

Guam Fire Weather Operations Plan 2022

(Updated October, 2021)

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FIRE WEATHER ORGANIZATIONAL DIRECTORY

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INTRODUCTION

The National Weather Service's Fire Weather Program is designed to provide forecasts, warnings, and consultation services for the prevention, suppression, and management of forest and rangeland fires on Guam. Weather support is available throughout the year. This Operations Plan will cover services provided by the Guam Weather Forecast Office.

This plan will be reviewed annually by all parties. Any intermediate changes or amendments will be coordinated with all parties involved before the changes are incorporated.

NWS RESPONSIBILITIES

The National Weather Service Forecast Office located in Tiyan, Guam, will provide weather forecast products in support of fire suppression operations on the island of Guam. This will include a standard fire weather planning forecast, to be issued once daily in the late morning, with event-driven updates if necessary; and fire weather watches and red flag warnings to warn of significant weather threats which may affect fires and require repositioning of resources. Spot forecasts, as requested by government agencies involved in fighting currently-burning wildfires or soon-to-be ignited prescribed burns, will be provided as necessary.

In support of the National Fire Danger Ratings System (NFDRS), WFO Guam will disseminate a daily WIMS observation and generate a routine point forecast for central Guam.

FORESTRY RESPONSIBILITIES

When crews or other agencies are placed on firefighting duty on Guam, Guam Forestry will call the National Weather Service office to alert forecasters that fire operations are in progress. Guam Forestry should include both the location and size (if known) of the fire. Guam Forestry will also notify the National Weather Service once they have discontinued dry season fire monitoring with the onset of the 2022 wet season.

FIRE SEASON

The fire season will be broken into two separate periods. The dry fire season will run from January 1 through May 31, however, daily fire weather forecasts will begin on November 1st to provide weather information for forestry officials when considering controlled burns ahead of dry season. These dates may be changed depending on the severity of the fire season. The wet fire season will run from June 1 through December 31.

NWS GUAM'S FIRE DANGER CATEGORIZATION

On a daily basis, Guam Fire Dispatch will call the WFO requesting the fire danger rating (FDR). Prior to November, 2019, the FDR was based solely on the KBDI and consisted of four categories: Low, Moderate, High, and Extreme, with the Extreme category having a range of 600-800. This rating system did not factor wind speed, which plays a significant role in fire spread and containment, thus, on many occasions in which there was an Extreme fire danger but no wind, neither a Red Flag Warning nor Fire Weather Watch was issued. Starting in November, 2019, and further revised in October, 2021, the FDR consists of 5 tiers. These changes further acknowledged the role of surface winds concerning fire behavior and spread.

LOW 0-299 KBDI	MODERATE 300-499 KBDI	HIGH 500-800 KBDI <i>Low Wind</i>	VERY HIGH 600-699 KBDI <i>Strong Wind</i>	EXTREME 700-800 KBDI <i>Strong Wind</i>
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LOW: Fires are hard to start and will be slow to spread.

MODERATE: Some brushfires are possible; use caution if burning.

HIGH: Wildfires are possible. Fires can spread rapidly and could become difficult to control if windy.

VERY HIGH: Fires will start easily, spread rapidly, and intensify quickly.

EXTREME: Fires can spread furiously. Every fire has the potential to become large.

It is important for forecasters to remember that the fire danger categorization is no longer reliant solely on the KBDI value, especially when the KBDI exceeds 600. The wind criterion is listed among the other criteria in the section below.

The 2019 and 2021 modifications further reduce the number of days the fire danger is categorized as Extreme yet have no Red Flag Warnings or Fire Weather Watches issued.

FIRE WEATHER WATCH/RED FLAG WARNING

Specific conditions must be met for the issuance of a Fire Weather Watch and/or a Red Flag Warning. These conditions are as follows:

1. KBDI greater than or equal to 600, **and**
2. Two minute ASOS winds greater than or equal to 17 kts (20 mph), **and**
3. Minimum relative humidity of less than 60% in one or more observations, **and**
4. Low 10-hr fuel moisture, typically less than 13; measured in the early afternoon.

Monthly precipitation less than 2.00 inches with a decrease and/or cessation of dew can signal the onset of dry season. Forecaster judgment must be used in watch/warning decisions, taking into account weather trends, rather than relying on a single set of variables at a specific time of day.

In addition to weather observations recorded at WFO Guam (PGUM), forecasters should also reference Guam Sutrons, USGS rain gauge sites, wunderground.com surface observations, and the Dandan RAWS (tentatively to be installed in the 2022 dry season) for supplemental observational data when considering the issuance of a Fire Weather Watch and/or a Red Flag Warning.

