

## Wildland Fire Safety

Prevent Fires • Understand Wildfire Behavior • Make a Plan • Get to a Safety Zone



### FACILITY/STRUCTURE PROTECTION

- Maintain a defensible space of 100' around structures
  - Remove all flammable vegetation within 30' immediately around structures
  - Create a reduced fuel zone in the remaining 70' around structures
- Create horizontal and vertical spacing between plants
- Remove lower tree branches at least 6' from ground
- Landscape with fire resistant plants
- Identify at least two exit routes from your facility
- Create and/or identify safety zones for refuge in high fire hazard wildland areas
- Clear flammable vegetation at least 10' from roads and 5' from driveways
- Remove leaves and needles from gutters
- Use fire-resistant building materials (roofs, gutters, decks, exterior walls/windows)
- Maintain an emergency water supply (2500 gallons recommended if possible)

### VEHICLE & EQUIPMENT USE

- Do not drive or park over dry grass
- Mow before 10 AM; never mow or trim dry grass on a 'Red Flag Warning' day
- Spark arresters are required in wildland areas on all portable gas-powered equipment
- Keep gasoline in approved containers with a flame arrestor at the spout

### CAMPFIRES

- Make sure you know and understand campfire rules and regulations. Unless it is a developed campsite, you will probably need a permit for a campfire, IF it is permissible at all.
- Use an existing fire ring, if available, and keep at least a 3 foot wide area around your campfire ring free of litter, vegetation, or other material.
- Keep your fire small and under control.

- NEVER leave a fire unattended.
- Make sure your campfire is completely out before you go to leave or go to sleep. Douse the embers with water, break them up, and douse them again.

### IF YOUR CAMPFIRE GETS OUT OF CONTROL

- Try to extinguish it immediately
- Use water, dirt or a non-synthetic piece of material (e.g. jacket, blanket) to smother the fire. Synthetic materials such as fleece and polypropylene are very flammable.
- If you are unable to safely put the fire out quickly, notify emergency personnel immediately.

### FACTORS INFLUENCING WILDFIRE BEHAVIOR

1. Fuel Type & Loading
  - Fine fuels ignite easily; tall dry grass produces long flame lengths (3'- 12') and spreads rapidly (~300'/min @ 10 mph wind); chaparral brush produces longer flame lengths (>20') and spreads less rapidly (~200'/min @ 10 mph wind) but can spot ahead
2. Fuel Arrangement (Horizontal Continuity & Vertical Arrangement)
  - Continuous fuels (e.g. - field of heavy grass) burn rapidly and intensely
  - Ladder fuels can spread ground fire to tree crowns
3. Temperature & Humidity
  - Higher temperature and lower relative humidity increases fire spread and intensity
4. Wind
  - Critical factor influencing fire behavior - higher wind speeds greatly increase rate of fire spread and intensity
  - Wind direction strongly influences direction of fire spread
  - Higher winds increase spotting potential by carrying firebrands ahead of the fire
  - Time-of-day effect - typically upslope winds during day and downslope winds in evening
  - Large fires create strong and erratic fire-generated winds
  - Passing weather (cold) front can cause abrupt shifts in wind direction and/or velocity
  - Strong dry off-shore ( for example Santa Ana) winds cause strong downslope movement
5. Aspect and Slope
  - South-facing slopes are warmer/drier so ignite easier with higher rate of fire spread
  - Fire spreads faster up steeper slopes
  - Burning material on steep slopes may roll downhill and start other ignitions below
6. Canyons and Ridges
  - Narrow chutes, saddles, and box canyons provide conditions for chimney effects to occur causing fire to move more rapidly upslope
  - Narrow canyons increase probability of fire spotting across drainages to opposite side
  - Fires burning on ridges can exhibit erratic or whirling fire behavior

## FIELD SAFETY

- Keep informed of fire weather conditions and forecasts
- As part of your fieldwork planning, develop an emergency plan that includes methods for contacting local emergency responders and identifies escape routes and assembly areas
- Most wildland fire fatalities are caused by being overrun by fire and spot fires
- Shifting winds (unanticipated strong upslope or downslope winds) create very dangerous conditions that may cause unexpected extreme fire behavior including rapid rate of fire spread; spotting; intense burning; and crowning
- Key to Wildfire Survival: L+C+E+S

