

Fire Weather: useful websites and tools



Jeff Stackhouse

Livestock and Natural Resources Advisor

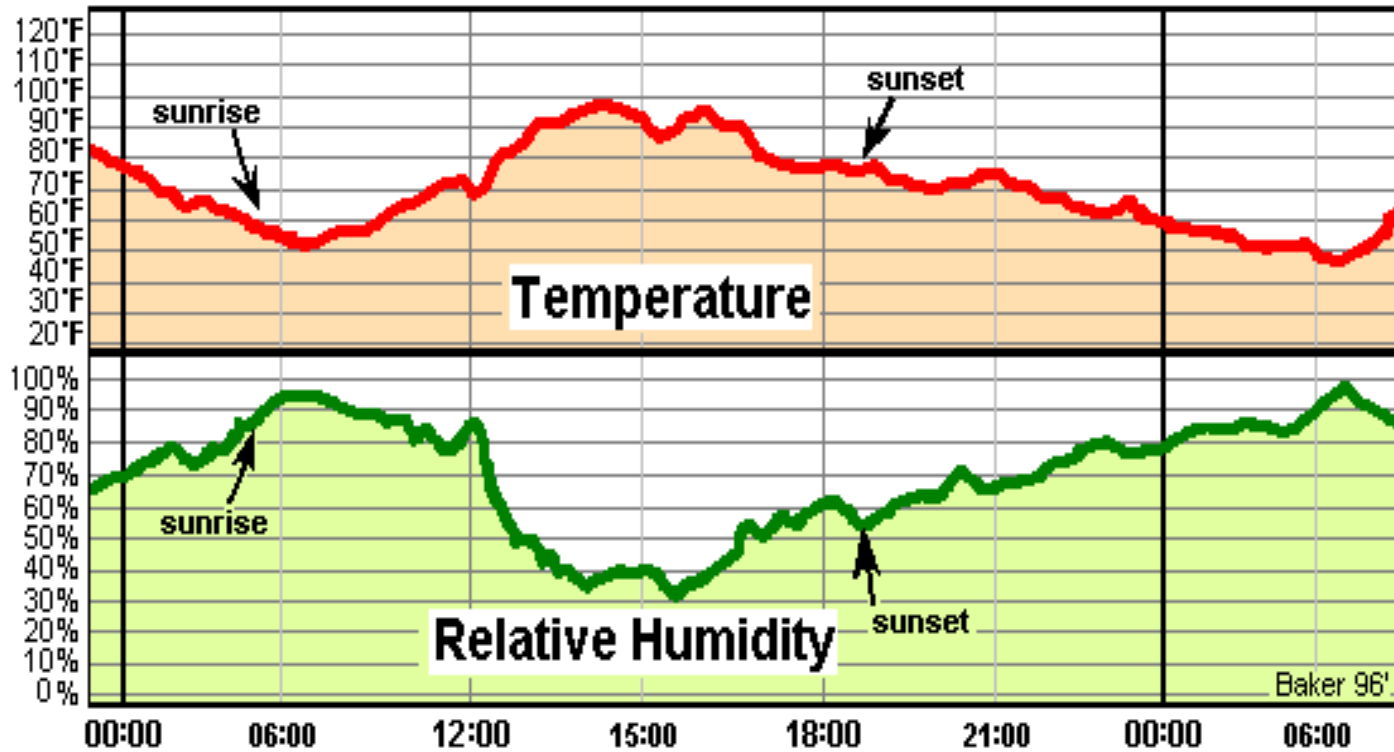
Weather and Prescribed Fire

- Weather is the most dynamic factor that affects fire behavior
 - Most difficult to predict



Daily Temperature (“Dry bulb”) and Humidity (“RH”) Relationship

Thermograph depicting 24 hours of temperature and relative humidity.



Note the diurnal relationship between temperature and relative humidity.

Relative humidity (RH): amount of moisture in the air divided by the amount the air could hold when saturated at the same (or “Relative”) air temperature; usually expressed in percent.

