700	Deer Mountain	R	453412	USFS	48.8	-117.45	3300
700	Flowery Trail	R	453145	USFS	48.3	-117.41	2680
700	Teepee Seed Orchard	R	453414	USFS	48.66	-117.48	3280
701	Kettle Falls	R	452916	NPS	48.61	-118.12	1310
701	Fairchild 36 RQF	R		BLM	48.42	-117.36	2450
701	Wellpinit	R	452918	BIA	47.88	-118.1	2240
701	Big Blue	R		BLM	48.01	-118.02	3400
701	Arcadia Orchards	R		BLM	47.91	-117.39	2050
702	Nespelem	R	452009	BIA	48.21	-119.02	1782
702	Gold Mountain	R	452510	BIA	48.18	-118.49	4636
703	Oroville	R	452039	BLM	48.96	-119.49	1360
703	Kramer	R	452040	BIA	48.27	-119.52	2720
703	Spectacle Lake	R		BLM	48.83	-119.51	1825
703	Aeneas	R	452001	DNR	48.74	-119.62	5185
704	NCSB	R	452030	USFS	48.43	-120.14	1650
705	Entiat	R	452136	USFS	47.67	-120.21	796
705	KEAT	A		NWS	47.4	-120.2	1227
706	Douglas	R	452601	BLM	47.62	-119.9	2530
707	Saddle Mtn	R	452701	FWS	46.69	-119.69	650
707	Othello (Columbia NWR)	R	453102	BLM	46.88	-119.32	855
708	Spokane BLM QD#1	R		BLM	47.54	-118.56	2100
708	Spring Canyon	R	453002	NPS	47.93	-118.93	1340
708	Escure	R	453601	BLM	47.07	-117.98	1725
708	Turnbull Wildlife	R	453506	FWS	47.41	-117.53	2250
708	Spokane Airport	A	453505	NWS	47.6	-117.5	2365
709							

101	Bonnors Ferry	R	100101	USFS	48.72	-116.29	2310
101	Magee Peak	R	100425	USFS	47.89	-116.31	4856
101	Fish Hook	R	100421	USFS	47.86	-115.91	4700
101	Hoodoo	R	100208	USFS	48.05	-116.79	2270
101	Lines Creek	R	100424	USFS	48.15	-116.29	5120
101	Nuckols	R	100423	USFS	47.54	-115.97	4000
101	Priest Lake	R	100204	USFS	48.6	-116.96	2600
101	Saddle Pass	R	100107	USFS	48.98	-116.79	5120

# North Dakota (Grand Forks and Bismarck)

## 2022 North Dakota Fire Weather Operating Plan

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## Introduction

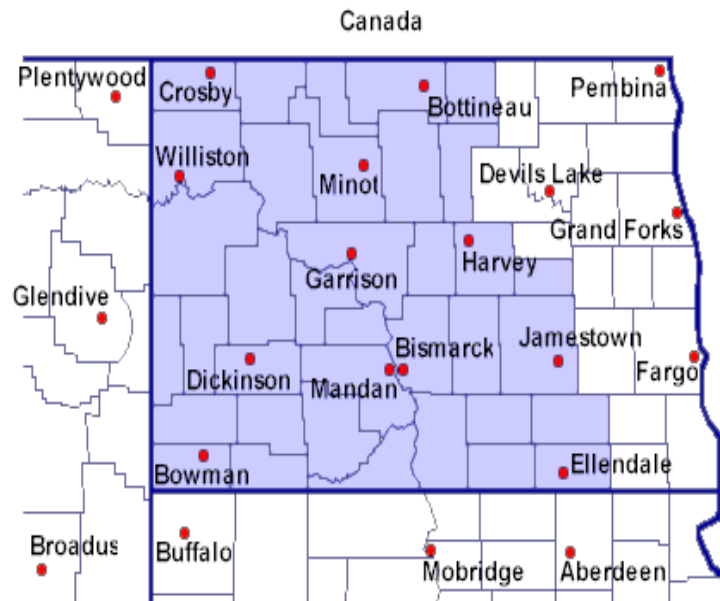
The Annual Operating Plan (AOP) is a procedural guide, based on the National Interagency Agreement for Meteorological Services, which describes fire meteorological services provided within North Dakota. The AOP is updated annually after review by representatives of the National Weather Service (NWS) and each user agency in North Dakota.

## II. Service Area and Organizational Directory

Fire meteorological services in North Dakota are provided by the National Oceanic and Atmospheric (NOAA) National Weather Service (NWS) offices in Bismarck and Grand Forks. The NWS weather forecast office (WFO) in Bismarck is responsible for the fire weather program in western and central North Dakota (Fire Weather zone 134). The NWS WFO in Grand Forks is responsible for eastern North Dakota (Fire Weather zone 135). See Figure 1. The normal fire weather season begins in early April and continues to around the end of October. The season will vary according to the actual weather. Fire weather forecasts and other fire weather related information can be found on the Bismarck and Grand Forks Internet web pages:

<https://www.weather.gov/bis/> or <https://www.weather.gov/fgf/>

Figure 1. Fire Weather Zone 134 is shaded, Fire Weather Zone 135 is not shaded.





## A. Agency Contact Points:

### **Northern Rockies Predictive Services**

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### III. Fire Danger Rating for North Dakota

The most commonly accepted definition of Fire Danger is: **“The resultant descriptor of the combination of both constant and variable factors which affect the initiation, spread and difficulty of control of wildfires on an area.”** The various factors of fuels, weather, topography and risk are combined to assess the daily fire potential on an area. Fire Danger is usually expressed in numeric or adjective terms.


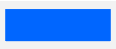


The North Dakota Fire Danger Rating Map is produced each day by the North Dakota Department of Emergency Services around 7:00 AM Central time using information from the Experimental Fire Weather Matrix produced by the National Weather Service (see Section IV.A.3 for details on the Experimental Fire Weather Matrix, and Appendix B.1 for an example). It is a forecast of the **potential** for non-agricultural grasslands to **carry** fire. It is based on weather and grassland conditions. The highest threat period for grassland fire danger is usually before the Spring green-up (when grasslands are still in dormancy coming out of the winter season); and again in the late Summer into Fall (when the curing of grasslands leads to critical dryness in the moisture content of the various warm-season and cool-season grasses).

The five fire danger ratings are:

Low   Moderate   High   Very High   Extreme

These ratings may be useful to local fire management officials for daily planning and preparedness purposes.

The following description of Fire Danger Rating is a description of what **may** happen should a fire ignite. It does **not** describe whether or not a fire will ignite.

Fire Danger Rating and Color Code	Description
Low (Green) 	Fuels do not ignite readily from small firebrands although a more intense heat source, such as lightning, may start fires in duff or punky wood. Fires in open cured grasslands may burn freely a few hours after rain, but woods fires spread slowly by creeping or smoldering, and burn in irregular fingers. There is little danger of spotting.
Moderate (Blue) 	Fires can start from most accidental causes, but with the exception of lightning fires in some areas, the number of starts is generally low. Fires in open cured grasslands will burn briskly and spread rapidly on windy days. Timber fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel, especially draped fuel, may burn hot. Short-distance spotting may occur, but is not persistent. Fires are not likely to become serious and control is relatively easy.
High (Yellow) 	All fine dead fuels ignite readily and fires start easily from most causes. Unattended brush and campfires are likely to escape. Fires spread rapidly and short-distance spotting is common. High-intensity burning may develop on slopes or in concentrations of fine fuels. Fires may become serious and their control difficult unless they are attacked successfully while small.
Very High (Orange) 	Fires start easily from all causes and, immediately after ignition, spread rapidly and increase quickly in intensity. Spot fires are a constant danger. Fires burning in light fuels may quickly develop high intensity characteristics such as long-distance spotting

and fire whirlwinds when they burn into heavier fuels.

Extreme  
(Red)



Fires start quickly, spread furiously, and burn intensely. All fires are potentially serious. Development into high intensity burning will usually be faster and occur from smaller fires than in the very high fire danger class. Direct attack is rarely possible and may be dangerous except immediately after ignition. Fires that develop headway in heavy slash or in conifer stands may be unmanageable while the extreme burning condition lasts. Under these conditions the only effective and safe control action is on the flanks until the weather changes or the fuel supply lessens.

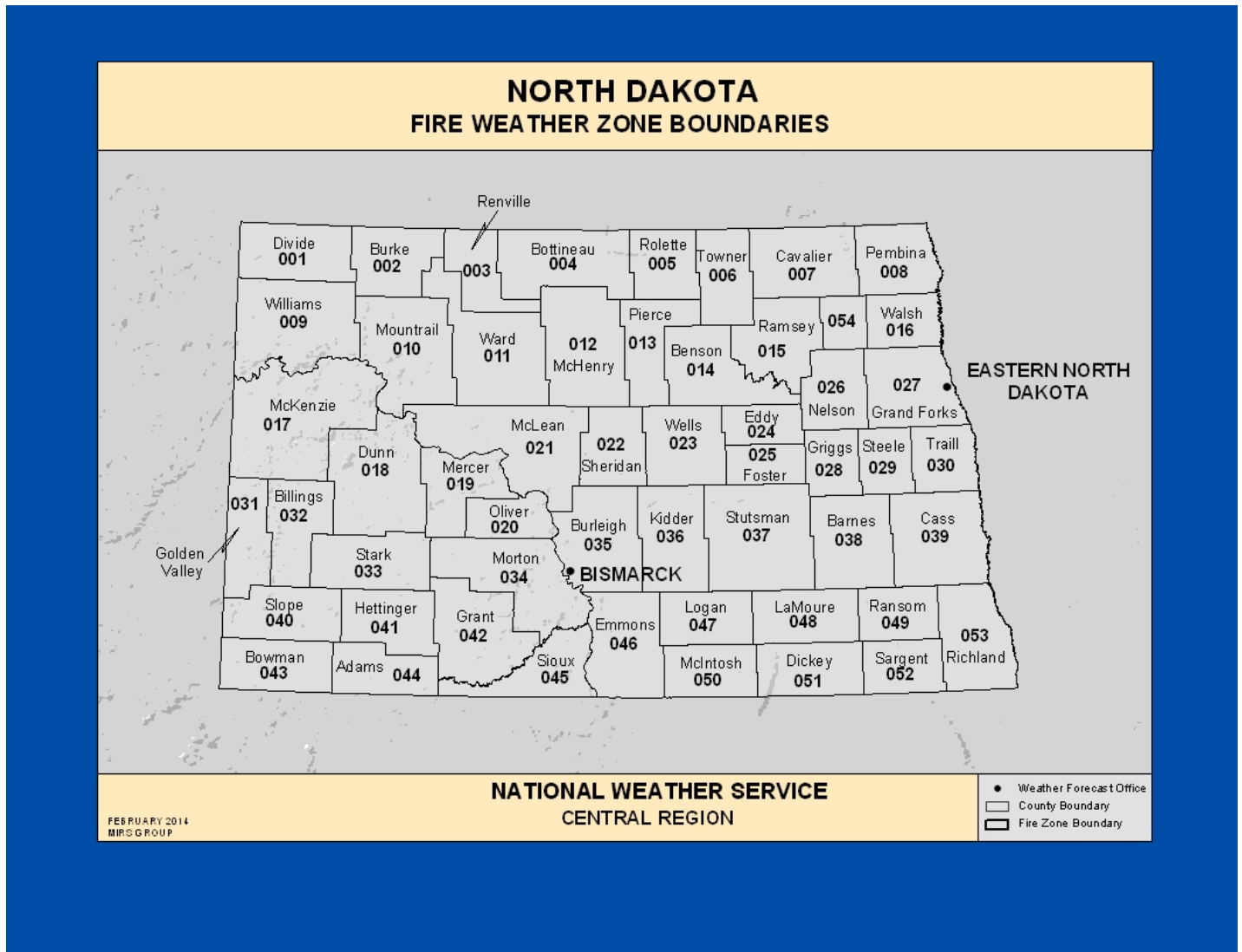


Figure 2. North Dakota Fire Weather Zones used for Fire Danger Rating, Fire Weather Watches and Red Flag Warnings.

