

Prescribed Fire Field Guide

Burning legally, safely, & responsibly in Nevada County



INTRODUCTION

The Nevada County Resource Conservation District (NCRCD) was founded on November 13, 1943 with a mission to promote responsible natural resource management within our jurisdiction. The NCRCD is a state mandated Special District that is neither a regulatory authority nor a County entity. We are a “political subdivision” of the State of California (under California Public Resources Code, Division Nine, Section 9003), not funded by the state, and required to pay state sales tax. We are a not-for-profit, federally tax-exempt organization under Section 170(c)(1) of the Internal Revenue Service code and can accept donations as tax-free contributions. We receive a small percentage of revenue from property taxes of Nevada County residents. We are governed by a board of 5 local landowners who provide input for local resource management and are appointed by the Nevada County Board of Supervisors.

The NCRCD is housed with the USDA Natural Resources Conservation Service (NRCS). We partner with the NRCS to assist landowners and land managers in improving and conserving their land. The NCRCD and the NRCS provide technical assistance regarding issues that include erosion control, pond management, invasive weed control, fuels management, wildlife habitat improvement, and pasture, rangeland, orchard and vineyard management.

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ABOUT PRESCRIBED FIRE

WHAT IS PRESCRIBED FIRE?

Prescribed fire is the intentional and carefully managed use of fire on a landscape. For thousands of years, Indigenous communities have applied this practice with deep expertise to shape ecosystems, support cultural traditions, and maintain healthy forest environments. Today, land stewards continue to use prescribed fire to reduce hazardous fuels, strengthen forest resilience, and promote the growth of native plant species.

WHY IS IT IMPORTANT?

Frequent fires—sparked naturally by lightning and intentionally set by Indigenous communities—once moved through many lower-elevation areas every 2 to 15 years. These regular burns kept fuels low and created more open forests with widely varied tree spacing. Because leaves, needles, and small plants were burned before they could build up, most fires stayed low to the ground and burned with relatively low intensity.

Over the past 200 years, however, fire has been actively suppressed across California. Without regular burning, forests and shrublands have grown dense, and fuels have accumulated, leading to hotter, more damaging wildfires.

In our dry climate, natural decomposition happens slowly, so fire historically acted as the main “decomposer” in these fire-adapted landscapes. Frequent, low-intensity burns also reduced crowding by thinning out smaller trees, and today there is a growing effort to restore this kind of beneficial “good fire” to maintain healthier, more resilient forests.



WHY USE PRESCRIBED BURNING?

Low-intensity controlled burns can improve defensible space, clean up forest debris, and support healthier forests and soils. Prescribed fire is an efficient way to reduce and maintain low surface fuels like leaves, needles, small sticks, and low-growing plants. Before burning, remove ladder fuels—small trees, shrubs, and lower branches—and thin or clear out larger woody debris. When applied correctly, prescribed burning also encourages the return of native plants.

ABOUT PRESCRIBED FIRE



Untreated Forest Crown Fire



Un-Thinned Forest



Previously Thinned and Burned Area



Thinned Forest

OTHER REASONS TO BURN INCLUDE:

- Improved forage and wildlife habitat
- Improved range for ranchers
- Control pests (like ticks) and invasive grasses and weeds

How do we prepare and conduct a prescribed burn?

The first step is to look at the land and decide why you want to burn. These are the burn objectives or what you are trying to accomplish. This could include any of the reasons listed above. The most common reasons people burn is to remove fuel hazards, improve defensible space, restore forests, and enhance native plants. The next step is to prepare the site for burning.

The Prepare to Burn and Conduct a Burn chapters go into more detail on how to do your own burn. If all the prior necessary steps are completed successfully, then a prescribed burn can be done safely, legally, and responsibly.

A good prescribed burn is:

- Planned and controlled, with low and slow fire.
- Meets your objectives.
- Avoids smoldering or burning longer than needed, managing smoke.
- Relaxed and fun!