Moisture

Fine Fuels

- gain and lose moisture quickly
- Example: 1 hr fuels (time-lag-class) is how long it takes for that fuel class to equilibrate to the RH
- react rapidly to moisture

Heavy Fuels

- gain and lose moisture slowly
- react slowly to moisture

Precipitation Duration vs. Amount

- Duration has greater impact on fuel moisture than amount



“PIG” or Probability of Ignition

PowerPoint Slide Show - [WeatherMonitoringFor_RiFire.pptx] - PowerPoint

Fire Weather Monitoring Review

Step 4:

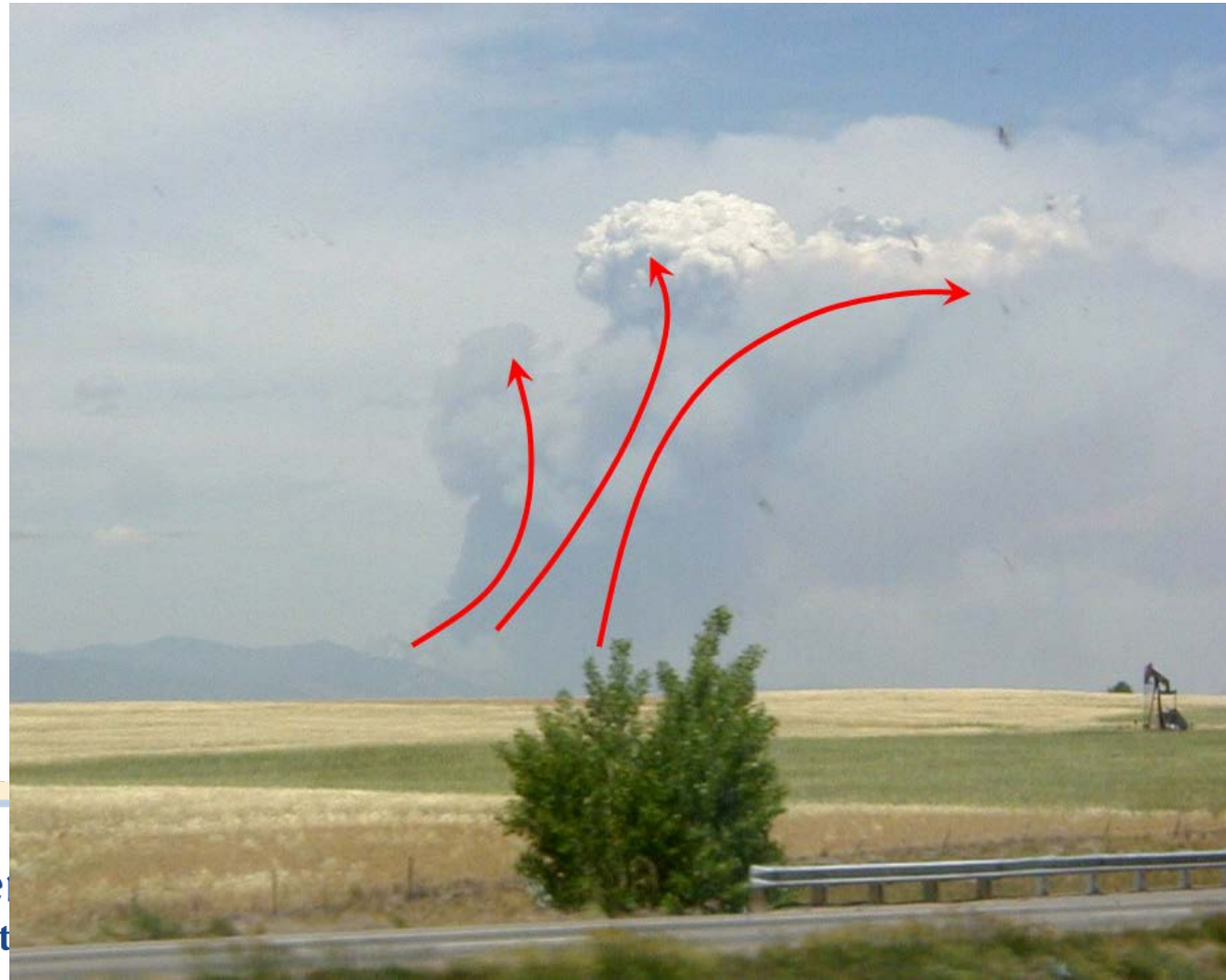
Calculate Probability of Ignition

- Use your Fine Dead Fuel Moisture, Temperature, and Shaded/Unshaded status to calculate the POI in table.
- For Example: *with a temperature of 60 degrees F, canopy cover less than 50%, and a fine dead FM of 9%, the probability of ignition is 30%.*