## IV. Services Provided by the NOAA National Weather Service

### A. Basic Services

#### 1. Fire Weather Planning Forecast (routine issuance)

This forecast product is issued twice daily during the fire weather season. The planning forecast will be issued at approximately 4 a.m. and 4 p.m. Central Time. For the Grand Forks NWS Office, the morning issuance will be updated to include the observed Haines index.

The morning forecast contains a brief weather discussion, forecasts for today, tonight and tomorrow, and a general 3 to 7-day forecast. The afternoon forecast covers the periods of tonight, tomorrow, tomorrow night, the following day, and a general 3 to 7-day forecast. The product will be updated as needed. The “Discussion” should be tailored to address items of importance to the fire weather forecast. Persistent errors or biases in the forecast should be brought to the attention of the National Weather Service. The local optional elements may vary from office to office.

The Bismarck planning forecast optional local elements will be the mid-level Haines index (Appendix D), LAL (Appendix E), Chance of Wetting Rain (CWR >.10 inches), transport wind, mixing height and smoke dispersal (Appendix F). See Appendix A.2 for examples of these products.

The Grand Forks optional local elements will be the mid-level Haines index, LAL, Precipitation amount, hours of sunshine, transport wind, mixing height, and smoke dispersal.

#### 2. National Fire Danger Rating System Forecasts – Fire Weather Matrix (FWM) (routine issuance)

The National Fire Danger Rating System (NFDRS) is designed to represent the fire potential at peak burning conditions over a large area, generally in excess of 100,000 acres. The NWS offices in Bismarck and Grand Forks provide a point forecast, or Fire Weather Matrix (FWM) for RAWS stations utilized in the forecast NFDRS program. The point forecast is used in the Weather Information Management System (WIMS) forecast NFDRS calculations.

The following RAWS sites will receive point forecasts daily during the fire season:

##### NWS Bismarck

Crosby	320101	Watford City	321703
Painted Canyon	322503	Sand Creek	323804
Lostwood	320220	Knife River	322701
J. Clark Salyer	320401	Long Lake	322901
Arrowwood	323536	Turtle Mountain	320501
Tatanka Prairie	328501	Williams Lookout	324101

##### NWS Grand Forks

Devils Lake	321401		
Hampden	320701	Sheyenne	324605

The point forecasts (FWM) should be sent by 1545 LDT. Forecasted NFDRS indices are valid 24 hours from the current day’s 1400 LDT observation. The forecasts should be available in WIMS by 1615 LDT.

The Following is an explanation of codes used in NFDRS Forecasts. See Appendix A.3 for an example.

FCST, STATION#, YYMMDD, 13, WX, TEMP, RH, LAL1, LAL2, WDIR, WSPD, , TX, TN, RHx, RHn, PD1, PD2, WETF

FCST: Indicates individual site forecasts.

STATION#: NFDRS site number

YYMMDD: Date

13: Valid Forecast Time (Always 13 to indicate 1300 LST)

WX: Weather valid at 1300 LST tomorrow. Valid entries are:

0 clear

1 scattered clouds (1/8 to 4/8)

2 broken clouds (5/8 to 7/8)

3 overcast clouds (more than 7/8)

4 foggy

5 drizzle

6 raining

7 snowing or sleet

8 showers (in sight or at the station)

9 thunderstorm

(Categories 5, 6, 7 sets most NFDRS indices to 0. ERC is the exception)

TEMP: Temperature in degrees F valid at 1300 LST

RH: Relative humidity in percent valid at 1300 LST

LAL1: Lightning Activity Level 1400 LST to 2300 LST

LAL2: Lightning Activity Level 2300 LST to 2300 LST

WDIR: Wind direction valid at 1300 LST

WSPD: Wind speed in mph valid at 1300 LST

TX: Maximum temperature from 1300 LST to 1300 LST tomorrow

TN: Minimum temperature from 1300 LST to 1300 LST tomorrow

RHx: Maximum relative humidity from 1300 LST to 1300 LST tomorrow

RHn: Minimum relative humidity from 1300 LST to 1300 LST tomorrow

PD1: Precipitation duration in hours 1300 LST to 0500 LST

PD2: Precipitation duration in hours 0500 LST to 1300 LST

WETF Y or N: Wet flag, yes or no. This indicates whether or not fuels will be wet at 1300 LST.

### 3. Experimental Fire Weather Matrix (routine issuance)

This forecast product is produced twice daily and issued around 4 a.m. and 4 p.m. Central Time. It is available online and through NWS dissemination sources with the product identifier BISOPUBIS. The Experimental Fire Weather matrix provides a county-based value that describes the potential for wildfires to ignite, spread, and be difficult to control in non-agricultural grasslands based on weather conditions, fuel state, and topography. A single value is provided for each of the 53 counties in North Dakota and is provided on a scale of 1 (lowest potential) to 5 (highest potential). A daily forecast for each of the next seven days is provided in the matrix. Weather inputs to the matrix are provided from both the NWS Bismarck and NWS Grand Forks offices, while fuel state information is provided by a calculated Growing Season Index that is supplemented by NFDRS-provided Energy Release Component values. The weather forecast and fuel state information is combined in a model that provides a scale-based value of the potential for non-agricultural grasslands to carry fire based on combinations of critical weather and fuel states, including computation of NFDRS-based Ignition Components and Burning Index values.

See Appendix B.1 for an example of the Experimental Fire Weather Matrix.

### 4. Fire Weather Watch/Red Flag Warning (non-routine issuance)

These products are essential to the safety of the fire crews. Because of this, a Red Flag Warning should be issued even if the event appears to be borderline. Coordination with surrounding offices and land management agencies is essential. Red flag warnings should be issued any time of the day if conditions warrant.

- 1) A Fire Weather Watch will be issued when the potential for Red Flag conditions are expected in the next 12 to 72 hours.
- 2) A Red Flag Warning will be issued if the Red Flag criteria, given below, are expected to be met within the next 24 hours, are imminent or are occurring.

The Red Flag information will be included as a “headline” in the daily planning forecast. It will also be disseminated as a special product that is available on the Internet and NOAA Weather Wire. In addition, the North Dakota Interagency Dispatch Center will be notified by phone at the main dispatch line: 701-989-7330. The main dispatch line is forwarded to the “Dispatcher on Call” on weekends and after hours. If there is no answer, call Marti Dahlin, Center Manager, at 701-848-6649. If this is during the overnight hours, delay notification until 8:00 AM CST/CDT.

See Appendix B for Red Flag Criteria. An example of the fire weather watch and red flag warning product is provided in Appendix A.4.

### 5. Spot Forecasts (non-routine issuance)

#### a. Policy

- Spot Forecasts will be issued upon request of any federal, state, tribal, or local official in support of a **wildfire**.
- Upon request of any **federal official** as required under the Interagency Agreement
- Upon request of any state, tribal, or local official **in coordination with any federal land management agency**.
- Upon request of any public safety official when **essential to public safety**
- Will **not** provide to private citizens or commercial entities not acting as an agent of a government agency.



## b. Procedure for Requesting Spot Forecasts

The preferred method to request a spot forecast is via the national spot web page at <http://www.weather.gov/spot>. The Spot Forecast will be posted to the web page. Our goal is to provide a forecast within 30 minutes of the request; however, higher priority duties may occasionally delay the spot forecast. An updated Spot Forecast may be requested if it appears conditions are significantly different than those forecast. User feedback on the Spot Forecasts is strongly encouraged.

Should the national spot web page be unavailable, requests for Spot forecasts to WFO Bismarck (Fire Zone 134) can also be made using WS Form D-1 or equivalent (Figure 5b). Normally, requests/forms should be submitted by fax (701-250-4450). Topographic information and observed weather conditions should be provided when appropriate/available. Phone inquiries should be directed to 701-250-4494. For Spot Forecast service in eastern North Dakota (Fire Zone 135), call WFO Grand Forks at 701-795-5127. The requesting agency should provide the appropriate fax number or email address for this spot forecast.

The NWS will strive to provide as much detail as possible in the wind forecast. This includes specific wind shift times, wind gusts, etc.

## c. Weather Elements Included in Spot Forecasts

Discussion - A brief synopsis of weather features affecting the area

Sky/Weather, Maximum/Minimum temperature, Maximum/Minimum relative humidity, and 20 foot Winds (including shifts and gusts)

Optional Elements (Bismarck) – Mid-level Haines index, transport wind, mixing depth, LAL, and Chance of wetting rain (>.10 inches).

Optional Elements (Grand Forks) - Mid-level Haines index, LAL, Precipitation amount, hours of sunshine, transport wind, mixing height, and smoke dispersal.

See Appendix A.5 for an example of a Spot Forecast.

## B. Special Services

### 1. Incident Meteorologist (IMET) Service

If a wildfire is, or is expected to be, uncontrollable, and loss of life and/or considerable property damage is a possibility, the land management agency may request an on-site deployment of a trained and certified NWS Incident Meteorologist (IMET). An IMET may be requested to a wildland fire at the request of a land management agency through the North Dakota Interagency Dispatch Center. Per NWSI 10-402, "All requests for IMET support will be requested through the NFWOC (National Fire Weather Operations Coordinator)." If a request to the Bismarck Weather Forecast Office for an IMET is made from anyone other than the NFWOC, then contact the Bismarck MIC (Meteorologist in Charge). The MIC will contact the NFWOC on duty, who will facilitate finding an IMET at the regional or national level. The NFWOC 24 hour Duty Number is 877-323-IMET (4638).

## **V. Wildland Fire Agency Services and Responsibilities**

### **A. RAWS Station Identification Numbers: Procedures for a New RAWS Station**

The following steps are necessary in order to correctly provide a new RAWS station with its identification number:

The land management agency responsible for the new site will provide preliminary information on the plans for a new station. This information will be provided to the NWS Central Region Fire Weather Program Manager (Christopher Foltz, available at Christopher.foltz@noaa.gov 816-268-3143). The preliminary information should also be shared with the local NWS office. The NWS will provide input on siting criteria of the site if requested by the land management agency.

