Red Flag Program

Fire Weather Watches and Red Flag Warnings are issued when the combination of fuels and weather conditions support extreme fire danger and/or fire behavior.

A *Fire Weather Watch* is used to alert agencies to the high potential for development of a Red Flag event in the18-96 hour time frame. The Watch may be issued for all or selected portions of a fire weather zone or zones.

A *Red Flag Warning* is used to inform agencies of the impending or occurring Red Flag conditions. A Red Flag Warning is issued when there is high confidence that Red Flag criteria will be met within the next 48 hours or less or criteria are already being met. Longer lead times are allowed when confidence is very high or the fire danger situation is critical. The Warning may be issued for all or selected portions of a fire weather zone or zones.

Fire Weather Watch and/or Red Flag Warning headlines are included in all affected forecasts. All NWS fire weather web pages also highlight any watch and/or warning issuances.

Format and Contents - A bullet format text message (RFW) is used for issuing, updating, and cancelling all Fire Weather Watches and Red Flag Warnings. Complete information regarding the format, content and examples of Fire Weather Watches and Red Flag Warnings can be found here: http://www.nws.noaa.gov/directives/sym/pd01004001curr.pdf

NWS offices normally call affected dispatch offices when Red Flag Warnings and Fire Weather Watches are issued or updated. Watches and Warnings are also available on the internet via the California Fire Weather web page, the web site(s) of the issuing NWS office(s), the NWS National Fire Weather Page and (www.weather.gov/fire) and from WIMS.

If the issuance of a Red Flag Warning or Fire Weather Watch requires an update of the forecast, the NWS office will verbally notify the Redding and Riverside PSUs as soon as possible. During non-duty hours for the PSUs, contact the GACC Coordinator on Duty (COD) as available.

Fire Weather Watches and/or Red Flag Warnings from NWS offices are normally issued only after, 1) an accurate assessment of fuel conditions has been determined (see “Qualifying Fuels Information” section), and 2) conferring with affected agencies, including the GACC Predictive Services Units. The final authority for the issuance of a watch/warning rests with the NWS forecaster.

Watch/Warning Fuel Requirements:

Live and/or dead fuels are sufficiently receptive (dry) so that fire starts from any cause may become an initial attack problem for fire agencies in the Fire Weather Zone(s) impacted. Fuel dryness/receptiveness should be determined by the following methods, in ranking level of importance:

- The local Fuels Management Officer (FMO) determines fuels are dry enough in the (portions of) Fire Weather Zone(s) to constitute an initial attack problem.
- High to Extreme Fire Danger as determined by the local fire management agency.
- The Fuel Dryness Level of the Geographical Area Coordination Center (GACC):

Northern California - The Fuel Dryness Level 7 Day Fire Potential Matrix in a brown or yellow category for the (portions of) Fire Weather Zone(s) expected to be impacted. If the fuel dryness level in the chart is green, the forecaster must determine if there will be an initial attack concern due to fuel dryness over all or part of the Fire Weather Zone or Zones. In rare cases, fuels may be or, may be becoming, too wet for an imminent large fire concern for the GACC, but are still dry enough, or dry enough for long enough, to be an initial attack concern.

Southern California – In addition to the 7 Day Fire Potential Matrix, the Predictive Services Unit in Riverside produces a written discussion on fuel status across southern California every other Thursday during fire season. This discussion is based on input from the fire community and includes a brief description of the current status of the live and dead fuel moistures, including green-up/curing information, as well as expected fuel conditions over the next seven days. The Fuels Discussion can be found at: http://gacc.nifc.gov/oscc/predictive/fuels_fire-danger/myfiles/Fuels_Discussion.pdf

- **Non Desert:** When a fuel condition of "Dry" (yellow) or "Very Dry" (brown) is displayed on the matrix for any Predictive Service Area (PSA), the "fuels switch" will be considered "on" for that day. A RFW is NOT recommended for any PSA designated as "Moist" (green).

- **Desert** (excluding the lower Colorado River Valley)**:** During dry winters and the spring curing season, fuel moistures **over the deserts** may be quite low without initiating serious concerns about the potential for large fire growth. Reasons include light fuel loading and/or discontinuous fuel, or the existence of dry fine fuels when larger live fuels remain relatively green. The Southern California GACC PSU will coordinate with affected WFOs to clearly communicate fuel conditions, and provide updates regarding spatial trends and changes in large fire potential, despite a "Very Dry" (brown) display on the associated PSA matrix.

The NWS should refer to this online document as the primary source of fuels information along with the National Fuel Moisture Database located at: http://www.wfas.net/index.php/national-fuel-moisture-database-moisture-drought-103, but may look at other sources for fuels information.