		PROBABILITY OF IGNITION TABLE																
		Shading (%)	Dry Bulb Temperature (°F)	Fine Dead Fuel Moisture (%)														
				2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
EXPOSED	3E Unshaded <50%	110+	100	80	70	60	60	50	40	40	30	30	20	20	20	20	10	10
		100 - 109	100	90	80	70	60	60	50	40	40	30	30	20	20	20	10	10
		90 - 99	100	90	80	70	60	50	40	40	30	30	20	20	20	10	10	
		80 - 89	100	90	80	70	60	50	40	40	30	30	20	20	20	10	10	10
		70 - 79	100	80	70	60	60	50	40	40	30	30	20	20	20	10	10	10
		60 - 69	90	80	70	60	50	50	40	30	30	20	20	20	20	10	10	10
		50 - 59	90	80	70	60	50	40	40	30	30	20	20	20	10	10	10	10
		40 - 49	90	80	70	60	50	40	40	30	30	20	20	20	10	10	10	10
		30 - 39	80	70	60	50	50	40	30	30	20	20	10	10	10	10		
SHADED	3S Shaded >50%	110+	100	90	80	70	60	50	50	40	40	30	30	20	20	10	10	
		100 - 109	100	90	80	70	60	50	50	40	30	30	20	20	20	10	10	
		90 - 99	100	90	80	70	60	50	40	40	30	30	20	20	20	10	10	10
		80 - 89	100	80	70	60	60	50	40	40	30	30	20	20	20	10	10	10
		70 - 79	90	80	70	60	50	50	40	30	30	30	20	20	20	10	10	10
		60 - 69	90	80	70	60	50	40	40	30	30	20	20	20	10	10	10	10
		50 - 59	90	80	70	60	50	40	40	30	30	20	20	20	10	10	10	10
		40 - 49	90	80	60	50	50	40	30	30	30	20	20	20	10	10	10	10
		30 - 39	80	80	60	50	50	40	30	30	20	20	10	10	10	10		