A formal request for the six-digit RAWS identification number will be provided to the responsible NWS office, or directly to the Central Region Headquarters Operational Service Meteorologist.

The regional Operational Services Meteorologist will coordinate with the local NWS office, appropriate land management personnel, and the WIMS staff in order to determine the proper RAWS identification number. Note that the first two digits of the identification number denote the state (in ND, the number is 32), the second pair of digits denotes the county, and the last pair of digits denotes the particular station in that county. In each county, once a station is given a number, that identification number can no longer be used, even if that station becomes inactive.

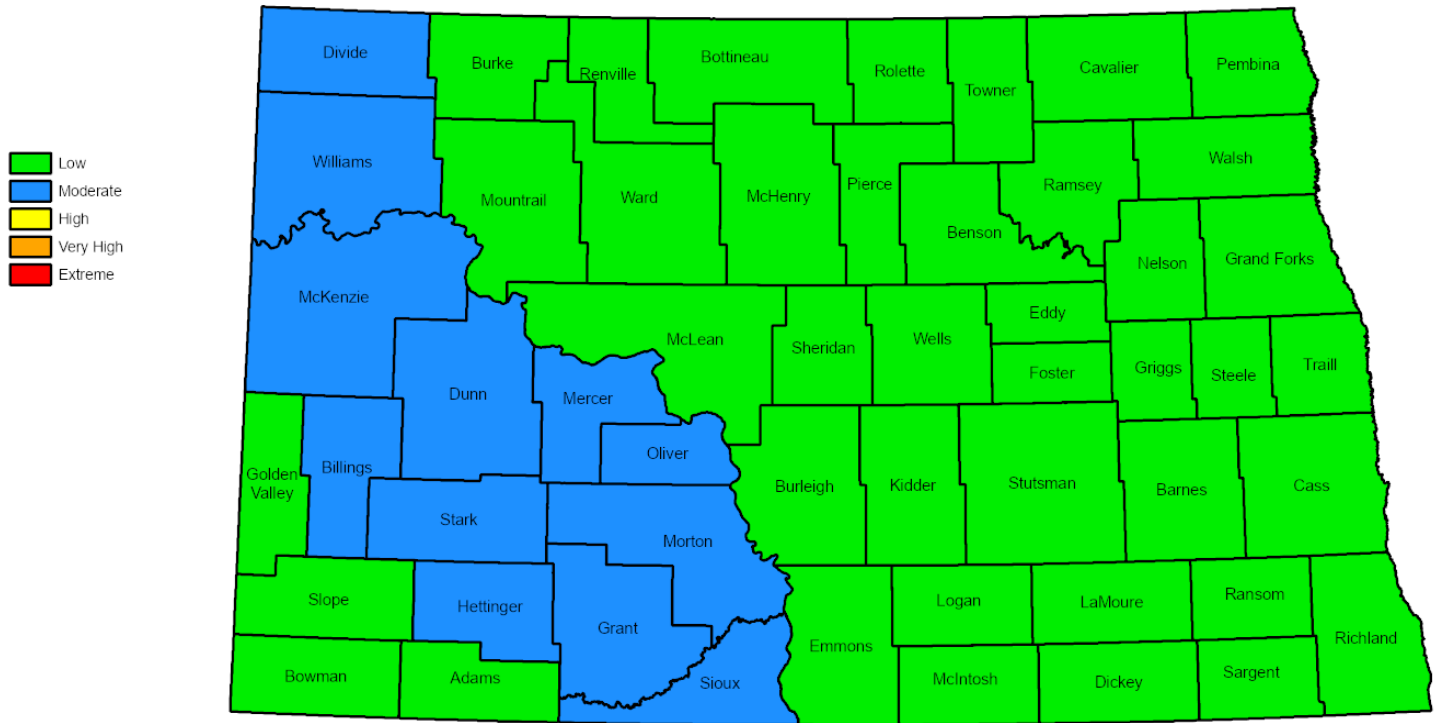
The regional Operational Services Meteorologist will provide the RAWS identification number to the requesting land management agency and the appropriate NWS office.

The land management agency will notify WIMS in order to assure that the observations are received and sent from the system.

# VI. Appendices

## A. North Dakota Fire Danger Rating Map

### North Dakota Adjective Fire Danger



Time: 7:01 AM  
Wednesday, February 16, 2022

## **B. NWS Product Examples**

### **1. Experimental Fire Weather Matrix**

EXPERIMENTAL FIRE WEATHER MATRIX  
NATIONAL WEATHER SERVICE BISMARCK ND  
415 AM CDT THU OCT 28 2021

THIS DEVELOPMENTAL PRODUCT CONTAINS EXPERIMENTAL FIRE WEATHER  
MATRIX OUTPUT FOR NORTH DAKOTA. THIS IS AN EXPERIMENTAL PRODUCT.  
FOR OFFICIAL WEATHER FORECASTS, REFER TO WEATHER.GOV. FOR NORTH  
DAKOTA FIRE DANGER INFORMATION, REFER TO THE NORTH DAKOTA  
DEPARTMENT OF EMERGENCY SERVICES AT NDRESPONSE.GOV/FIRE-DANGER.

NDC023-282200-  
DIVIDE-  
415 AM CDT THU OCT 28 2021

	TODAY	FRI	SAT	SUN	MON	TUE	WED
L CLASS 3		3	2	2	2	2	1

\$\$

NDC013-282200-  
BURKE-  
415 AM CDT THU OCT 28 2021

	TODAY	FRI	SAT	SUN	MON	TUE	WED
L CLASS 2		3	2	2	1	2	1

\$\$

(Continues for the remainder of counties in North Dakota)

## 2. Fire Weather Planning Forecast

FIRE WEATHER PLANNING FORECAST (MORNING)

NATIONAL WEATHER SERVICE

TIME-DATE

...HEADLINE... (REQUIRED FOR RED FLAG WARNINGS AND FIRE WEATHER WATCHES...RECOMMENDED FOR SIGNIFICANT FEATURES AT OTHER TIMES)

.DISCUSSION...

NDZXXX-XXX>XXX-DDHHMM-

GEOGRAPHICAL DESCRIPTORS

...RED FLAG WARNING/FIRE WEATHER WATCH HEADLINE... (AS NEEDED)

.TODAY...

SKY/WEATHER.....

MAX TEMPERATURE....

24 HR TREND.....

MIN HUMIDITY.....

24 HR TREND.....

WIND (20 FT)...../.....

OPTIONAL ELEMENTS...

.TONIGHT...

SKY/WEATHER.....

MIN TEMPERATURE...

24 HR TREND.....

MAX HUMIDITY.....

24 HR TREND.....

WIND (20 FT).....

OPTIONAL ELEMENTS...

.TOMORROW...

SKY/WEATHER.....

MAX TEMPERATURE...

MIN HUMIDITY.....

WIND (20 FT).....

OPTIONAL ELEMENTS....

.FORECAST DAYS 3 THROUGH 7... (WINDS MUST BE INCLUDED DAYS 3-5)

.DAY3... (DAYS CAN BE COMBINED)

.DAY4...

.DAY5...

.DAY6...

.DAY7...

\$\$

[FORECAST FOR NEXT GEOGRAPHICAL DESCRIPTOR AND FIRE WEATHER ZONE GROUP]

\$\$

FIRE WEATHER PLANNING FORECAST (AFTERNOON)

NATIONAL WEATHER SERVICE

TIME-DATE

...HEADLINE... (REQUIRED FOR RED FLAG WARNINGS AND FIRE WEATHER WATCHES...SIGNIFICANT FEATURES AT OTHER TIMES RECOMMENDED)

.DISCUSSION...

NDZXXX-XXX>XXX-DDHHMM-

GEOGRAPHICAL DESCRIPTORS

...RED FLAG WARNING/FIRE WEATHER WATCH HEADLINE... (AS NEEDED)

.TONIGHT...

SKY/WEATHER.....

MIN TEMPERATURE...

24 HR TREND.....

MAX HUMIDITY.....

24 HR TREND.....

WIND (20 FT).....

OPTIONAL ELEMENTS...

.TOMORROW...

SKY/WEATHER.....

MAX TEMPERATURE...

24 HR TREND.....

MIN HUMIDITY.....

24 HR TREND.....

WIND (20 FT).....

OPTIONAL ELEMENTS...

.TOMORROW NIGHT...

SKY/WEATHER.....

MIN TEMPERATURE...

MAX HUMIDITY.....  
WIND (20 FT).....  
OPTIONAL ELEMENTS...

.FOLLOWING DAY...  
SKY/WEATHER.....  
MAX TEMPERATURE...  
MIN HUMIDITY.....  
WIND (20 FT).....  
OPTIONAL ELEMENTS...

.FORECAST DAYS 3 THROUGH 7... (WINDS MUST BE INCLUDED DAYS 3-5)  
.DAY3... (DAYS CAN BE COMBINED)  
.DAY4...  
.DAY5...  
.DAY6...  
.DAY7...

\$\$  
[FORECAST FOR NEXT GEOGRAPHICAL DESCRIPTOR AND FIRE WEATHER ZONE GROUP]  
\$\$

### 3. National Fire Danger Rating System Forecasts

The following is an example of the point forecast for the RAWS sites in the Bismarck forecast area. The Grand Forks product will look the same, but will be for the RAWS sites in their forecast area.

FNUS83 KBIS 061944

FWMBIS

FCST,320101,100407,13,1,54,27,1,1,W,14,,56,29,72,26,0,0,N  
FCST,320220,100407,13,2,54,31,1,1,S,11,,56,28,81,20,0,0,N  
FCST,320401,100407,13,1,56,34,1,1,SSE,06,,57,29,81,29,0,0,N  
FCST,321703,100407,13,2,54,29,1,1,W,13,,58,30,78,15,0,0,N  
FCST,322503,100407,13,2,51,30,1,2,WNW,14,,54,30,72,24,0,0,N  
FCST,322701,100407,13,2,55,34,1,2,SE,05,,60,30,78,19,0,0,N  
FCST,322901,100407,13,1,55,35,1,2,NNW,10,,60,31,81,22,0,0,N  
FCST,323536,100407,13,1,53,36,1,1,N,14,,60,30,85,28,0,0,N  
FCST,323804,100407,13,2,49,32,1,2,WNW,14,,55,30,72,27,0,0,N  
FCST,320501,100407,13,1,52,41,1,1,NNE,04,,52,27,92,41,0,0,N  
FCST,328501,100407,13,2,55,34,1,2,WNW,06,,61,32,78,23,0,0,N  
FCST,324101,100407,13,1,56,34,1,1,SSE,06,,57,29,81,29,0,0,N

Both the Grand Forks and Bismarck NWS offices provide 7-day point forecasts for the RAWS sites. The following is an example of the 7-day point forecast for Crosby RAWS and Lostwood RAWS. The text continues for 10 more RAWS sites within the Bismarck forecast area. The Grand Forks text product will look much the same, but will be valid for the RAWS sites in Grand Forks' forecast area.