PREPARE TO BURN

**Prescribed fire is not allowed within city limits. Verify your eligibility on the CAL FIRE Burn Permit webpage*

Prescribed burning is designed to be safe and manageable. Success depends on preparation—most of the work happens before lighting the first flame.

1. **Decide what, why, where, when, and how** you want to burn. Choose an easy location such as gentle or flat terrain near a road, trail, or water source, and plan for a slow, low-intensity burn, especially when working near neighbors.
2. **Make a simple plan.** A basic map can be enough. Include your objectives, a simple prescription of acceptable weather and flame height, and key contacts such as neighbors, the fire district, and the nearest hospital.
3. **Prepare the site.** This is most of the work—often 80% of the project. Clear ladder fuels, build a control line, remove heavy fuels and hazards, and protect values at risk.
4. **Organize your equipment.** Gather water, hoses, nozzles, tools, your burn plan, and contact lists before you begin.
5. **Obtain required permits and paperwork.** Air Quality permits are needed for residential burns and burns at or over one acre in a year, and burn permits from CAL FIRE or Truckee Fire may also be required depending on the season.

There are several permits that may be required.

- Air Pollution: for one or more acres in a year
- Smoke Management Plan: for 10 or more acres in a day
- Small 4' x 4' Pile Burn
- General for large piles, agriculture, and hazardous project work
- Broadcast Burn

STEP 1: WHAT AND WHY YOU WANT TO BURN

Prescribed burns are one tool for accomplishing land-management goals. Before choosing to burn, think about what you want to achieve and whether fire is the right method for that task. Once you know your objective, decide where on your property a burn would be most effective and when conditions will be safest and most suitable.

What are your goals?

- Creating or improving defensible space around your home.
- Restoring forest health
- Enhancing native plants and wildlife habitat.

When is Prescribed Fire right for you?

- You've already reduced ladder fuels such as low branches, tall shrubs, and small trees.
- You have thick litter and duff on the forest floor, and raking it all is impractical and exhausting.
- You want healthier trees, better soil, improved water infiltration, and the return of fire-adapted native plants
- You need an affordable way to maintain defensible space and keep surface fuels low over time.

Which location is most important to burn?

- Where litter and duff are deep.
- Where you want healthier trees, better soil, and improved forest conditions, prescribed fire can help.

PREPARE TO BURN

When do you want to burn?

- A burn is legal, only when CAL FIRE declares it's legal. This will be during "open burning" season, or during permitted season.
- When it's a permissible burn day - check the Northern Sierra Air Quality Management District website.
- When the site is fully prepared (ladder fuels removed, control line in, etc.)
- You have a plan *and* a permit (CAL FIRE or Truckee Fire) if it is required.
- Weather conditions are mild enough so that flames will be low and fire spread slowly.

STEP 2: MAKE A SIMPLE PLAN

A plan is not required for all burns, but it really helps to have one. A plan helps make sure you are ready for a safe and legal burn and helps ensure you get the results you want. Very importantly, it shows that you are taking all the steps to have a safe, legal burn that will not escape control, limiting your liability. Most escapes are pile burns. Less than 1% of prescribed broadcast burns escape.

STEP 3: PREPARE YOUR SITE

If you have prepared well, your burn will be easier and safer. This includes reducing heavy fuels, addressing hazards, and building a control line.

First, decide where you want to burn. Usually, this is an area that is all facing the same way (i.e. south or east) and is near roads or trails or other breaks in fuel. For beginners, it's best to start with a simple, small burn on a gentle slope. Fires burn hotter and faster on steep slopes and are harder to control.

Next, **clear denser vegetation and fuel accumulations** to keep the fire low to the ground and less intense. Then, **clear ladder fuels**, anything that can carry fire from the ground up into the trees, like lower tree branches, tall shrubs or vines.