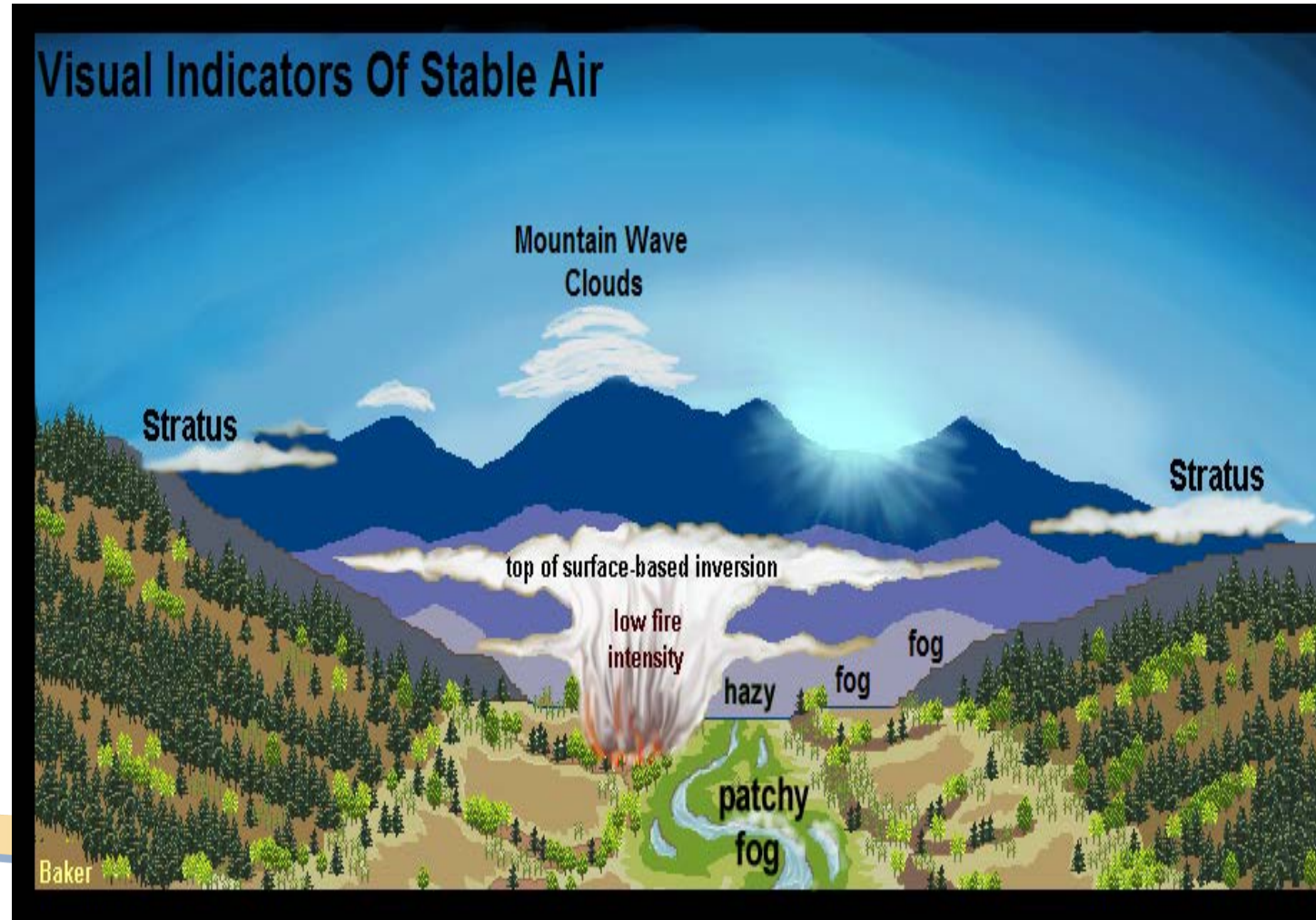
Atmospheric Stability

How vertical motion in the atmosphere is ENHANCED or SUPPRESSED.



Stable Atmosphere

- **Visual Indicators**
 - Clouds form in layers
 - Smoke drifts apart after limited rise
 - Poor visibility due to smoke or haze
 - Fog layers
 - Steady winds