FNUS83 KBIS 232232

FWMBIS

FCST,320101,160224,13,2,31,73,1,1,NNW,18,,39,21,100,62,0,0,N  
FCST,320101,160225,13,2,30,70,1,1,SW,06,,33,16,100,68,0,0,N  
FCST,320101,160226,13,0,42,56,1,1,W,12,,43,22,100,54,0,0,N  
FCST,320101,160227,13,2,38,62,1,1,N,09,,44,24,100,54,0,0,N  
FCST,320101,160228,13,2,27,73,1,1,W,09,,40,17,100,58,0,0,N  
FCST,320101,160229,13,2,25,69,1,1,NNE,09,,32,15,100,66,0,0,N  
FCST,320101,160301,13,2,30,67,1,1,WNW,08,,31,15,94,58,0,0,N  
FCST,320220,160224,13,3,29,80,1,1,NNW,18,,38,21,100,64,0,0,N  
FCST,320220,160225,13,2,28,72,1,1,W,08,,32,16,100,71,0,0,N  
FCST,320220,160226,13,1,38,65,1,1,WNW,16,,39,21,100,63,0,0,N  
FCST,320220,160227,13,2,35,68,1,1,NNE,09,,41,24,100,62,0,0,N  
FCST,320220,160228,13,2,21,81,1,1,W,08,,37,15,99,63,0,0,N  
FCST,320220,160229,13,2,23,68,1,1,ENE,08,,28,12,100,64,0,0,N  
FCST,320220,160301,13,2,28,69,1,1,W,08,,28,13,95,58,0,0,N



#### 4. Fire Weather Watches and Red Flag Warnings

URGENT - FIRE WEATHER MESSAGE  
National Weather Service Bismarck ND  
401 AM CDT Fri May 4 2020

...RED FLAG WARNING IN EFFECT THIS AFTERNOON AND EARLY EVENING FOR  
CENTRAL NORTH DAKOTA...

.Critical fire weather conditions are expected across central North Dakota  
this afternoon and early evening. Westerly winds will increase to around  
25 mph, gusting to 40 mph, with relative humidity values falling as low as  
17 percent. Any fires that ignite will spread rapidly in dry fuels and become  
difficult to control or suppress.

NDZ002>005-010>013-019>023-025-034>037-042-045>048-050-051-042115-  
/O.NEW.KBIS.FW.W.0003.180504T1800Z-180505T0000Z/  
Burke-Renville-Bottineau-Rolette-Mountrail-Ward-McHenry-Pierce-  
Mercer-Oliver-McLean-Sheridan-Wells-Foster-Morton-Burleigh-Kidder-  
Stutsman-Grant-Sioux-Emmons-Logan-La Moure-McIntosh-Dickey-  
401 AM CDT Fri May 4 2018 /301 AM MDT Fri May 4 2018/

...RED FLAG WARNING IN EFFECT FROM 1 PM CDT /NOON MDT/ THIS  
AFTERNOON TO 7 PM CDT /6 PM MDT/ THIS EVENING FOR WIND AND LOW  
RELATIVE HUMIDITY FOR CENTRAL NORTH DAKOTA...

The National Weather Service in Bismarck has issued a Red Flag  
Warning for wind and low relative humidity, which is in effect  
from 1 PM CDT /noon MDT/ this afternoon to 7 PM CDT /6 PM MDT/  
this evening.

- \* AFFECTED AREA...Central North Dakota.
- \* WINDS...Northwest 25 mph with gusts to 40 mph.
- \* RELATIVE HUMIDITY...As low as 17 percent.
- \* IMPACTS...Any fires that ignite will spread rapidly and become  
difficult to control or suppress.

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.

&&

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## 5. Spot Forecasts

Spot Forecast for (Name of Incident or Site)...(Requesting Agency)  
National Weather Service Bismarck ND  
401 AM CDT Fri May 4 2020

Forecast is based on ignition time of 1200 CDT on May (date).  
If conditions become unrepresentative...contact the National Weather Service.

.DISCUSSION...High pressure will dominate today resulting in a clear sky and warm temperatures as highs reach near 90F. At ignition time, expect a west northwest wind between 10 and 15 mph, which will become northwesterly by mid afternoon, and gradually decrease in speed to between 6 and 10 mph. A minimum relative humidity of 23 percent is forecast late this afternoon.

An area of showers and thunderstorms is expected to shift across the prescribed burn area after midnight tonight through mid morning Sunday. Gusty and erratic winds can be anticipated with any thunderstorm activity tonight through Sunday.

.REST OF TODAY...

Sky/weather.....Sunny.  
Chance of pcpn.....0 percent.  
Max temperature.....Around 89.  
Min humidity.....23 percent.  
Wind (20 ft).....Northwest winds 5 to 7 mph.  
Mixing height.....5700-6800 ft AGL increasing to 7800-9000 ft AGL  
early in the afternoon.  
Transport winds.....West 12 to 17 mph.  
Smoke dispersal.....Excellent (85400 knot-ft).  
Haines Index.....5 to 6 OR (moderate) to (high).

TIME (CDT)	12P	1PM	2PM	3PM	4PM	5PM
Sky (%).....	1	1	1	1	2	3
Chc of pcpn (%)..	0	0	0	0	0	0
Temp.....	83	85	87	88	89	89
RH.....	36	32	28	25	24	23
20 FT wind dir..	WNW	WNW	NW	NW	NW	NW
20 FT wind spd..	10	10	9	7	6	6
20 FT wind gust..	15	15	12	10	9	8
Mix hgt (kft)...	5.7	6.8	7.8	8.4	8.9	9.0
Transp wind dir..	W	W	W	W	W	W
Transp wind spd..	17	17	16	15	14	12
Haines index....	5	5	5	6	6	6

.TONIGHT...

Sky/weather.....Partly cloudy then becoming mostly cloudy.  
Chance of showers and thunderstorms after  
midnight.  
Chance of pcpn.....30 percent.  
Min temperature.....Around 59.  
Max humidity.....83 percent.  
Wind (20 ft).....Northwest winds to 6 mph early in the evening  
becoming southeast late in the evening. Gusty  
and erratic winds expected near thunderstorms

after midnight.

Mixing height.....8400-8800 ft AGL decreasing to 500-2200 ft AGL.  
Transport winds.....West 6 to 9 mph shifting to the southeast 5 to 13 mph in the late evening. Winds becoming south to 15 mph early Sunday morning.  
Smoke dispersal.....Fair to excellent (27900-70500 knot-ft) decreasing to poor (4300 knot-ft) in the late evening and overnight.

TIME (CDT)	6PM	7PM	8PM	9PM	10P	11P	MID	1AM	2AM	3AM	4AM	5AM
Sky (%)	4	6	8	11	15	21	28	38	50	62	71	75
Weather cov								CHC	CHC	CHC	CHC	CHC
Weather type								RW	RW	RW	RW	RW
Tstm cov								CHC	CHC	CHC	CHC	CHC
Chc of pcpn (%)	0	0	0	0	0	0	0	30	30	30	30	30
Temp	89	87	82	77	72	69	66	64	63	62	61	60
RH	24	26	33	38	44	51	56	60	63	66	70	75
20 FT wind dir	NW	NW	N	E	E	E	E	E	SE	SE	SE	E
20 FT wind spd	6	4	2	2	4	5	5	5	5	5	4	1
20 FT wind gust	7	5		3	5	6	6	6	6	6	5	2
Mix hgt (kft)	8.8	8.4	5.6	2.2	0.9	0.8	1.0	0.8	0.6	0.5	0.7	0.7
Transp wind dir	W	W	W	E	E	SE	SE	SE	S	S	S	S
Transp wind spd	9	7	6	5	6	7	9	10	13	15	16	16
Haines index	6	6	6	6	6	6	6	6	6	5	5	5

.SUNDAY...

Sky/weather.....Partly sunny. Chance of showers and thunderstorms early in the morning morning.  
Chance of pcpn.....30 percent.  
Max temperature.....Around 85.  
Min humidity.....36 percent.  
Wind (20 ft).....Light winds becoming north 5 to 10 mph. Gusty and erratic winds expected near thunderstorms in the morning.  
Mixing height.....400-1700 ft AGL increasing to 4600-5200 ft AGL.  
Transport winds.....Southwest 12 to 15 mph shifting to the northeast 9 to 16 mph in the late morning and afternoon.  
Smoke dispersal.....Poor to good (4500-50100 knot-ft) increasing to good to excellent (55500-72500 knot-ft) late in the afternoon.  
Haines Index.....4 to 6 OR (low) to (high).

TIME (CDT)	6 AM	9 AM	NOON	3 PM
Sky (%)	75	52	51	56
Weather cov	CHANCE	S CHC	S CHC	
Weather type	RNSHWR	RNSHWR	RNSHWR	NONE
Tstm cov	CHANCE	S CHC	S CHC	
Chc of pcpn (%)	30	20	20	10
Temp	59	67	80	85
RH	80	68	45	36
20 FT wind	N 3G5	N 6	N 8	N 10
Mix hgt (ft)	500	1100	4000	4700
Transport wind	SW 15	E 12	NE 9	NE 14
Haines index	6	5	4	4

\$\$  
Forecaster...(NWS Forecaster Name)  
Requested by...(Requesting Agent Name)  
Type of request...PRESCRIBED (or WILDFIRE or HAZMAT, etc.)  
.TAG 1810677.0/BIS  
.DELDT 05/26/18

.EMAIL (email of requesting agent)

## **B. Red Flag Warning Criteria and the Red Flag Matrix –**

The following red flag matrix was based on calculations for Rate of Spread of wildfires using “Behave” software given certain wind and relative humidity values on a sunny summer day with a temperature of 80F, and is used as a “first look” when considering the need for a Red Flag Warning. The chart is meant as a guide, and is not absolute.

Some special considerations (discretion clause) to take into account:

NWS will maintain limited flexibility in using and interpreting the Red Flag Matrix. This flexibility allows forecaster discretion, and will allow forecasters to issue a Red Flag Warning, albeit sparingly, for unforeseen or drastic weather events, such as:

- 1) Dry thunderstorm activity is foreseen during an extremely dry period.
- 2) Anytime the forecaster foresees a change in weather that would result in a significant increase in fire danger (e.g., very strong winds associated with a cold front even though the fire danger rating is below the high category, extensive lightning, etc.)
- 3) During the off-season (post freeze of RAWS stations and pre-greenup of the RAWS stations) forecasters will use the discretion while cross-referencing the Red Flag Matrix in Red Flag decision-making.