If the forecast office issues a Fire Weather Watch or Red Flag Warning, the fire weather forecaster will ***highlight the watch or warning in the regularly issued, or an updated Fire Weather Planning Forecast***, by using a headline and will also call Christine Fejeran at Guam Forestry. If no one can be reached at the Guam Forestry Office, forecasters should send a courtesy email stating a Watch or Warning is in effect or will be in effect. Examples of the Fire Weather Watch and Red Flag Warning are available in Station Duty Manual (SDM) 1.5.

A "**Fire Weather Watch**" is used to alert the user to the possible development of a Red Flag event in the near future. Fire Weather Watches may be issued up to 96 hours in advance.

A "**Red Flag Warning**" is used to warn the user of an impending or ongoing Red Flag event and is issued immediately when Red Flag Conditions are occurring. Otherwise, it is issued for impending Red Flag Conditions when there is a high degree of confidence that conditions will develop and the forecast time of onset for the event is less than four hours.

Because of the restrictions on user programs brought about by a Red Flag Warning, it is imperative that the warning be promptly canceled when the conditions cease to exist or if the conditions are no longer expected to develop.

DANDAN RAWS OBSERVATION STATION

Tentatively during the 2022 fire season, Guam Forestry and the USFS will be installing a new RAWs station in Dandan to replace the old and weathered station. Guam Forestry will collaborate with National Weather Service Electronic Technicians to maintain routine maintenance and upkeep with the system components with the goal of fully training Guam Forestry in those responsibilities.

FIRE WEATHER PLANNING FORECAST

During the fire season the Fire Weather Planning Forecast will normally be issued between 10 AM and 11 AM Guam Local Time, seven days a week, after the 00Z sounding data has been processed. A headline may be added to the top of the forecast, denoting significant weather, or for the issuance of a Red Flag Warning or Fire Weather Watch. The discussion will briefly cover locations of fronts and systems which produce the weather along with highlighting significant trends or changes that the forecaster anticipates. The 2 day tabular forecast will cover specific weather elements mentioned below. The narrative extended forecast portion of the forecast will pick up where the short term left off and continue out through day 7. The extended portion is a general forecast which mentions the possibility of precipitation, expected high and low temperatures for each day, and wind speeds and direction. An example of the Fire Weather Planning Forecast is available in the SDM 1.5.

Elements of the tabular and narrative sections are described below.

1. SKY COVER

- A. Clear (or Sunny) -- < 1/8th cloud cover.
- B. Mostly Clear/Mostly Sunny -- 1/8th to 2/8ths of cloud cover.
- C. Partly Cloudy/Mostly Sunny-- 3/8ths to 5/8ths of cloud cover.
- D. Mostly Cloudy/Partly Sunny -- 6/8ths to 7/8ths cloud cover.
- E. Cloudy -- 8/8ths cloud cover.

2. PRECIPITATION TYPE

- A. Rain—Frequent or nearly continuous (not showery), usually in a stable atmosphere. Small to medium sized water droplets.
- B. Showers—Rain of short duration and varying intensity, usually beginning and ending abruptly.
- C. Thunderstorms--Downpours of rain, often with strong gusty winds and lightning.

3. TEMPERATURE

The temperature will be in degrees Fahrenheit. The maximum and minimum temperatures are forecast for the 30-hour period from 1:00 PM the day of the forecast until 7:00 PM the next day.

4. RELATIVE HUMIDITY

The Relative Humidity (RH) is the ratio, in percent, of the amount of moisture in the air compared to the amount the air could hold if fully saturated (100%). The range of RH is

from 0% to 100%. Usually, the minimum RH occurs at the time of the maximum temperature and the maximum RH occurs at the time of the minimum temperature. Because of the dependency of the relative humidity upon temperature, it should be noted that if the temperature is under forecast (the actual temperature is higher than forecast), then the forecasted relative humidity will likely be too high.

5. WIND - DIRECTION AND SPEED

The wind direction applies to the direction from which the wind will blow. The direction will be listed using the 16 point compass (e.g. NE, S, WSW, etc.). Any significant changes expected during the forecast period will be mentioned in the narrative. The wind speed will be in miles per hour (mph). The speed is the forecast for the 20-foot level. Speeds pertain to the two-minute average while gusts pertain to the maximum instantaneous value expected.

6. WIND SHIFT

If a shift in wind direction associated with a shear-line passage is expected during the period, the new direction and wind speed will be forecast. Wind shifts may also be mentioned in the synopsis. Because a shear-line may take several hours to move through a zone, the approximate time of the wind shift will be encoded (i.e. Northeast 10 to 15 mph after midnight).