Watch/Warning Weather Criteria:

Abundant and/or Dry Lightning

Area Description	NWS Fire Weather Zones	Criteria
Northern California West of the Cascade/Sierra Crest	006, 201-204, 211-213, 215-221, 263, 264, 266-269, 276, 277, 279-283, 284, 505-513, 516-518, 528-530	Abundant lightning (scattered [25%] areal thunderstorm coverage or greater) in conjunction with sufficiently dry fuels (fuels remain dry or critically dry during and immediately following a lightning event). Warnings may be issued for isolated events (<25% areal coverage) when little or no precipitation is expected to reach the ground.
Eastern Sierra, Northeast CA	214, 270-271,273, 278, 284,285	
Lake Tahoe Basin	272	
Southern California desert area excluding the Lower Colorado River Valley	226-228, 230, 232, 260-262	A lightning event that is not accompanied by enough precipitation to significantly wet fuels that have been identified as critically dry. Significant precipitation is defined as ranging from .05 inches for grass or brush fuels to .15 inches for closed-canopy timber/heavy fuels. Fire Weather Watches and Red Flag Warnings will be issued for high impact lightning events in receptive fuels. Isolated events or events of short duration (i.e., events which start dry but become wet within an hour or two) do not need warnings but will be headlined in the forecast.
Lower Colorado River Valley	229,231	
Antelope Valley and SE Kern County Deserts	298, 299, 259, 289-297	
Central California Interior		
Southern California Excluding the Antelope Valley	234 - 241, 244, 245, 246, 251 - 254, 288, 547, 548	
Extreme Southern California	242, 243, 248, 250, 255-258, 260, 261, 262	

Wind and/or Low Humidity

Area Description	NWS Fire Weather Zones	Criteria
Southern California desert area excluding the Lower Colorado River Valley	226-228, 230, 232, 260-262	Relative Humidity ≤ 15% and wind gusts ≥ 35 mph for 6 hours or more, assuming fuel conditions are critical.
Lower Colorado River Valley	229,231	Relative Humidity ≤ 15% with sustained winds ≥ 20 mph or wind gusts ≥ 35 mph for 3 hours or more.
Antelope Valley and SE Kern County Deserts	298, 299, 259	Relative Humidity ≤ 15% and sustained (20-foot) winds ≥ 25 mph for a duration of 8 hours or more.
Central California Interior (WFO Hanford)	289-297	RAWS sustained winds ≥ 25 mph or frequent gusts ≥ 35 mph AND Relative Humidity ≤ 15% for a duration of 6 hours or more. OR Relative Humidity ≤ 10% for a duration of 10 hours or more regardless of wind.
Southern California Excluding the Antelope Valley (WFO Los Angeles)	234, 235, 236, 237, 238, 239, 240, 241, 244, 245, 246, 251, 252, 253, 254,	RH ≤ 10% with sustained wind ≥ 15 mph or with gusts ≥ 25 mph for 6 hours or more.
	288, 547, 548	RH ≤ 15% with sustained wind ≥ 25 mph or with gusts ≥ 35 mph for 6 hours or more.
Extreme Southern California (WFO San Diego)	242, 243, 248, 250, 255, 256, 257, 258, 260, 261, 262	RH ≤ 15% with sustained wind ≥ 25 mph or with gusts ≥ 35 mph for 6 hours or more.
Northern California West of the Cascade/Sierra Crest	006, 201-204, 211-213, 215-221, 263, 264, 266-269, 276, 277, 279-283, Western 284, 505-513, 516-518, 528-530	Refer to Wind/RH RFW Decision Matrix for Northern California West of the Cascade/Sierra Crest on next page.
Eastern Sierra, Northeast CA (WFO Reno)	214, 270-271,273, 278	RH ≤ 15% with wind gusts ≥ 30 mph for 3 hours or more.
Northeast CA excluding Surprise Valley (WFO Medford)	Eastern 284, 285	≤ 15% with wind gusts ≥ 30 mph for 3 hours or more. OR Daytime Min RH ≤ 10% with wind gusts ≥ 20 mph for 3 hours or more.
Lake Tahoe Basin	272	Relative Humidity ≤ 20% with wind gusts ≥ 30 mph for 3 hours or more. If fuels are at extreme levels: wind gusts ≥ 30 mph for 3 hours or more, regardless of Humidity.