**L = Lookout** – knowledgeable person assigned to continually assess fire behavior and weather conditions; anticipate and recognize changes in fire behavior and communicate threats to safety to everyone in the field; maintains personnel/crew accountability

**C = Communications** – establish system (i.e. radios) to inform everyone in the field of safety concerns, fire behavior; location and use of escape routes and safety zones

**E = Escape Routes** – choose alternative travel paths to reach safety zones; established firebreaks and burned over 'blackened' areas may serve as escape routes. Do not run unless you have a clear and complete path of escape. Escape downhill and away from a fire at a 45 angle. Fire moves faster uphill, in ravines, in windy conditions, and through saddles and passes. Smoke will indicate the direction of the wind – the fire will travel the fastest in that direction. Do not run blindly, move to a safety zone quickly, but carefully.

**S = Safety Zone** – pre-planned and pre-identified area of refuge in high fire hazard area; may be natural (bare ground; rock outcroppings; wet area/water body) or man-made (parking areas/landings; sufficiently wide road, etc.) or the burned over 'blackened' area; safety zones must be identified and discussed before field work begins. The goal is to find an area that will protect you from radiated heat and smoke. Possible safety zones include: a shallow trench or crevice, behind large rock, in a running stream, a pond, a dry stream bed, or a building.

- Prepare your safety zone by removing any flammable materials; scrape it down to bare earth or rock, whenever possible
- Cover your head and any exposed skin with non-synthetic clothing or dirt
- Lie face down
- Regulate your breathing. Avoid inhaling dense smoke. Keep your face near the ground and away from the direction of fire and smoke. Cover your mouth and nose with a dry cloth (a wet or damp cloth may cause steam to burn your airway).
- A vehicle may provide temporary protection from an intense flame front. If you are already in a vehicle, first try to drive away from the fire. If unable to do so and no better alternative exists, park the vehicle in an area with the least vegetation. Stay inside and keep windows tightly shut. Turn off the car. Cover as much skin as possible and stay low.

- If in a building that is not on fire, close all windows and doors, turn on the sprinkler system if available, and wait until the flame front passes.
- In either situation, if the vehicle or building catches fire, it may still offer some protection from the fire outside. Unruptured gas tanks rarely explode and vehicles take several minutes to ignite. Stay put until the situation outside becomes safer than where you are.
- If you have no other choice, passing through a narrow flame front into an already burned area may limit your injuries. This is especially useful in areas of low vegetation. Move quickly, parallel to the flame front to find a suitable area. Choose an area where the flames are less than 1 meter deep and can be seen through clearly.

**Be alert • Keep calm • Think clearly • Act decisively**

#### **POTENTIALLY DANGEROUS WILDLAND SITUATIONS**

- You are working in unfamiliar (previously unobserved) wildland territory/terrain
- Escape routes and safety zones have not been identified or terrain and fuels make escape to safety zones difficult
- You have no means of communication
- You are unfamiliar with weather and local factors influencing fire behavior
- Weather is becoming hotter and drier and/or wind increases or changes direction
- “Red Flags” during a wildfire event:
  - Wildfire is not scouted and sized up; you cannot see the main fire and you are not in contact with someone who can
  - You are on a hillslope with fire burning below you
  - You are on a hillslope with fire burning above you where rolling material can ignite fuel located below you
  - Wildfire is spotting ahead of the main fire.

#### **FIRST AID**

Remember your own safety before helping others. If you are unable to safely assist someone, your best action is to contact emergency personnel. Extinguish all flames on a person using water, dirt, or a non-synthetic material to smother the fire. Once a fire is out, care for the person’s injuries to the level of your first aid training and seek medical services.

**If you are on fire – STOP, DROP, and ROLL.**

## Research Conducted during Prescribed Burns

Ultimately the agency managing the prescribed burn has authority regarding qualifications and required training and personal protective equipment (PPE) for personnel allowed within the controlled area. The guidance below includes prerequisites and preparations recommended for researchers and other field staff that seek to collect environmental samples, perform monitoring, or conduct other research during active burns.