# Red Flag Matrix



Relative Humidity (%)

		40%	35%	30%	25%	20%	15%	10%
Sustained Wind Speed (mph)	5 mph	NO	NO	NO	NO	NO	NO	NO
	10 mph	NO	NO	NO	NO	NO	NO	NO
	15 mph	NO	NO	NO	NO	NO	NO	NO
	20 mph	NO	NO	NO	NO	YES	YES	YES
	25 mph	NO	NO	YES	YES	YES	YES	YES
	30 mph	NO	NO	YES	YES	YES	YES	YES
	35 mph	NO	YES	YES	YES	YES	YES	YES
	40 mph	NO	YES	YES	YES	YES	YES	YES

Use Red Flag Matrix when Fire Danger is: High, Very High, or Extreme

Red Flag Conditions needed for at least 3 consecutive hours

### C. Spot Forecast Fax Request Form and Instructions

WS FORM D-1 (1-2005) (Supersedes Previous Editions)		<b>SPOT REQUEST</b> (See reverse for instructions)		U.S. Department of Commerce NOAA National Weather Service	
Please call the NWS Weather Forecast Office (WFO) when submitting a request and also after you receive a forecast to ensure request and forecast were received. Please provide feedback to WFO on forecast.					
1. Time†	2. Date	3. Name of Incident or Project		4. Requesting Agency	
5. Requesting Official		6. Phone Number		7. Fax Number	8. Contact Person
9. Ignition/Incident Time and Date		12. Reason for Spot Request (choose one only) <input type="radio"/> <b>Wildfire</b> <input type="radio"/> <b>Non-Wildfire</b> Under the Interagency Agreement for Meteorological Services (USFS, BLM, NPS, USFWS, BIA) <input type="radio"/> <b>Non-Wildfire</b> State, tribal or local fire agency working in coordination with a federal participant in the Interagency Agreement for Meteorological Services		13. Latitude/Longitude:	
10. Size (Acres)				14. Elevation (ft, Mean Sea Level) Top:                      Bottom:	
11. Type of Incident <input type="radio"/> <b>Wildfire</b> <input type="radio"/> <b>Prescribed Fire</b>				15. Drainage	

<input type="radio"/> <b>Wildland Fire Use (WFU)</b> <input type="radio"/> <b>HAZMAT</b> <input type="radio"/> <b>Search And Rescue (SAR)</b>	<input type="radio"/> <b>Non-Wildfire</b> Essential to public safety, e.g. due to the proximity of population centers or critical infrastructure.	<b>16. Aspect</b>	<b>17. Sheltering</b> <input type="radio"/> <b>Full</b> <input type="radio"/> <b>Partial</b> <input type="radio"/> <b>Unsheltered</b>				
<b>18. Fuel Type:</b> <input type="checkbox"/> Grass <input type="checkbox"/> Brush <input type="checkbox"/> Timber <input type="checkbox"/> Slash <input type="checkbox"/> Grass/Timber Understory <input type="checkbox"/> Other _____ <b>Fuel Model:</b> 1,2,3    4,5,6,7    8,9,10    11,12,13    2,5,8							
<b>19. Location and name of nearest weather observing station (distance &amp; direction from project):</b>							
<b>20. Weather Observations from project or nearby station(s):</b> (Winds should be in compass direction e.g. N, NW, etc.)							
<b>Place</b>	<b>Elevation</b>	<b>†Ob Time</b>	<b>20 ft. Wind</b>	<b>Eye Level Wind.</b>	<b>Temp.</b>	<b>Moisture</b>	<b>Remarks</b> <i>(Relevant Weather, etc)</i>
			<b>Dir</b> <b>Speed</b>	<b>Dir</b> <b>Speed</b>	<b>Dry</b> <b>Wet</b>	<b>RH</b> <b>DP</b>	
<b>21. Requested Forecast Period Date</b>  <b>Start</b> _____  <b>End</b> _____  <b>Forecast needed for:</b> <input type="radio"/> Today <input type="radio"/> Tonight <input type="radio"/> Day 2 <input type="radio"/> Extended		<b>22. Primary Forecast Elements (Check all that are needed) (for management ignited wildland fires, provide prescription parameters):</b>  <div style="display: flex; justify-content: space-between;"> <div> <b>Sky/Weather</b> _____  <b>Temperature</b> _____  <b>Humidity</b> _____  <b>20 ft Wind</b> _____  <b>Valley</b> _____  <b>Ridge Top</b> _____  <b>Other (Specify in #23)</b> _____         </div> <div style="text-align: right;"> <b>Needed:</b>            _____            _____            _____            _____            _____            _____         </div> </div>			<b>23. Remarks (other needed forecast elements, forecast needed for specific time, etc.)</b>		
<b>24. Send Forecast to:</b> <b>ATTN:</b>		<b>25. Location:</b>			<b>26. Phone Number:</b> <b>Fax Number:</b>		
<b>27. Remarks (Special requests, incident details, Smoke Dispersion elements needed, etc.):</b>							
<b>EXPLANATION OF SYMBOLS:</b> † Use 24-hour clock to indicate time. Example: 10:15 p.m. = 2215; 10:15 a.m. = 1015 Indicate local standard time or local daylight time							

WS FORM D-1  
**WS FORM D-1, January 2005**

**INSTRUCTIONS:**

**I. Incident Personnel:**

1. Complete items 1 through 27 where applicable.

<b>13. Weather Observations from project or nearby station(s):</b>											
<b>Place</b>	<b>Elevation</b>	<b>†Ob Time</b>	<b>20 ft. Wind</b>		<b>Eye Level Wind.</b>		<b>Temp.</b>		<b>Moisture</b>		<b>Remarks</b> <i>(Relevant Weather, etc.)</i>
			<b>Dir</b>	<b>Speed</b>	<b>Dir</b>	<b>Speed</b>	<b>Dry</b>	<b>Wet</b>	<b>RH</b>	<b>DP</b>	

Unit G-50	1530'	0830	NW	6-8	NW	3-5	32		72		Observations from unit RAWS station, 50% cloud cover.
-----------	-------	------	----	-----	----	-----	----	--	----	--	---

- a. Example of weather conditions on site:
- b. If the incident (HAZMAT, SAR) involves marine, put the wave/swell height and direction in the Remarks section.
5. Transmit in numerical sequence or fax to the appropriate Weather Forecast Office. (A weather forecaster on duty will complete the special forecast as quickly as possible and transmit the forecast and outlook to you by the method requested)
6. Retain completed copy for your records.
7. **Provide feedback to NWS utilizing separate page.** Be sure to include a copy of the spot forecast with any feedback submission including forecaster's name. Feedback to NWS personnel is imperative to assist with future forecasts. Remember, feedback on correct forecasts is equally as valuable as feedback on incorrect forecasts! If spot forecast is significantly different than conditions on site, a second forecast may be required.

**II. ALL RELAY POINTS should use this form to insure completeness of date and forecast. A supply of this form should be kept by each dispatcher and all others who may be relaying requests for forecasts or relaying completed forecasts to field units.**

**III. Forms are available from your local National Weather Service Weather Forecast Office. They may also be reproduced by other agencies as needed, entering the phone number and radio identification if desired.**

***NOTICE: Information provided on this form may be used by the National Weather Service for official purposes in any way, including public release and publication in NWS products. False statements on this form may be subject to prosecution under the False Statement Accountability Act of 1996 (18 U.S.C. § 1001) or other statutes.***

#### **D. Haines Index Calculations**

Computing the Haines Index in Middle Terrain Elevations:

Stability Term = Temp(850mb) - Temp(700mb)

Moisture Term = Temp(850mb) - Dew Point Temp(850mb)

Each term is given a value of either 1, 2 or 3.

Stability Term Value:

1 – if 5 deg C or less

2 – if 6-10 deg C

3 – if 11 deg C or more

Moisture Term Value:

1 – if 5 deg C or less

2 – if 6-12 deg C

3 – if 13 deg C or more

The Stability and Moisture terms are added to calculate the Haines index.

Mid Level Haines Index Potential for large fire growth

<u>2 or 3</u>	<u>...very low</u>
<u>4</u>	<u>...low</u>
<u>5</u>	<u>...moderate</u>
<u>6</u>	<u>...high</u>

### E. Lightning Activity Level Guide

#### Lightning Activity Level Guide

<b>LAL</b>	<b>Coverage</b>
1	No T-storms
2	Isolated T-storms (1-14% coverage)
3	Widely Scattered T-Storms (15-24% coverage)
4	Scattered T-storms (25-54% coverage)
5	Numerous (55+% coverage)
6	>=15% coverage...little or no rain

### **F. Smoke Dispersal and Ventilation Terms**

#### **Smoke Dispersal Terms**

**Category**

**Description**

**Very Poor**

High smoke pollution potential. Usually occurs in a very stable air (strong



inversion) and light winds. Normally occurs late at night and early in the morning hours, but could occur during the daytime when a shallow pool of cold air intrudes into the area creating strong low level inversions. Burning is not advised under this category.

- Poor** Moderate to High smoke potential. Burning not advised under this category. Most likely time of occurrence is from evening through the early morning.
- Fair** Marginal smoke pollution potential. Dependent on trend of weather and local conditions. Generally acceptable for small burns of dry fuels.
- Good** Moderate to Low smoke pollution potential. No inversion and gentle winds expected. Most likely to occur in the late morning and afternoon when surface heating usually breaks through the low level inversions.
- Very Good** Low smoke pollution potential. Transport winds or mixing height lower than that for Excellent. Transport winds stronger than that for Good. Most likely to occur in the late morning and afternoon.
- Excellent** Low smoke pollution potential. Unstable airmass and/or brisk winds. Best time to conduct burning operations if fire can be controlled. Most likely to occur in the late morning and afternoon or when a strong weather system affects the area, eliminating all low level inversions and generating moderate winds.

### **Breakdown of Ventilation**

#### **Based on Mixing Height and Transport Wind**

- Excellent.....150,000 Knot Feet and Greater
- Very Good.....100,000 to 150,000 Knot Feet
- Good.....60,000 to 100,000 Knot Feet
- Fair.....40,000 to 60,000 Knot Feet
- Poor.....Less than 40,000 Knot Feet

#### **G. Listing of RAWS Stations in North Dakota**

The following is a listing of active RAWS stations in North Dakota as of March 1<sup>st</sup>, 2021.

NWS Bismarck Forecast Area

Crosby	320101	Watford City	321703
Painted Canyon	322503	Sand Creek	323804
Lostwood	320220	Knife River	322701
J. Clark Salyer	320401	Long Lake	322901
Arrowwood	323536	Turtle Mountain	320501
Tatanka Prairie	328501	Williams Lookout	324101

NWS Grand Forks Forecast Area

Hampden	320701	Devils Lake	321401
Sheyenne	324605		

**VI. Agency Signatures**

This plan is valid for the 2022 North Dakota fire season.