Cut or limb mature tree branches 6 to 10 feet up from the ground. Cut tall shrubs and small trees that are dense, especially under mature trees. Move them out of the burn area, create a burn pile and burn them, or if there aren't too many, cut them up (or lop) and scatter them, away from under trees and shrubs. If you want, you can leave some small clumps of shrubs or smaller trees in open areas for wildlife habitat.

7/4/23 1:45 PM

EXAMPLE - SIMPLE

California Standardized Prescribed Fire Plan

Project Title: Doe Property Burn

Property Owner: John and Jenny Doe

Date Created: 7/1/23 Date Re-Evaluated* (if applicable): _____

1. Project Area Description

Location Description: 25 Pretty Lane, Nevada City, (unincorporated)

CA 95959

Latitude and longitude (in Degrees Decimal Minutes (DDMM)):

Latitude: _____ Longitude: _____

Property Ownership (private, state, etc.): private

Unit Size (acres): 1/2

Unit Description: Pine/black oak, gentle slope, west-facing

Prescribed fire goals and objectives

Reduce fire hazard, fuels

Restore forest

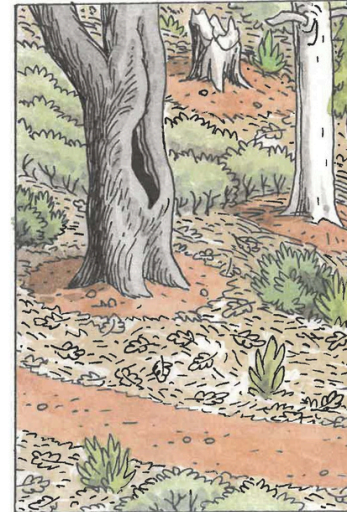
2. Pre-burn Considerations

Plan for unit preparation (describe line type/construction, pre-treatment of fuels, pre-burn land management considerations (e.g., grazing deferment), etc.):

Roads and trails around area. Ache, use blower, weedcut on road/trail edges. Trim branches in 5 feet.

Water supply (describe quantity, location, and other considerations):

Garden hose on 2 sides. Truck with portable water tank & pump & hose at corner on other side.



PREPARE TO BURN

Identify Hazards & Values at Risk

Anything you don't want to burn, that can easily ignite, fall across your control line, or injure someone, should be treated as a hazard. Stumps, fallen logs, standing dead trees, and scarred or pitchy trees all fall into this category. Clear a two to four-foot small dirt ring around them, spray with water to reduce the chance they ignite or mark them so everyone knows their location and can watch for fire activity.

Electrical power lines can arc or create flames in heavy smoke. Avoid burning under or near them when possible. If you can't avoid them, reduce the burnable material beneath and around them so flames and smoke stay very low.

Once hazards are addressed, **it's time to build your control line.** This is the boundary that stops the fire, and it must contain no burnable material—just a wide, clean dirt path or road. Remove logs, branches, roots, needles, and duff from the line, as any of these can carry fire across. The control line also serves as a safe working area for people with tools and water. You can place it where you may have or want a future trail. Burning is not a one-time action; it's a maintenance tool to use every few years as leaves, needles, branches, and vegetation accumulate again.

CAL FIRE requires a minimum of a 4' wide control line for permitted season burns. It may require even wider control lines if you decide to leave larger vegetation next to the control line. You have to consider that flames can be three times the height of the burning vegetation, and that could jump the line!

With careful preparation, you can expect lower flame lengths, making the fire easier to control. A well-managed fire is safer for your crew, your property, the wildlife that lives there, and your community. That's good fire.

STEP 4: ORGANIZE YOUR BURN DAY

There are three key parts to organizing ahead of time for a prescribed burn: water, tools, and people:

Water is essential for putting out fire. Garden hoses with good nozzles and water pressure usually work for simple burns, especially if they reach around the whole unit. If not, backpack pumps or small portable tanks are helpful.