Wind/RH Decision Matrix for Northern California West of the Cascade/Sierra Crest

- Matrix assumes daytime 10-hour fuel moisture (NFDRS obs time) is ≤ 6%, annual grasses have cured, and no wetting rain (greater than 0.10 inch) has fallen in the past 24 hours.
- The sustained wind refers to the standard 20-foot, 10 minute average fire weather wind speed.
- The wind event should be expected to last for at least 8 hours to qualify for a Red Flag warning. [This guidance was developed for Foehn wind events, which normally exceed 12 hours duration, and may last as long as 3-5 days].
- A **'W'** in the matrix indicates that a Watch or Warning should be considered.

Relative Humidity	**Sustained Wind 6-11 mph**	**Sustained Wind 12-20 mph**	**Sustained Wind 21-29 mph**	**Sustained Wind 30+ mph**
Daytime Minimum RH 29-42% and/or Nighttime Maximum RH 60-80%				**W**
Daytime Minimum RH 19-28% and/or Nighttime Maximum RH 46-60%			**W**	**W**
Daytime Minimum RH 9-18% and/or Nighttime Maximum RH 31-45%		**W**	**W**	**W**
Daytime Minimum RH < 9% and/or Nighttime Maximum RH < 31%	**W**	**W**	**W**	**W**

Predictive Services:

Predictive Service Units (PSU's) in Redding and Riverside provide fire weather and fire potential predictions and assessments to fire managers through the Predictive Services Program. PSU meteorologists are also liaisons with the California Air Resources Board (CARB) and other regional air quality district officials.

More information on Predictive Services is available at:
http://www.predictiveservices.nifc.gov/NPSG/npsg_pdf/PSHandbook_2009Update.pdf

Northern California Weather web site: http://gacc.nifc.gov/oncc/predictive/weather/index.htm
Southern California Weather web site: http://gacc.nifc.gov/oscc/predictive/weather/index.htm.

PSU Meteorologists Proficiency and Currency

1. Proficiency

a) Completion of S-190, S-290, and S-390
b) Work no less than five (5) shifts handling all operational products
c) Conduct at least 2 each, and 10 total, of the following:
- Daily coordination calls with other GACC office (Redding or Riverside)
- 0830 PDT (South Ops) or 0845 PDT (North Ops) conference call with the NWS
- 1030 PDT Briefing for Ops/ECC personnel
- 1300 PDT Smoke coordination conference calls
- Special briefings and conference calls for CALFIRE and Federal agencies

d) Work with Intel to produce all Predictive Services products
Included in this are the:
- Monthly Outlooks (for upcoming month)
- Seasonal Outlooks (Months 2 and Months 3 & 4)

e) The PSU Program Manager will sign-off on proficiency

2. Currency

a) The forecaster has prepared and issued at least 12 operational products during the past three months.
b) Must maintain proficiency in accordance with NWCG Technical Specialist standards.

Technology Transfer

Predictive Services will continuously integrate advancing technology and prediction systems into fire management planning and operations. Some efforts include:
- Incorporation of CANSAC data into predictive products.
- Use of FireFamily-Plus to advise fire Managers/ECCs on fuels conditions and fire danger.
- Proper use of RAWS and NFDRS, and assistance with WIMS, FS PAL, and Pocket Cards.
- Research and development to advance both fire meteorology and climate anomaly forecasting.

1. Nelson Dead Fuel Moisture Model Implementation in WIMS:

In late 2010, the Nelson model and the automated state-of-the-weather (SOW) were implemented in WIMS as version 2.0.0. System fixes and enhancements related to the automated SOW and Nelson model has brought the versioning of WIMS to 2.0.5.

Some recent highlights related to the integration of the Nelson Model in NFDRS can be found here:

Fire Weather Observations

1. RAWS and NFDRS Observations:

Fire weather observations for stations that desire next- day forecasts should be entered into WIMS no later than 1340 PST (1440 PDT). Local quality control is a critical element in the data entry process. Observations from Remote Automated Weather Stations (RAWS) sites will be the observation that is closest to 1300 LST/1400 LDT. In WIMS this can be either a 12xx or 13xx RAWS observation.

Both RAWS and manual stations utilized for NFDRS are expected to be sited and maintained according to the standards and guidelines published in NWCG PMS 426-3 "National Fire Danger Rating System Weather Station Standards and Guidelines". The website to view this document, and recent updates is: http://www.nwcg.gov/pms/pubs/pubs.htm

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Proper siting of weather stations has always been a high priority in California. The GACC meteorologists are available to assist land or fire managers in selecting proper sites. Annual RAWS maintenance requirements will be strictly adhered to.