/Signed/date

Jeffrey Savadel, NOAA National Weather Service Meteorologist in Charge (Bismarck)  
Representing both NWS offices with fire weather forecast responsibility in North Dakota  
3/15/2022

/Signed/date

Jeff Dion, FMO, USFWS ND Zone, Arrowwood NWR, U.S. Fish and Wildlife Service  
North Dakota Fire Council Chairman  
3/15/2022

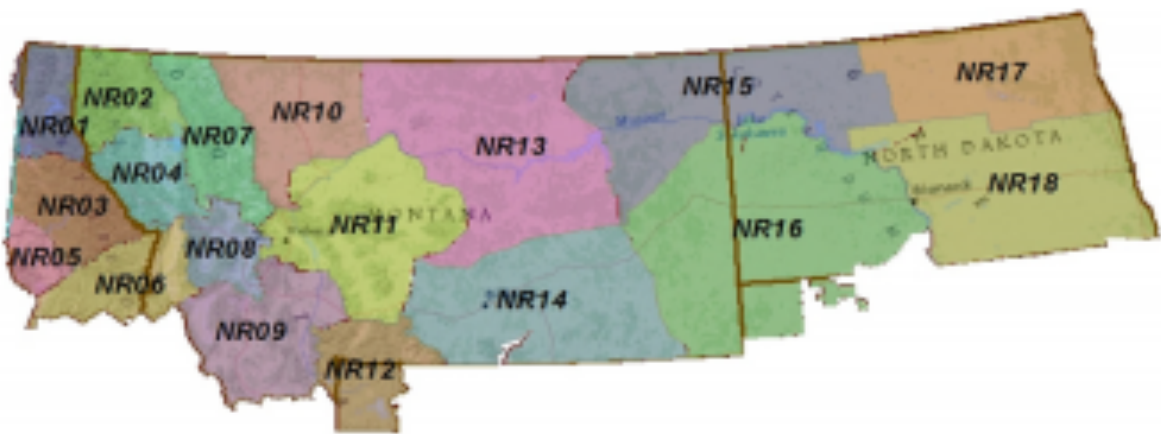
# Predictive Services

## PREDICTIVE SERVICES – SERVICES AND RESPONSIBILITIES

The Northern Rockies Predictive Services Unit (PSU) resides at the Northern Rockies Coordination Center, in the Aerial Fire Depot complex, Missoula, Montana. It is one of ten Geographic Area Coordination Centers (GACCs) across the country within the National Predictive Services organization, based at the National Interagency Coordination Center (NICC) in Boise Idaho. Each of the interagency GACC's primary missions are to provide resource support for the functional areas of overhead, crews, aircraft, supplies and equipment to the field for wildland fire and other emergency operations. The PSU provides daily, medium-range, and long-range fire weather, fire danger, and resource outlooks for use in tactical and strategic planning. These outlooks complement forecast products provided by the National Weather Service.

As part of the Smoke Management Unit for the Idaho/Montana Airshed Group, Predictive Services meteorologists in the Northern Rockies coordinate forecast efforts for smoke management during both wildfire season and prescribed burning seasons.

Here is a map/description of the Predictive Service Areas (PSAs) which are geographic areas of similar climate based on statistical correlation of RAWS data



**Northern Rockies Predictive Service Areas (PSAs)**

(Click on PSA # for particular GRC, 1000-hr, and 100-hr Fuel Moisture graphs)

PSA #	PSA NAME
NR01	Northern Idaho Panhandle
NR02	Northwestern Montana
NR03	Southern Idaho Panhandle
NR04	Western Montana
NR05	Camas Prairie of Idaho
NR06	North Central Idaho & Bitterroot/Sapphire Mountains
NR07	Glacier NP & Wilderness Areas
NR08	Southwest Montana, West of Continental Divide
NR09	Big Hole - Southwest Montana, East of Continental Divide
NR10	Northern Front Range
NR11	West Central Montana
NR12	South Central Montana & Yellowstone NP
NR13	Northern Plains & Missouri Breaks
NR14	Southern Montana (Big Horn/Powder River)
NR15	Northeast Montana & Northwest North Dakota
NR16	Southeast Montana & Southwest North Dakota
NR17	Northeastern North Dakota
NR18	Southeastern North Dakota

[https://gacc.nifc.gov/nrcc/predictive/fuels\\_fire-danger/PSAmap.htm](https://gacc.nifc.gov/nrcc/predictive/fuels_fire-danger/PSAmap.htm)

**A. Operational Support**

Predictive Services will produce a suite of products tailored to the tactical and strategic mission of the land management agencies within the Northern Rockies. While the main area of responsibility is at the geographic area level including MAC support when needed, Predictive Services will provide services to sub-units of the geographic area, such as dispatch centers, local administrative units, and the Smoke Management Unit (SMU). Contributions will also be made to the national level Predictive Services program. All of the Northern Rockies Predictive Services products can be found on the Northern Rockies Coordination Center’s website (<https://gacc.nifc.gov/nrcc>), in the Predictive Services tab in the upper left corner. From there, Intelligence, Weather, Fuels/Fire Danger, and Outlooks sections will expand into their own pages (see example below from the Weather section:

**NRCC**  
Northern Rockies Coordination Center

Friday, March 8, 2019

**>> Predictive Services WEATHER**

**Current Conditions**  
NCAR NR Regional Surface Map  
WYOMING (Main Website)  
NR Surface Map  
NR Hourly Observations  
NR 24-Hr Trend Monitor  
NR 5-Day Temperatures  
NR 5-Day Humidity  
NR Precipitation Monitor

**SATELLITE IMAGES (GOES-10)**  
Current Visible | Infrared | Water Vapor  
Animated Visible | Infrared | Water Vapor  
NWS Regional Satellite Links  
NASA Global Hydrology & Climate Center Images  
NCAR RAP Real-Time Weather Data  
NEXLAB Experimental Satellite  
RAMMB Cira Slider (GOES-16)

**LIGHTNING**  
NIFC Lightning Maps  
SPC Lightning Dryness Level  
SPC Experimental Dry Thunderstorm Forecast

**Snow / Precipitation Data**  
National Water & Climate Center (WCC)  
SNOTEL Data Network  
Idaho Snowpack  
Wyoming Snowpack  
Interactive Mountain Snowpack Maps  
Climate Prediction Center (CPC)  
6-10 Day Temperature Outlook  
6-10 Day Precipitation Outlook  
8-14 Day Temperature Outlook  
8-14 Day Precipitation Outlook  
30-90 Day Outlooks  
Hydrologic Information Center (HIC)  
Weather Prediction Center (WPC)

**NRCC Weather Products**  
Predictive Services Fire Weather Web Briefing  
Daily Outlooks: Day 1 | Day 2 | Day 3  
Weekly Fire Weather and Climate Outlook  
Interactive Weather Briefing  
2017 Northern Rockies Annual Operating Plan

**National Weather Service (NWS)**

Billings	Fire Wx	Red Flag	Spot
Bismarck	Fire Wx	Red Flag	Spot
Boise	Fire Wx	Red Flag	Spot
Glasgow	Fire Wx	Red Flag	Spot
Grand Forks	Fire Wx	Red Flag	Spot
Great Falls	Fire Wx	Red Flag	Spot
Missoula	Fire Wx	Red Flag	Spot
Pendleton	Fire Wx	Red Flag	Spot
Pocatello	Fire Wx	Red Flag	Spot
Riverton	Fire Wx	Red Flag	Spot
Spokane	Fire Wx	Red Flag	Spot

NWS Northern Rockies Graphical Forecasts  
NWS National Fire Weather Page  
NWS Storm Prediction Center (SPC)

**Climatology / Drought**  
Climate, Ecosystem & Fire Apps (CEFA)  
Assessment Products  
National Drought Mitigation Center (NDMC)  
U.S. Drought Monitoring Map  
U.S. Vegetation Drought Response Index  
Palmer Drought Severity Index (PDI)  
U.S. Seasonal Drought Outlook  
Short-Term Drought Indicator Blend Percentiles  
Long-Term Drought Indicator Blend Percentiles  
U.S. Drought Portal  
National Drought Mitigation Center (NDMC)  
Montana County Drought Status  
NOAA El Niño / La Niña

<https://gacc.nifc.gov/nrcc/index.htm>

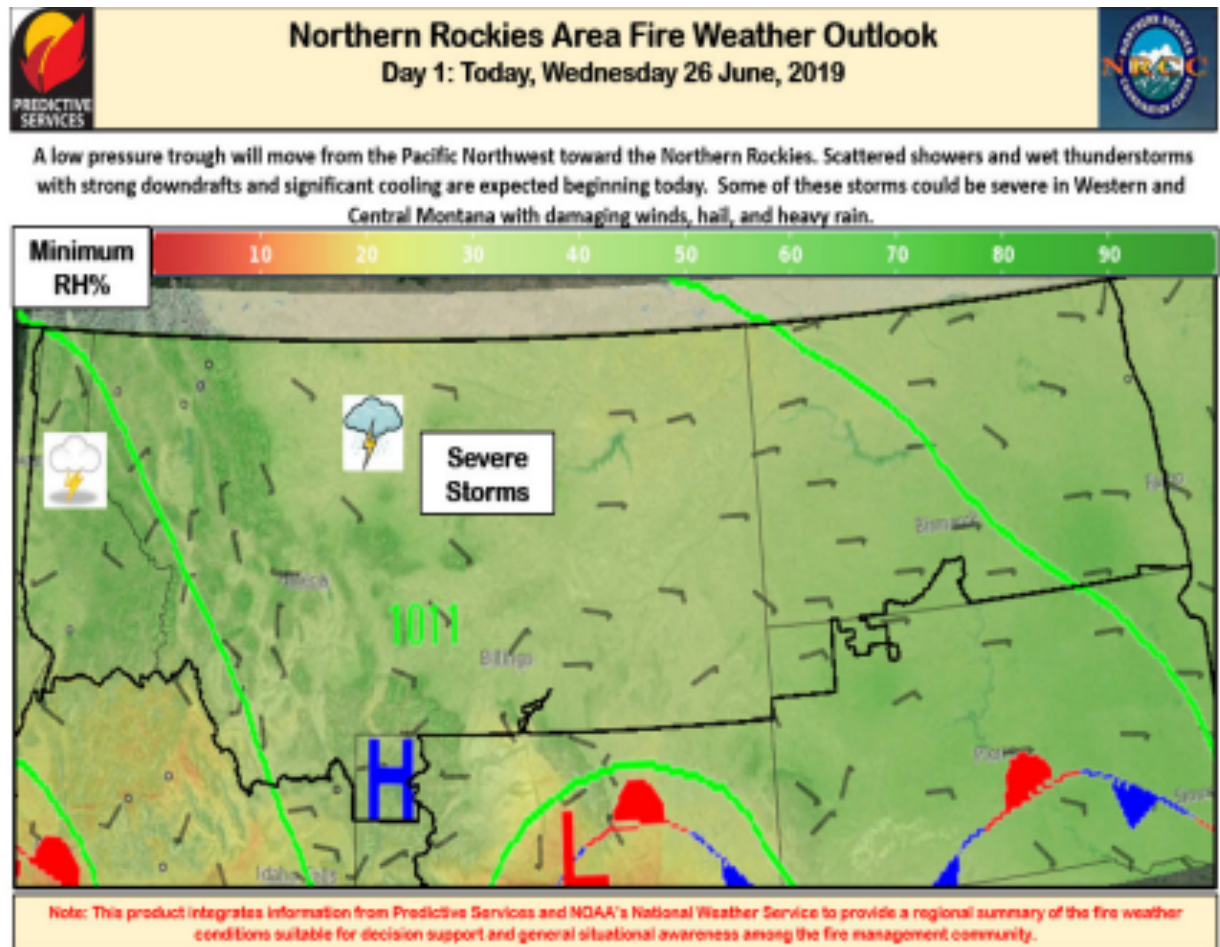
## 1. Daily Fire Weather Map

The Daily Fire Weather Map is a text-and-graphics product which summarizes expected fire weather conditions for the next 24-hours. There are separate maps for Today, Tomorrow, and Day 3.

