



RED FLAG WARNINGS

A Red Flag Warning (RFW) is a term that has been used since the 1960s by the National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) fire weather forecasters to alert forecast users to an ongoing or imminent critical fire weather pattern. The warning is issued as needed for anywhere in the country. The primary fire management applications include setting daily staffing levels and making tactical decisions based on the forecasted potential that conditions might impact firefighter safety. Through time, however, several issues with this system have evolved. First, there is no single quantitative definition of a RFW—different regions use different factors to determine the warning, raising the question of what the definition should be. Second, the NWS also issues a “Fire Weather Watch.” To many users, it is not clear how this watch differs from RFWs. Third, RFWs are issued so frequently that agencies and the public are becoming numb to the product largely because of an increased perception that the warnings are now less meaningful.

Overall, there is a concern amongst NWS and fire agency personnel that the Red Flag Warning is not an effective messaging medium. As a result of these issues and questions, the California Nevada Applications Program (CNAP), a NOAA Regional Integrated Sciences and Assessments team, NOAA NWS Fire Weather, NOAA National Integrated Drought Information System (NIDIS) and the National Wildfire Coordinating Group, Fire Environment Committee, began a collaborative project in 2018 to begin an assessment of this forecast product with the aim of developing an improved product that meet the NWS, the fire management community, and public warning needs.

Red Flag Warning
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North Bay Hills, East Bay Hills, Diablo Range

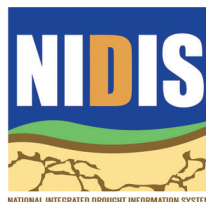
12 am Sunday to 12 pm Monday

- Increasing fire weather danger
- Low humidity
- Gusty north to northeast winds

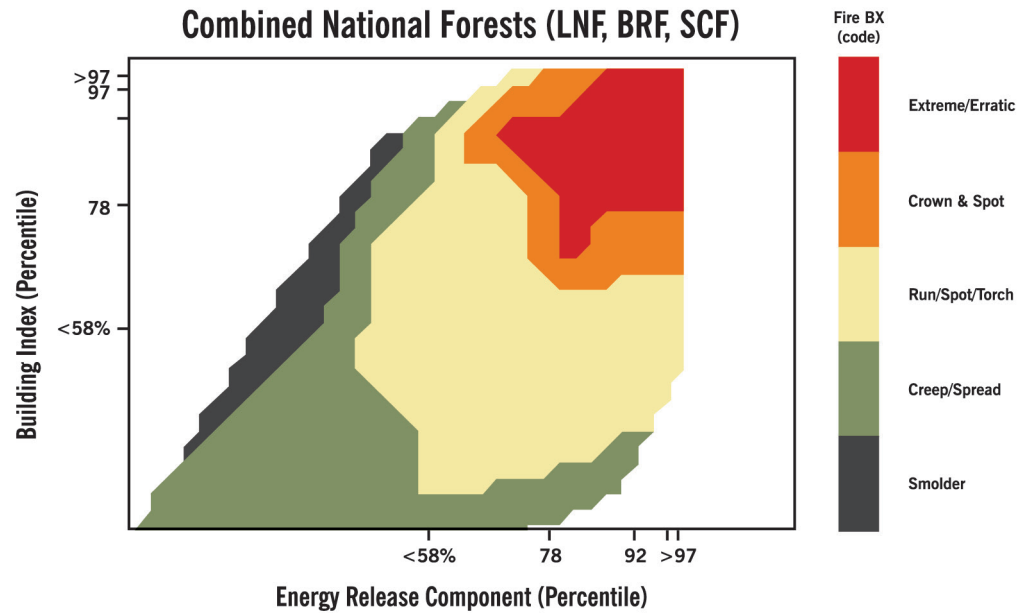
Red Flag Warning
TAKE ACTION. Be extremely careful with open flames. NWS issues a Red Flag Warning, in conjunction with land management agencies, to alert land managers to an ongoing or imminent critical fire weather pattern. NWS issues a Red Flag Warning when fire conditions are ongoing or expected to occur shortly.

Fire Weather Watch
BE PREPARED. A Watch alerts land managers and the public that upcoming weather conditions could result in extensive wildland fire occurrence or extreme fire behavior. A watch means critical fire weather conditions are possible but not imminent or occurring.

SOURCE: <https://www.weather.gov/safety/wildfire-ww>



The first step of this assessment was a review of 40 annual operating plans for NWS Weather Forecast Offices, and coding all red flag criteria. In all, 524 unique RFW criteria were identified. At a workshop in Boise, ID in September 2018, several paths forward to refine and standardized RFW criteria were discussed. The need to be in alignment with the NWS Hazard Simplification program was also recognized. Building off this RFW assessment and needs, the project team applied for and received funding from the NOAA CSTAR program for a 2-year effort beginning on 1 June 2019 to do the following:



A proposed method for including fuels as a component in red flag warning criteria includes both burning index and energy release component indices. The higher the percentile in each axis, the more extreme and erratic fire behavior is likely to occur. Source: Dr. Matt Jolly, USFS.

CURRENT RESEARCH TASKS:

- **Quantitative (percentile) analyses of fire weather-danger-behavior indices to determine the best consistent set of inputs needed for established breakpoint criteria for fire weather watch/warning decisions;**
- **Determine categorical breakpoint criteria linked to fire management and public notifications and actions necessary for safety;**
- **Identify potential messaging for communicating forecast confidence and uncertainty of probabilistic hazard information to fire management building off current fuel indices research;**
- **With these inputs, develop a prototype decision matrix with NWS, fire management, and emergency services.**

Changing the RFW product has challenges not seen in most other NWS hazard messaging products because it needs to include aspects of both weather and vegetation conditions, and may or may not include the presence of a wildfire. The product will be meant to serve fire management, emergency managers, and the public. Thus, substantial testing will be necessary both as part of this project and, provided adequate funding is available, in a next phase that includes the NOAA Hazardous Weather Testbed and NOAA's Operations Proving Ground. The project embraces a strong partnership with NWS fire weather staff, NOAA Storm Prediction Center staff, researchers from academic and federal institutions, NOAA NIDIS, and U.S. Forest Service staff to help ensure that the prototype criteria developed reflect the best science and are also rigorously tested before they enter into formal research-to-operations processes. Testing will take place in representative fire regime areas/weather forecast offices across the United States, to assess the robustness of the criteria across the spectrum of weather and fire regimes, as well as forecast confidence. The project outcome is to improve both consistency and messaging of the RFW product, including improving communication and identifying actions for public and firefighter safety across fire prone areas of the United States.

<https://www.weather.gov/hazardsimplification/>

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