2. Fireline Observations and Spot Forecast Feedback:

Fireline Observations:

Representative observations are required when requesting a spot forecast, whether for a wildfire, prescribed burn, or other need. Distance is not the only factor in determining whether an observation site is considered representative. Fire agency personnel will take standard fireline observations of temperature, relative humidity, wind direction and speed, and weather/sky condition consistent with guidance provided in NFES 2140 *"Weather Station Handbook – An Interagency Guide for Wildland Managers."*

Fire agency personnel are encouraged to provide any useful feedback related to the fire or burn with the meteorologist preparing the spot forecast. This can alert the forecaster to details which would otherwise not be apparent, such as variations in humidity across a large and/or complex site, the time at which winds switched from upslope to downslope, etc.

Spot Forecast Feedback and Validation:

When providing manual observations (i.e. from a belt weather kit or Kestrel) for use in spot forecasts, prescribed burners should proactively provide feedback to their forecast providers, whether PSU or NWS. This feedback should be made available as soon as possible. Be sure to include the following:

- Sky cover and/or precipitation verification
- Relative humidity
- Wind speed and direction
- Temperature

JOINT RESPONSIBILITIES

The National Weather Service (NWS) and the California Wildland Fire Coordination Group (CWCG) use a joint Fire Weather Program Assessment Team (FWPAT) to evaluate fire weather services in California. This team may make recommendations for improvements and/or changes to the program, and they also help ensure fire weather information is coordinated between agencies.

1. California Fire Weather Web Page and the Emergency Communication Center Dispatch Area (ECCDA) Forecast Summaries

An interagency fire weather web page for California is available at: http://www.wrh.noaa.gov/sto/cafw/. This web site serves as a portal for fire weather information for California, including links to fire weather forecasts, SPOT forecasts, current conditions, and much more.

Emergency Communication Center Dispatch Area (ECCDA) Forecast Summaries are also available from this web site. These simplified fire weather summaries are meant to be used for fire agency radio broadcasts while at the same time providing the most essential daily weather information. Any Red Flag Warning or Fire Weather Watch headlines shown in the ECCDA Forecast Summaries are linked to the actual watch or warning product. All forecast segments within an ECCDA are listed at the beginning of the forecast and can be mouse clicked to jump immediately to that segment.

2. Training

Meteorological training can be provided by both NWS and Predictive Services (PS). The NWS forecast offices primarily handle local courses that occur within their area of responsibility. Predictive Services' primary role is with regional and national level courses.

Requests for training from NWS offices should be directed to that office's Fire Weather focal point or the Meteorologist-In-Charge. If the office is not able to provide an instructor for a course, that office will assume the responsibility for finding an instructor. Requests for training from the PS units should be directed to the Training Coordinator or PS program manager. In all cases, sufficient advance notice (≥ six weeks whenever possible) should be given to allow for scheduling and proper preparation.

Costs incurred by NWS in providing training assistance (other than salary costs for a normal non-holiday weekday) will be borne by the requesting agency. Costs incurred by PS instructors are covered in their annual budget, without need for reimbursement. Below is a table outlining the instructor availability for 2013:

Name Of Office	**Instructors qualified to teach S-190, S-290**	**<u>Other Classes</u> that the listed office has at least one meteorologist qualified to instruct in**
Redding Predictive Services	Brenda Belongie John Snook Steve Leach Basil Newmerzhycky	S-390, S-490, S-491, RX-410 WIMS, S-144, ECCO, RX-341
Riverside Predictive Services	Tom Rolinski Rob Krohn	S-390, S-490, S-491, WIMS
Eureka	Jeff Tonkin Nancy Dean	S-390, S-490, S-590
Hanford	Cindy Bean Dan Harty	S-390, RX-300
Las Vegas	Jim Harrison Mike Staudenmaier	S-390
Medford	Frederic Bunnag Dennis Gettman Brett Lutz	S-390, S-490
Monterey	Ryan Walbrun Matt Mehle	S-390, S-490
Oxnard	Rich Thompson Dave Gomberg	S-390, S-490
Phoenix	Valerie Meyers	S-390, S-490
Reno	Alex Hoon Rhett Milne James Wallmann	S-390
Sacramento	Mike Smith Jason Clapp	S-390, S-490, S-590, RX-300
San Diego	Stefanie Sullivan	S-390, S-490

3. Coordination Conference Calls

Coordination conference calls will be conducted, as needed, between the PS units and the WFOs during fire season. **See the document titled "Predictive Services Coordination Calls in the appendix section.**

4. WIMS IDs for NFDRS Stations

All NFDRS observation stations are assigned a six-digit station identification number for use in WIMS. The Northern California or Southern California PS units must be contacted for assignment of a six-digit number for any new station, or for any changes in location made to existing stations that already have a WIMS ID number. The PS units will notify the NWS of any new or relocated NFDRS stations.