Fire behavior forecasts will be included when a Fire Behavior Analyst is assigned to Predictive Services at the coordination center during heightened conditions.

The Daily Fire Weather Map will be issued every day – Monday through Friday and on weekends during critical fire periods beginning early June and continuing through September 30. Seasonal start and stop dates may vary upon existing or expected fire danger or activity. The forecast should be issued and posted to the internet by 12:00 pm MDT each day. Updates will be made when it appears that

observed or expected conditions are significantly different than those contained in the product.



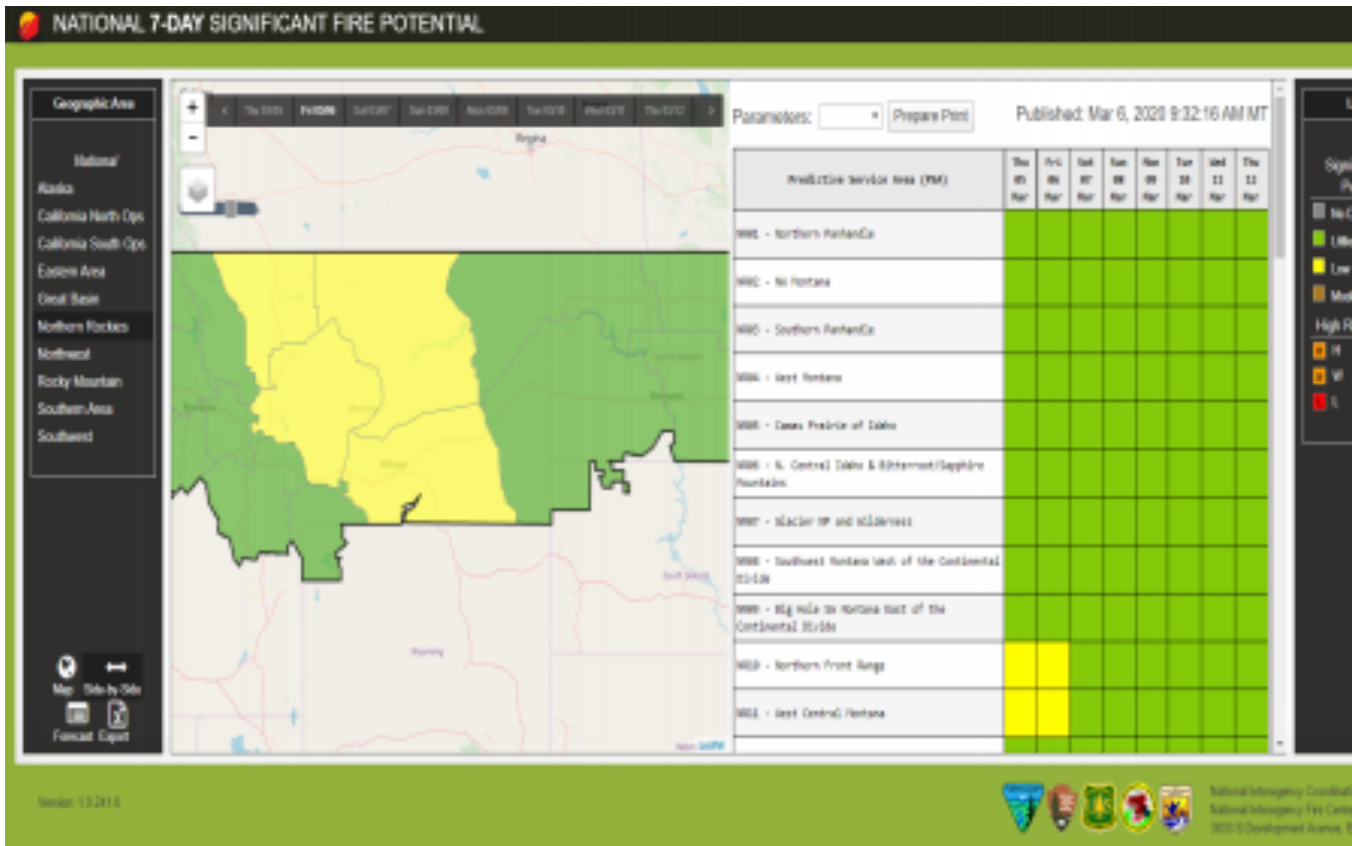
<https://gacc.nifc.gov/nrcc/predictive/weather/Day1.jpg>

## 2. 7-Day Significant Fire Potential Outlook

The 7-Day Significant Fire Potential Outlook addresses the probability of new large fires and/or spread of existing fires for each Predictive Services Area (PSA) across the Northern Rockies for each of the next 7 days. The outlook will identify significant fire potential in a 3-category scale based on ERCs and 100-hour fuel moisture forecasts. Fire triggers (i.e., lightning, wind, etc.) will be incorporated to refine the potential on individual days.

The outlook will be issued every morning – Monday through Friday and on weekends during critical fire periods - by 0930 MST/MDT, beginning early June and continuing through September 30. Seasonal start and stop dates may vary upon existing or expected fire danger or activity. Updates will be made when it appears that observed or expected conditions are significantly different than those contained in the product. 7-Day Outlooks will be archived each day for the 2017 fire season.





<https://fsapps.nwcg.gov/psp/npsq/forecast/#/outlooks?state=sideBySide&gacclid=5>

### 3. Significant Wildland Fire Potential Outlook (Issued Monthly)

The Monthly/Seasonal Fire Potential Outlook is a broader, more general assessment of weather, climate, and fuels conditions across the area. It incorporates climate trends, potential weather, and fuel conditions and trends to make long-term predictions of impacts on fire business. Outlooks will focus on potential for large fire activity and time frames that will impact resource availability and mobilization relative to normal fire business for the time of year. The Monthly outlook will be issued on the first day of each month by the Predictive Services at NIFC, with all of the 10 Geographic Areas (GACCs) contributing their outlooks with the same general format. The Northern Rockies text section is embedded within the National Outlook.



# National Significant Wildland Fire Potential Outlook

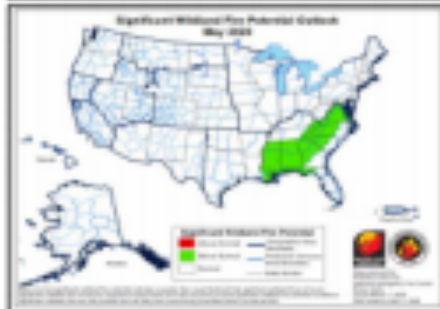
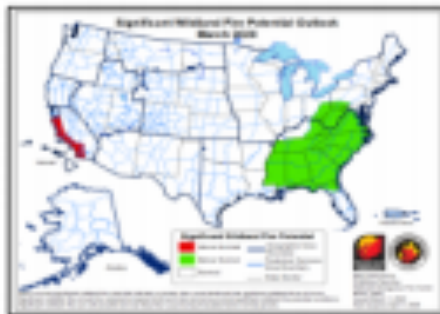
Predictive Services  
National Interagency Fire Center



Issued: March 1, 2020  
Next Issuance: April 1, 2020

## Outlook Period – March, April and May through June 2020

### Executive Summary



The significant wildland fire potential forecasts included in this outlook represent the cumulative forecasts of the ten Geographic Area Predictive Services units and the National Predictive Services unit.

National fire activity remained low in February as most of the country remained out of season. The previous month's progressive weather patterns stabilized as most locations along the West Coast became increasingly impacted by persistent high pressure ridges that promoted very dry conditions across California, northern Arizona, and the western Great Basin. Many locations across these areas received less than 25% of average precipitation for the month. Further inland, persistent troughs of low pressure promoted generally cooler than average conditions with above average precipitation along the Continental Divide. In the East, the presence of persistent troughs over the Great Plains promoted a warm and very moist southwesterly flow pattern. Most locations away from coastal areas received between 200% and 400% of average precipitation. Temperatures were nearly 6 degrees above average region-wide.

Mountain snowpack remained near to above average along the Canadian Border and Continental Divide. While the higher elevations across the northern Great Basin and eastern Oregon generally fared well, there were some areas that remained below average across southwestern Oregon and the Sawtooth Mountains of Idaho. The central and southern Sierra Nevada Mountains of California and Nevada continued to lose ground under very dry conditions. By month's end, several basins were reporting between 45% and 55% of average snowpack. In Alaska, the snowpack across the Interior was well above average while on the Kenai Peninsula and across the Chugach Mountains it improved to be between 57% and 100% of average.

Entering March and continuing through April, the prolonged periods of dry conditions across Southern California may lead to periods of elevated fire potential during days experiencing offshore winds. However, a muted greenup should initially limit activity. Normal to Below Normal significant large fire potential is expected along the Rocky Mountain Front during the pre-greenup period due to sufficiently wet or snowy conditions experienced during late winter.

Both the Southwest and Alaska will gradually transition into fire season in May with both regions peaking in activity by late June. Overall Normal significant large fire potential is expected during the period except possibly across northern and western portions of Arizona and across portions of South Central Alaska including the Kenai Peninsula where

[https://www.nifc.gov/nicc/predictive/outlooks/monthly\\_seasonal\\_outlook.pdf](https://www.nifc.gov/nicc/predictive/outlooks/monthly_seasonal_outlook.pdf)

## 4. Seasonal Fire Potential Outlook



The Seasonal Outlook is similar to the Monthly, except for a longer time period. This outlook attempts to predict the overall character of the upcoming fire season relative to a normal season (based on 5-to-10-year historical averages). The Seasonal is issued/updated from late winter through late spring prior to the onset of the core fire season and is available as a web presentation and also .pdf slide formats. Update times are not fixed but depend on such factors as winter snowpack, onset and progress of snow melt, weather trends, fuels condition and trends, etc.

**PREDICTIVE SERVICES**

# Fire Season 2020 SEASONAL OUTLOOK

03 March, 2020

High-Severity Burn Area  
From Roberts Fire in 2017, Warren Pass  
Elev. 8550 ft., Pintler Range, PSA 08  
30 June, 2018 M. Richmond

**NRCA Predictive Service Areas (PSAs)**

0:06 / 14:50

[Chaskell@blm.gov](mailto:Chaskell@blm.gov) 406-329-48  
[mrichmond@fws.gov](mailto:mrichmond@fws.gov) 406-329-47

**Meteorologists, Predictive Services  
Northern Rockies Coordination Center**

<https://gacc.nifc.gov/nrcc/index.htm>

<https://gacc.nifc.gov/nrcc/predictive/weather/SeasonOutlookWebBriefing/SeasonOutlookWebBriefing.mp4>

## 5. Smoke Monitoring Unit (SMU) Support

During the Spring (March 1 – May 31) and Fall (September 1-November 30) burning seasons the Predictive Services meteorologists at the Smoke Management Unit compile data and provide forecast meteorological conditions and smoke dispersion on a daily basis Monday through Friday. Unless unusual conditions suggest an update is appropriate, weekend forecasts after Friday are generally not provided.