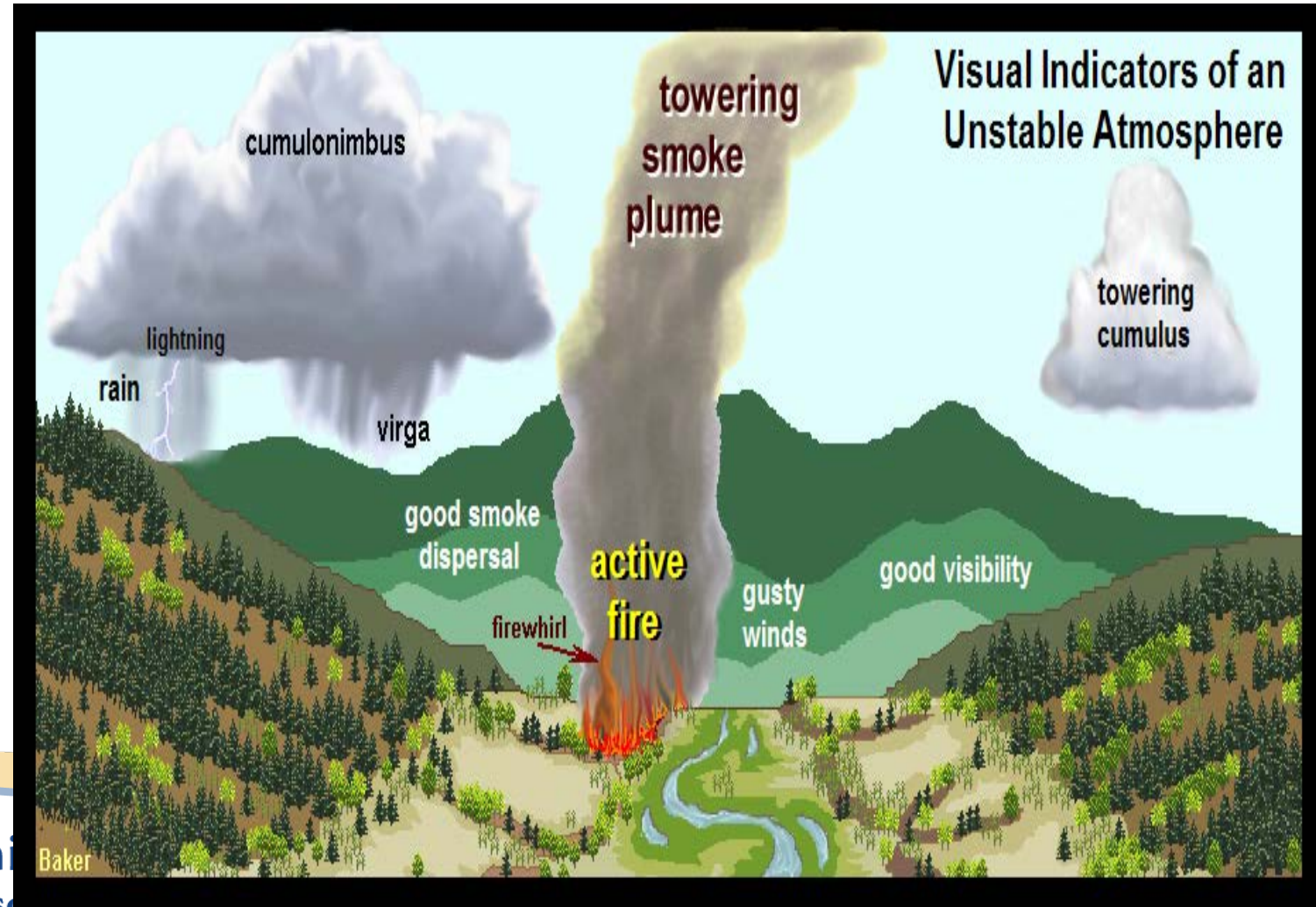


Unstable Atmosphere

Visual Indicators

- **Visual Indicators**

- Clouds grow vertically and smoke rises to great heights
- Cumulus clouds
- Good visibility
- Gusty winds
- Dust devils and firewhirls



Winds

- Wind impacts the fire environment by:
 - Increasing the supply of oxygen to the fire.
 - Determining the direction of fire spread.
 - Increasing drying of the fuels.
 - Carrying sparks and firebrands ahead of the main fire causing new spot fires.
 - Preheating of fuels ahead of the fire: bending flame



Predictive Services



- Monitors, analyzes, and predicts precipitation, wind, and RH as it relates to fire growth or resource safety:
 - Fire weather
 - Fire danger
 - Interagency fire management resource impact!

National Weather Service: weather.gov

- National Weather Service

Products produced:

- for fire weather zones
- by meteorologists
- Geared toward tactical planning



Hourly
weather
forecast:

Text Discussions: allow you to get into the head of the forecaster.

- Gauge confidence
- Convey threats
- Understand forecast challenges and significant trends

The screenshot shows the National Weather Service website for Sacramento, CA. The page title is "Area Forecast Discussion" and it was issued by NWS Sacramento, CA. The page includes a navigation menu with options like Home, Site Map, News, Organization, and Search. A left sidebar contains various links such as "Local forecast by City, St or Zip Code", "Warnings", "Observations", "Forecasts", "Text Messages", "Forecast Models", "Climate", "Weather Safety", "Education/Outreach", "Information Center", and "Contact Us". The main content area displays the "Area Forecast Discussion" text, which includes a synopsis and a discussion of weather conditions. The synopsis mentions a period of windy conditions with temperatures slightly above normal and a threat of thunderstorms. The discussion details the movement of a low pressure system over the Great Basin, its impact on the Sacramento valley, and the expected weather conditions through the weekend.