7. POPS AND TYPE

The probability of precipitation, or POP, expresses the chance that measurable rainfall will occur at any given point within a county zone group within a 12-hr period. Measurable rainfall is 0.01 inches or greater. Probability is expressed in percent. A forecast of the predominate type of precipitation will accompany a probability of precipitation forecast (**i.e. 40 percent chance of showers, 60 percent chance of rain, 100 percent chance of thunderstorms**).

8. SMOKE MANAGEMENT FORECAST PARAMETERS

The forecast parameters include mixing height, and transport wind. Note: One consequence of the Clean Air Act is that land managers must practice principles of careful smoke management. This is done by combining favorable meteorological conditions with a variety of prescribed fire techniques so that smoke will be readily dispersed. The Clean Air Act has established 500 meters (1700 feet) as a minimum for mixing height for permitting prescribed burning.

A. AFTERNOON MIXING HEIGHT

Mixing height is the extent or depth to which smoke will be dispersed by means of turbulence and diffusion. Mixing height increases with daytime solar warming of the surface and increased low-level wind speed. The forecast of mixing height is expressed in feet above sea level.

B. TRANSPORT WIND

Transport wind is the average wind speed in mph throughout the depth of the mixed layer. These winds are a good indication of the horizontal dispersion of smoke and suspended particles. The forecast transport wind is the expected wind speed and direction at the time of maximum mixing of the atmosphere, normally during the mid afternoon. Usually a wind of less than 8 mph restricts an agency from burning due to reduced vertical mixing from a lowered trade-wind inversion. Transport wind directions are typically given to eight compass points (e.g. northeast, east, southwest, etc.)

WIMS OBSERVATIONS

WFO Guam will enter into WIMS the data for the ASOS site located in northern Guam. The observations should be entered into WIMS as soon as possible after 1:00 PM Local Standard Time. Point forecasts will not be prepared without the ability to look at each observation.

WIMS POINT FORECASTS

Point forecasts will be issued by 2:00 PM daily for the ASOS site. The National Fire Danger Rating System (NFDRS) is a quantitative means for evaluating the fire danger. This complex model of fuel and weather parameters processes daily weather observations and fuel moisture as input, and fire managers receive numeric output that suggest the severity of fire danger over a large area.

Point Forecast Terminology

1. STATION NAME

Each location will have a name. This name will be provided by the agency requesting the observation site.

2. STATION NUMBER

Before a forecast will be made for a station, it must have a valid station number in WIMS.

3. VALID DATE

The valid date will be the next day in the order: YYMMDD

4. VALID TIME

The valid time will be 1300 (1:00 PM)

5. STATE OF THE WEATHER

A single digit number from 0 to 9.
0 Clear (Less than 1/10th of sky is cloud covered).

1 Scattered Clouds (1/10th to 5/10ths of sky cloud covered).

2 Broken Clouds (6/10ths to 9/10ths of sky cloud covered).

3 Overcast (More than 9/10ths of sky cloud covered).

4 Foggy

5 Drizzle

6. Rain

7 Snow or Sleet

8 Showers (In sight or at station and reaching the ground).

9 Thunderstorms/Hail

6. TEMPERATURES

Temperature forecast for 1:00 PM the next day.

7. RELATIVE HUMIDITY

Relative Humidity forecast for 1:00 PM the next day.

8. LIGHTNING ACTIVITY

- A. Period 1 (L1) is from 2 PM until midnight that night (a 10 hour period). Period 2 (L2) is from midnight the night of the forecast until midnight the next night (24 hour period.)
- B. A single digit (1 through 6) will be used. The meaning of each number is as follows:
- 1 No thunderstorms
 - 2 Few building cumulus with isolated thunderstorms
 - 3 Building cumulus with scattered thunderstorms, light to moderate rain reaches the ground.
 - 4 Thunderstorms common but do not obscure the sky, moderate rain reaches the ground.
 - 5 Thunderstorms common and occasionally obscure the sky, moderate to heavy rain reaches the ground.
 - 6 Same as 3 above but dry, no rain

9. WIND DIRECTION AND SPEED

Wind forecast at 1 PM the next day. The wind speed is a 10 minute average at 20 feet above the ground measured to 16 compass points (e.g. WSW, NW, NNE, E, etc).

10. TEN HOUR TIME LAG FUEL MOISTURE

Since the fire weather meteorologist does not typically have access to fuel

moisture information, an M will be entered for missing.

11. TEMPERATURE

The 24 hour maximum and minimum temperature forecast from 1:00 PM the day of the forecast until 1:00 PM the next day. This will typically be the maximum temperature of the current day and the overnight low expected in the next 12 to 16 hours. The temperature in the maximum temperature column must be at least equal to or higher than the temperature given in part (6) above. If not, WIMS will not process a forecast for that station.