- ALWAYS coordinate access with and follow direction from the on-site burn boss.
- Attend the on-site briefing before work is started.
- Communicate your intended work plans and location; don't deter from your plans without explicit approval.

### PREREQUISITE AWARENESS TRAINING

- Review this UC Wildland Fire Safety guidance document and consider the L+C+E+S principles as part of your field planning and group discussions.
- Complete the following online training modules available free via the National Wildfire Coordinating Group (NWCG) website (<https://onlinetraining.nwcg.gov/>) and present certificates or comparable training records upon request:
  - S-110 Basic Wildland Fire Orientation (15 minutes)
  - S-190 Introduction to Wildland Behavior (6-8 hours)
  - Optional training: L-180 Human Factors in the Wildland Fire Service (4 hours)
  - Optional training: S-130 Firefighter Training (22 hours online plus one field day exercise)

### ACCOUNTABILITY & COMMUNICATION

- A knowledgeable person must be assigned as a Safety Officer/Lookout role to continually assess fire behavior and weather conditions; listen to the field radio and communicate threats to safety to everyone in the field; and maintain personnel/crew accountability.
- The Safety Officer serves as the primary liaison between the fire crew/burn boss and researchers working on-site.
- Line of sight accountability or two-way communication via field radios is required.

### PERSONAL PROTECTIVE EQUIPMENT (PPE)

- Leather boots
- Leather gloves
- Flame resistant pants and shirt (e.g. Nomex), with non-synthetic underclothes
- Eye protection (e.g. tinted EyePRO safety glasses)
- Hardhat

## FURTHER INFORMATION

California Wildland Fire Coordinating Group – Wildfire Preparedness/Prevention:

<http://www.preventwildfireca.org/>

CAL FIRE Wildfire Safety Tips:

[http://www.fire.ca.gov/communications/communications\\_firesafety\\_redflagwarning](http://www.fire.ca.gov/communications/communications_firesafety_redflagwarning)

Inciweb Incidents for California <https://inciweb.nwcg.gov/?state=5>

Wildfire Incidents Discussion Board and Activity Map: <http://www.wildfireincidents.com/>

Online Scanner Radio Feeds (Situational Awareness): <https://www.broadcastify.com/listen/stid/6>

Wildfire Smoke – A detailed OEHHA report for public health officials on wildfire smoke and sensitive populations <https://oehha.ca.gov/media/wildfiresmoke2016.pdf>

Worker safety during wildland fire response/clean up: <https://www.osha.gov/dts/wildfires/response.html>

Commonly Used Terms (CALFIRE):

[http://calfire.ca.gov/communications/downloads/fact\\_sheets/FireTerminology.pdf](http://calfire.ca.gov/communications/downloads/fact_sheets/FireTerminology.pdf)

S-110 Basic Wildland Fire Orientation (15 minutes) and S-190 Introduction to Wildland Behavior (6-8 hours) – Online training available free via the National Wildfire Coordinating Group (NWCG) website:

<https://onlinetraining.nwcg.gov/>

Additional Training: <https://www.nifc.gov/wfstar/>

Standard Orders and Watch Outs: <http://www.cpf.org/go/cpf/health-and-safety/wildland-firefighter-safety/standard-orders-and-watch-outs/>

LCES: <http://www.cpf.org/go/cpf/health-and-safety/wildland-firefighter-safety/lces/>

UC Field Research Safety Program: <https://www.ucop.edu/environment-health-safety/groups-and-programs/centers-of-excellence/field-research-safety/index.html>

*Written by Robert Charbonneau, OPRS Emergency Services and Sara Souza, EH&S*

*Reviewed by Curt Itson, UCB Fire Chief and Rob York, Blodgett Forest Research Station, Sep 2016.*

*Revised July 2018 (links fixed, NWCG training added); revised November 2018 (guidance for research conducted during prescribed burns added; in consultation with Jeff Brown, Sagehen Creek Field Station and Rich Dean, UC Berkeley Deputy Fire Marshal)*