National Weather Service Weather Forecast Office
Sacramento, CA

Home Site Map News Organization Search for: [] NWS All NOAA Go

Local forecast by "City, St" or Zip Code
City, St [] Go

XML RSS Feeds

Warnings
Current
By State/County...
UV Alerts
more....

Observations
Radar
Satellite
Snow Cover
Surface Weather...
Observed Precip
more....

Forecasts
Local
Graphical
Aviation
Marine
Hurricanes
Severe Weather
Fire Weather
more....

Text Messages
By State
By Message Type
National

Forecast Models
Numerical Models
MOS Prod Statistical Model
GFS-LAMP Prod Statistical Model
more....

Climate
Past Weather
Predictions

Weather Safety
Weather Radio
Hazard Assmt...
StormReady
TsunamiReady
Skywarn™
more....

Education/Outreach
Information

Information Center
Tsunamis
Publications...
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Contact Us
FAQ
Comments...

Area Forecast Discussion

Issued by NWS Sacramento, CA

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943
FXUS66 KSTO 111120
AFDSTO

[Area Forecast Discussion](#)
National Weather Service Sacramento [CA](#)
420 AM PDT Fri May 11 2018

..SYNOPSIS...
Period of windy conditions today. Temperatures remaining slightly above [normal](#). Showers and [thunderstorm](#) chances mountains through the middle of next week.

&&

..Discussion...
Upper low now centered over northeast Oregon will drop southeast into the Great [Basin](#) today. Surface high pressure pushing in behind over the Pacific Northwest will create a tight northerly [gradient](#) over the north state which when combined with [upper level](#) northerly [flow](#) will bring breezy north winds. Northerly winds already starting to pick up over the northern Sacramento valley with current wind speeds in the mid teens. Winds are expected to pick up above wind advisory criteria throughout the Sacramento valley by late morning as surface gradients increase to above 12 [mb](#) from Sacramento to Medford. [Shortwave](#) dropping down backside of low may bring a few showers over the northern Sierra. Cooler air will filter into the area bringing a decrease in daytime highs today but maximum temperatures should remain a bit above [normal](#). Winds will stay breezy during the evening hours but will be on the decrease.

Upper low remains over the Great [Basin](#) through early next week. Shortwaves rotating around the low will bring a threat of showers over the Sierra Cascade range Saturday. [Stability](#) progs indicate enough [instability](#) for a slight threat of thunderstorms as well. Only minor changes are expected in the weather pattern Sunday and Monday with upper low expected to only move slightly. This should [mean](#) only slight changes with high temperatures and afternoon/evening Sierra [crest thunderstorm](#) threat Saturday through Monday.

&&

..EXTENDED DISCUSSION (Tuesday THROUGH Friday)
An [upper level](#) low centered over the Great [Basin](#) weakens, and exits the area on Tuesday, only to be replaced by a Pacific upper low. Afternoon/evening thunderstorms are expected to continue over the mountains and foothills at least through Friday, and

Windy.com



University of California
Agriculture and Natural Resources

96 hr Air Quality Forecast: CA Air Resources Board

ARB's Meteorology Program

Secure | <https://www.arb.ca.gov/smp/met/me.htm>

www.terrafin.c Humboldt Tuna Club Gratis AIS-volgsyste Windy, Windy, Wir BUOY 46022 (STOR SF Map Results | Wind

CA.GOV CALIFORNIA AIR RESOURCES BOARD

Search ARB

About Our Work Resources Business Assistance Rulemaking News

UP LINKS

- Reducing Air Pollution - ARB Programs
- Smoke Management Program
- Meteorology Program