Predictive Services meteorologists post the smoke dispersion forecast by airshed to an [Internet based Airshed Management System](#) by 9:00 am Mountain Time. In addition to daily smoke dispersion forecast information, the Meteorology/Dispersion Discussion helps burners identify the next window of opportunity so they may plan accordingly.

The screenshot displays the Airshed Management System interface. At the top, there is a navigation bar with links for Home, About, Contact Us, Current Items, and Meteorology/Dispersion. Below the navigation is a header image of a forest fire with the text "Airshed Management System".

The main content area is divided into several sections:

- Burn Recommendations:** A section with a "Show Information for" dropdown menu set to "03/08/2019". It lists recommendations for Idaho ("No Proposals") and Montana ("No Restrictions").
- Meteorology/Dispersion Discussion:** A section with a "Show Information for" dropdown menu set to "03/08/2019". It contains a "Friday March 08 Discussion" and a "Saturday March 09 Discussion".
- Resources:** A list of links including "Current Operations Guide", "Montana Department of Environmental Quality", "Idaho Department of Environmental Quality", "Fire Cache smoke monitors", "AQI modeling", "Flathead County Restrictions", "Lincoln County Restrictions", "Missoula County Restrictions", "Montana Burn Permits", "Montana/Idaho Air Quality Index Forecast", and "Realtime Air Quality Imaging - Idaho".
- Shapefile Downloads:** A table with columns for "Shapefile", "Last Modified", and "Size KB".

Shapefile	Last Modified	Size KB
03/08/2019	03/08/2019 11:44:00	36.711
03/08/2019	03/08/2019 11:44:00	14.621

<https://mi.airshedgroup.org/posts/meteorology/>

In addition to this text forecast, there is a daily Smoke Dispersion Web Briefing that can be found from the Northern Rockies Coordination Center Website:





Friday, March 8, 2019

**INCIDENT INFORMATION**

**PREDICTIVE SERVICES**

- Intelligence
- Weather
- Fuels/Fire Danger
- Outlooks

**LOGISTICS / DISPATCH**

- Dispatch Operations
- Aviation
- Crews
- Equipment/Supplies
- Overhead

**ADMINISTRATIVE**

- Northern Rockies Coordinating Group
- Policy and Reports
- Incident Business Management
- Safety Management
- Software Applications
- Training

**RELATED LINKS**

- National
- Area

**>> Predictive Services**  
**WEATHER**

**Current Conditions**

NCAR NR Regional Surface Map

**MesoWEST (Main Website)**

- NR Surface Map
- NR Hourly Observations
- NR 24-Hr Trend Monitor
- NR 5-Day Temperatures
- NR 5-Day Humidity
- NR Precipitation Monitor

**SATELLITE IMAGES (GOES-16)**

- Current Visible | Infrared | Water Vapor
- Animated Visible | Infrared | Water Vapor
- NWS Regional Satellite Links
- NASA Global Hydrology & Climate Center Images
- NCAR RAP Real-Time Weather Data
- NEXLAB Experimental Satellite
- RAMMB Cira Slider (GOES-16)

**LIGHTNING**

- NIFC Lightning Maps
- SPC Lightning Dryness Level
- SPC Experimental Dry Thunderstorm Forecast

**Snow / Precipitation Data**

- National Water & Climate Center (WCC)
- SNOTEL Data Network
- Idaho Snowpack
- Wyoming Snowpack
- Interactive Mountain Snowpack Maps
- Climate Prediction Center (CPC)
- 6-10 Day Temperature Outlook
- 6-10 Day Precipitation Outlook
- 8-14 Day Temperature Outlook
- 8-14 Day Precipitation Outlook
- 30-90 Day Outlooks
- Hydrologic Information Center (HIC)
- Weather Prediction Center (WPC)
- 3-Day Precipitation Forecast
- 5-Day Precipitation Forecast
- 7-Day Precipitation Forecast

**NRCC Weather Products**

- Predictive Services Fire Weather Web Briefing
- Daily Outlooks: Day 1 | Day 2 | Day 3
- Weekly Fire Weather and Climate Outlook
- Interactive Weather Briefing
- 2017 Northern Rockies Annual Operating Plan

**National Weather Service (NWS)**

Billings	Fire Wx   Red Flag   Spot
Bismarck	Fire Wx   Red Flag   Spot
Boise	Fire Wx   Red Flag   Spot
Glasgow	Fire Wx   Red Flag   Spot
Grand Forks	Fire Wx   Red Flag   Spot
Great Falls	Fire Wx   Red Flag   Spot
Missoula	Fire Wx   Red Flag   Spot
Pendleton	Fire Wx   Red Flag   Spot
Pocatello	Fire Wx   Red Flag   Spot
Riverton	Fire Wx   Red Flag   Spot
Spokane	Fire Wx   Red Flag   Spot

- NWS Northern Rockies Graphical Forecasts
- NWS National Fire Weather Page
- NWS Storm Prediction Center (SPC)

**Climatology / Drought**

- Climate, Ecosystem & Fire Apps (CEFA) Assessment Products
- National Drought Mitigation Center (NDMC)
- U.S. Drought Monitoring Map
- U.S. Vegetation Drought Response Index
- Palmer Drought Severity Index (PDI)
- U.S. Seasonal Drought Outlook
- Short-Term Drought Indicator Blend Percentiles
- Long-Term Drought Indicator Blend Percentiles
- U.S. Drought Portal
- National Drought Mitigation Center (NDMC)
- Montana County Drought Status
- NOAA El Nino / La Nina

**Weather Maps**

- Surface Charts: Past 24 Hours
- Lower Atmosphere Stability (Haines) Index

<https://gacc.nifc.gov/nrcc/predictive/weather/WebBriefing/WebBriefing.mp4>

Note: During the “core” fire season, the same link can be used to view the daily Fire Weather Web Briefing.

### **B. Remote Automated Weather Stations (RAWS)**

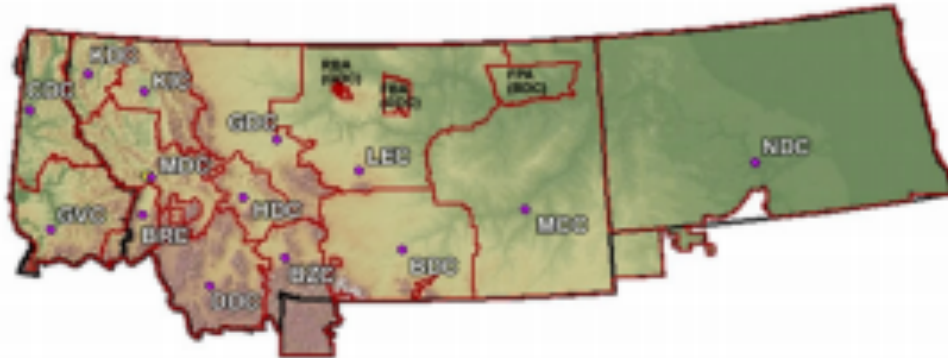
When an observation is identified as unrepresentative, notify the Northern Rockies Predictive Services meteorologist to initiate maintenance or repair of the station in question. Predictive Services will relay information regarding the network, address issues and concerns, and offer recommendations for improvements, to the USDA Forest Service Regional RAWS coordinator and to the BLM-NIFC RAWS Program manager, as appropriate.

### **C. Land Management Liaisons**

Predictive Services meteorologists will act as a liaison on issues regarding weather, climate, fuels, and fire danger between land management agency partners and service providers in the Northern Rockies. These include the NWS, fire management units and committees, and the research community.

During the core fire season, weekly Fire and Fuels Status updates are provided each Wednesday, by noon MDT.

## Northern Rockies Fire and Fuel Status for the 14-Day Period Ending 26 September, 2018



<b>Fire/Fuels Information</b>			
<u>Dispatch Center</u>	<u>Planning/Staffing Level</u>	<u>Number of New Fires/Acres</u>	<u>Fire Danger Level and Fuel Information</u>
<b>Billings</b>	PL 2	5 New, 1 Acre	Moderate
<b>Bitterroot</b>	PL 2	No report	High Open burning restricted
<b>Bozeman</b>	PL 2	3 New, Less than an Acre	High
<b>Coeur d'Alene</b>	PL 1	8 New, 31 Acres	Moderate North end wet, South end dry
<b>Billings</b>	PL 2	8 New, 169 Acres	Moderate to High

[https://gacc.nifc.gov/nrcc/predictive/fuels\\_fire\\_danger/NorthernRockiesFireandFuelStatus.pdf](https://gacc.nifc.gov/nrcc/predictive/fuels_fire_danger/NorthernRockiesFireandFuelStatus.pdf)

### D. Fire Danger Monitoring and Analysis

Northern Rockies Predictive Services meteorologists monitor fire weather and National Fire Danger Rating System (NFDRS 16) components from a number of key station Idaho, Montana, Wyoming, and North Dakota and South Dakota.

ERC, 1000-hr fuel moisture, 100-hr fuel moisture and Burning Index graphs are generated according to Predictive Service Areas (PSAs), which are geographic areas of similar climate/fuels based on statistical correlation of RAWS data.

- For geographic comparison we are using Fuel Model Y and Fuel Model V, depending on applicability. ERC and 1000-hr fuel moisture are stable indexes that do not jump around from day-to-day, whereas 100-hr fuel moisture is more variable. All are good for monitoring the fire season.

- The graphs are updated daily and show a trending average for the 2003-2017 time period (heavy gray line). The 90th and 97th percentile values are shown as solid back horizontal lines. Seasonal traces for year-to-date (blue line) and other significant/record years (orange line) may also be shown. (Note: Some stations do not have data for all representative years; what is available is used).



[https://gacc.nifc.gov/nrcc/predictive/fuels\\_fire-danger/PSAmap.htm](https://gacc.nifc.gov/nrcc/predictive/fuels_fire-danger/PSAmap.htm)

### E. Monitoring, Feedback, and Improvement of Fire Weather Information

Land management agencies will monitor all sources of fire weather information to ensure quality, consistency, and applicability. When significant issues arise, Predictive Services will address the issue with the service provider to enhance awareness and to work toward an appropriate solution.

Predictive Services integrates advanced technology into analytical and prediction systems for use in fire management planning and operations. This will include regional numerical modeling, weather and fuels data assimilation and dissemination, and continued research and development in fire meteorology.

#### **F. Incident Response**

Predictive Services meteorologists will collaborate as needed with the local NWS forecast offices, Incident Meteorologists (IMETs), Air Resource Advisors (ARAs), and NOAA's Storm Prediction Center (SPC) to maintain GACC- wide forecast message consistency.

#### **G. Instruction**

Predictive Services assists with the course development and instruction of NWCG and local courses including:

Fire Behavior S-series (S-190, S-290, S-390, S-490), Smoke Management RX-410, and Annual Fire Refresher Training (RT-130).

#### **H. Contact and Location Information**

The Northern Rockies Predictive Service Unit is located at:  
Northern Rockies Coordination Center  
5765 West Broadway, Missoula MT 59808-9361

The Predictive Service Meteorologists can be reached using NWS\_Chat and:

[Steven.ippoliti@usda.gov](mailto:Steven.ippoliti@usda.gov)  
(406) 329-4703