12. RELATIVE HUMIDITY

The 24 hour maximum and minimum Relative Humidity forecast from 1:00 PM the day of the forecast until 1:00 PM the next day. The maximum RH value listed must equal or exceed the value given in part (7) above. Similarly, the minimum RH value must equal or be less than the value in part (7) above. Either error will cause WIMS to not process a forecast for that station.

13. PRECIPITATION DURATION

The number of hours for which precipitation is forecast. Period 1 is from 1:00 PM the day of the forecast until 5:00 AM the next day (16 hours). Period 2 runs from 5:00 AM the next day until 1:00 PM that same day (8 hours).

SPOT FORECASTS

Requests for Spot or Prescribed Burn forecasts will be made via telephone. The requesting agency should supply information on topography and vegetation of the area, as well as current weather conditions at the site. Unless otherwise stated by the requesting agency, the forecast parameters of sky condition, weather, temperature, relative humidity, 20 foot wind, significant/sudden changes in wind speed or direction, along with mixing heights, and transport winds shall be provided in the Spot Forecast.

METHODS OF COMMUNICATIONS

REGULAR FORECASTS

The Fire Weather Planning Forecast may be found on the INTERNET at the addresses listed earlier (and below). NFDRS data may be found on the WIMS internet site, given a proper user ID and password.

NWS GUAM FIRE WEATHER PRODUCTS ON THE WEB

Forecasts issued by the NWS can be found online at <http://weather.gov/gum>

The screenshot shows the National Weather Service website for Guam. At the top, there is a navigation bar with links for HOME, FORECAST, PAST WEATHER, SAFETY, INFORMATION, EDUCATION, NEWS, SEARCH, and ABOUT. Below this is a section for local forecasts with a search box and a "Go" button. To the right, there are "News Headlines" with three items: "Typhoon Warning is in effect for Agrihan, Pagan, and Alamagan", "New Impact-Based Flash Flood Warning Format Starting Nov 13", and "Hafa Adai from the Guam Weather Forecast Office!". The main content area is titled "WFO Guam" and includes a sub-link "Weather.gov > Tiyan, GU". Below this is a navigation bar for "Current Hazards", "Current Conditions", "Radar", "Forecasts", "Rivers and Lakes", "Climate and Past Weather", and "Local Programs". A map of the Marianas islands is displayed, with labels for Garapan, San Jose (tinian), Sinapalu, and Hagatna. A legend on the right indicates "High Surf Advisory" (purple) and "Rip Current Statement" (cyan). The map is dated "Last Map Update: Fri, Nov. 15, 2019 at 9:04:02 am CHST". At the bottom, there is a pink banner with the text "*** Click for the latest on Tropical Storm 26W (FENGSHEN) ***".

Fire weather products can be found by hovering the mouse over the “Forecasts” tab above the map of the Marianas and clicking on “Fire Weather”. (The “FORECAST” link at the very top goes to the national forecast map)

The daily Fire Weather Forecast can be found in the section “Text Products Issued Daily”. This forecast is updated daily from November 1 through May 31, or longer if dry conditions persist.

The screenshot shows the National Weather Service website for Tiyan, GU. At the top, there are navigation links: HOME, FORECAST, PAST WEATHER, SAFETY, INFORMATION, EDUCATION, NEWS, SEARCH, and ABOUT. Below the navigation is a search bar for local forecasts by city, state, or ZIP code. The main content area is titled 'Fire Weather Product Suite' for Tiyan, GU. It includes a 'No Active Red Flag Warning' message, a 'Text Products issued Daily' section (FWF - Fire Weather Forecast Issued Nov 1st - May 31st), and 'Experimental Fire Weather Graphical Forecasts'. A weather forecast for Tiyan, GU shows 81°F (27°C) with a 30% chance of scattered showers then partly sunny, with a high of 88°F.

VERIFICATION OF RED FLAG FORECASTS

Verification of Red Flag Warnings and Fire Weather Watch Forecasts will be conducted during the 2022 fire season.

Methodology of Verification for Red Flag Warnings and Fire Weather Watches:

Verification of Red Flag Warnings and Fire Weather Watches will be “tracked” for Guam. A Red Flag Warning issued at the request of a land management agency will not be considered for verification purposes. However, such warnings issued will be tallied separately and, for the purpose of workload indication, will be included in the number of total warnings issued for that office.

Data/information from surface observations (ASOS, Sutrons, USGS gauges, etc.), supplementary and complementary weather sources, satellite and radar imagery, etc. may be used to verify Red Flag Warnings and Fire Weather Watches. Experience, judgment, objectivity, consistency, and ethics will be used in verifying.

NOAA WEATHER RADIO

Fire Weather Watches and Red Flag Warnings are not typically broadcast on NOAA Weather Radio.