PROGRAM LINKS

Agricultural Burning

- Burn Forecast
- Historical Air Basin Burn Decisions
- Sacramento Valley Allocation
- Ag Rx Burn Report Form

Data and Current Observations

- Aircraft Soundings
- Frequently Asked Questions
- Meteorological Database
- Real-Time Air Quality and Meteorological Data
- Walnut Grove Tower

Prescribed Burning

- PFIRS
- CB3 Form

Specialized Forecasts

- Diesel PM Study

RESOURCES

- Contact Us
- Join Any Smoke Management Email List(s)
- RSS / Newsfeed

ARB's Meteorology Program

This page last reviewed April 4, 2018

Welcome to the ARB's **Meteorology Section** web page. The Meteorology Section provides forecasting services in support of the State's agricultural and prescribed burning program. ARB meteorologists issue daily agricultural burning control notices specifying the burn/no burn status for 11 of the State's 15 air basins, and coordinate with air quality staff from the other 4 basins. The Meteorology Section also provides meteorological and climatological services to other ARB programs.

For information on the agricultural burn forecast for your area, click on the map below.

Mountain Counties

As per Title 17 Section 80110, the ARB shall specify each day of the year as a permissive burn day, or a no-burn day for each air basin or other specified area. Also, the ARB may declare a marginal burn day if meteorological conditions approach the criteria contained in Title 17.

Permissive Burn

Any day on which agricultural burning, including prescribed burning, is not prohibited by the state board and burning is authorized by the district consistent with these Guidelines.

Marginal Burn

A day when limited amounts of agricultural burning, including prescribed burning, for individual projects in specific areas for limited times is not prohibited by the state board and burning is authorized by the district consistent with these Guidelines.

No Burn

Any day on which agricultural burning, including prescribed burning, is prohibited by the state board or the air district in which the burning will occur.

The Meteorology Section manager is **Pinguan Di** (916) 322-6040.
The Modeling and Meteorology Branch manager is **John DaMassa** (916) 324-7167.

For questions or comments regarding this page, please contact Air Pollution Meteorologist forecaster at (916) 322-6014.

Back to Top | All ARB Contacts | A-Z Index

PFIRS - Prescribed Fire Information Reporting System

Secure | <https://ssl.arb.ca.gov/pfirs/cb3/cb3.php?id=4>

www.terrafin.c Humboldt Tuna Club Gratis AIS-volgsyste Windy, Windy, Wir BUOY 46022 (STOR SF Map Results | Wind

PFIRS Prescribed Fire Information Reporting System

Front Page ARB Products Local Agencies Support

Controlled Burn Notices (CB3s) Username: Password: **Log In**

Page is updated by **3 p.m.** each day

Entire State North Coast NE Plateau Sac Valley Mtn Counties San Joaquin Lake Tahoe Lake County Bay Area NC Coast SC Coast Great Basin Mojave Desert Salton Sea South Coast San Diego

The notices on this page do not necessarily reflect the burn status of your local area. You must contact your local fire permit official (local air district or fire agency) for final authorization to burn.

Fire Weather Links: California | Oregon | Nevada | Arizona

Mountain Counties

Basin	24-hr Decision Fri May 11	48-hr Forecast Sat May 12	72-hr Outlook Sun May 13	96-hr Trend Mon May 14
Mountain Counties North (Plumas, Sierra, Nevada, Placer, El Dorado)	Burn (Good)	Favorable (High Confidence)	Favorable	Favorable
Mountain Counties South (Amador, Calaveras, Tuolumne, Mariposa)	Burn (Good)	Favorable (High Confidence)	Favorable	Favorable

Air Basin Map

Notes and Instructions

El Dorado County Burn Line:

- Mtn Counties: (530) 621-5897 or (866) 621-5897
- Lake Tahoe: (530) 621-5842 or (888) 332-2876

Placer County Burn Line: (530) 889-6868

Northern Sierra Burn Lines:

- Western Nevada County: (530) 274-7928
- Eastern Nevada County: (530) 582-1027
- Western Sierra County: (530) 289-3662
- Eastern Sierra County: (530) 994-3561
- Quincy Area: (530) 283-3602
- Greenville: (530) 284-6520
- Chester: (530) 258-2588
- Portola: (530) 832-4528

Amador County Burn Line: (209) 223-6246

Calaveras County Burn Line:

- All: (209) 754-6600
- Copperopolis: (209) 785-7664

Mariposa County Burn Line: (209) 966-2220 or 1-888-777-0377

Tuolumne County Burn Line: (209) 533-5598

District Contact Information

Mountain Counties North

El Dorado County AQMD
Phone: (530) 621-7501
Fax: (530) 295-2774
Website

Placer County APCD
Phone: (530) 745-2330
Fax: (530) 745-2373
Website

Northern Sierra AQMD
Phone: (530) 274-9360
Fax: (530) 274-7546
Website

Mountain Counties South

Amador County APCD
Phone: (209) 257-0112
Fax: (209) 257-0116
Website

Calaveras County APCD
Phone: (209) 754-6504
Fax: (209) 754-6521
Website

Mariposa County APCD
Phone: (209) 966-2220
Fax: (209) 966-8248
Website

Tuolumne County APCD
Phone: (209) 533-5693
Fax: (209) 533-5520
Website

For more fire weather information, youtube:

“Engber Rx Fire Weather Resources 2019”

<https://www.youtube.com/watch?v=H5Arl9g51VI>

The screenshot shows a YouTube video player with the following details:

- Video Title:** Weather Monitoring for Prescribed Fire
- Channel:** Fire Science
- Published:** May 24, 2019
- Views:** 1 view
- Category:** People & Blogs
- Comments:** 0 Comments

The video player shows a thumbnail with the title "Weather Monitoring for Prescribed Fire" and the presenter "Eamon Engber – Fire Ecologist". The thumbnail includes a screenshot of a weather monitoring software interface, a photo of wooden stakes, and a photo of a prescribed fire in a field.

Below the video player, there are several recommended videos:

- Davy WSARE RxFire Medusahead 2019** (10:47)
- Beekeeping 5 rookie mistakes in this video that you can learn...** (25:59)
- How to Catch, Clean and Cook a Snapping Turtle! PT 1** (11:43)
- Cheap VS Expensive Solar Panels | 12v Touring | Project...** (15:53)
- His Veins Run Cold When He Realizes Who's Been Haunting...** (19:49)
- Most Efficient Chicken Coop Tour** (12:07)
- How to Remove a Stump, Cheaply & Effectively!** (21:44)
- Beginner Beekeepers: 3 Essential Skills**

Questions?



University of California
Agriculture and Natural Resources

Personal Protective Equipment for Prescribed Burn Associations



Jeff Stackhouse
University of California Cooperative Extension
Eureka, CA

There are no laws around PPE and Rx fire for landowners

- HCPBA Minimum PPE:
 - Leather Boots
 - Leather Gloves
 - Natural Fiber Shirt
 - Natural Fiber Pants
- UCANR Additions:
 - Eye Protection (ANSI Z87)
 - “Long-sleeve” Shirt
 - “Non-flammable” Cap/Hat
- You will not see fire shelters on private burns.



HCPBA Personal Equipment Cost

- Leather Gloves: \$0
- Cotton Pants/Shirt/Hat: \$0
- Tool: \$0

Total: \$0



Professional PPE Costs

- Gloves: \$0
- Hawthorn Boots: \$185
- Shroud: \$55
- Goggles: \$55
- Fire Pack: \$185
- Nomex Pants: \$140
- Nomex Shirt: \$120
- Helmet: \$270
- Fire Shelter: \$400
- BK Radio: \$1500



Total: \$2910/ea

The cost of outfitting a wildland firefighter

According to spokespeople from the U.S. Forest Service, it costs about \$2,700 to outfit a wildland firefighter from head to toe. The breakdown, compiled by Logan Baird of the Forest Service's Española Ranger District:



Safety

- “To the black”... what does that mean?
- If the flames are too hot, move away.
- Consider hardhat when working in forested settings.
- Always have a good first aid kit!
- Torch handling debrief
- Smoke Inhalation/Overheating