Tools support fire control. Everyone should have a working hand tool—McLeods, Rogue Hoes, shovels, or similar tools—to scrape and rake around burning material, protect small trees, and help extinguish fire with water and dirt.

People are needed to hold the fire on the control line. For beginner burns, plan for someone about every 50 feet on the perimeter. Helpers should be able to walk uneven ground, tolerate some smoke, and stay for the full burn. Having experienced support is especially useful when you're starting out.

STEP 5: DO PAPERWORK AND OBTAIN REQUIRED PERMITS

See the next chapter for more detail.

Prepare Your Site Checklist:

- ✓ Decide where you want to burn
- ✓ Clear denser vegetation and fuel accumulation
- ✓ Clear fuel ladders
- ✓ Trim tree branches, shrubs, and small trees
- ✓ Identify hazards
- ✓ Build control lines

PREPARE TO BURN

Summary - Preparing the site for burning:

WHAT	WHY	HOW
Ladder Fuels	Can catch on fire and be hard to control- flames too high, carries into tree crowns.	Cut and remove most small trees, tall shrubs, and tall vines or brambles that are under or close to taller vegetation. Cut and remove, pile burn ahead of time, or scatter in open areas.
Dead trees, broken tops, hollows, pitch or scars on tree trunks	If embers get in them and/or they catch on fire, it can become hard to control. May be dangerous to work around.	Remove fuels around the tree trunk. Scratch a line in the dirt to mineral soil around the tree. Have water handy during the burn or pre-wet. Mark dead trees, show people so they can avoid them. Cut dead trees that could fall over control line or move the control line away from the dead tree.
Stumps, logs	May easily catch on fire and be hard to put out, burn a long time, and cause too much smoke. Burns for a very long in the roots underground and pop back up elsewhere in or outside the unit.	Scratch a line in the dirt to mineral soil around the tree. Have water handy during the burn and/or pre-wet. Pull back old bark and knock off punky top to make it harder to catch fire.
Holes	Can cause injury	Flag or mark them and show people where they are.
Heavy or tall fuels along control line	Can cause a lot of heat, make the fire more likely to get outside the burn, & harder to stand on the control line.	Move heavy fuels (logs, large sticks) into burn or away from control line. Avoid a mound of sticks, litter, leaves mixed with soil, a "berm", along the control line. It will smolder and be hard to put out. Cut back ladder fuels and reduce fuels overall along both sides of control line.
What is outside the burn?	Heavy, flammable fuels, buildings, flammable water tanks should be outside the burn area as they can easily catch fire from tiny embers difficult to see.	Do some pre-treatment here too. Remove ladder and heavy fuels 20 to 100 feet around the outside of the burn area. Make sure there is good defensible space around buildings, etc. Clear five (5) feet next to building or tank to bare mineral earth or rock, etc.
Access?	Emergency vehicles need plenty of room to get in and out.	Make sure roads and trails are cleared back and pullouts open, gates easily opened, and address visible.

PREPARE TO BURN

SOMETHING EXTRA: HOW TO PILE BURN SAFELY AND LEGALLY

Pile burning is a common and effective way to reduce fuels in a burn area and lessen heat and potential damage to the larger trees and plants you want to keep.

The first step is choosing where to place a pile. Keep piles away from trees so the heat doesn't scorch the crown, and avoid large logs, propane tanks, buildings, or anything else that can ignite. Next, make sure the pile cannot escape by clearing the area around it.

CAL FIRE requires a 10-foot-wide ring of bare mineral soil with no leaves, branches, or roots.

During permitted burn season, CAL FIRE limits piles to 4 feet wide and 4 feet tall for a residential burn permit. While small, these are easier to burn when you have nearby "feeder" piles. Otherwise, you can apply for a LE-5 General Burn Permit. In open burn season, larger piles are allowed, but they create more heat and are harder to control.

Preparing a Burn Pile

- Build loose piles to allow oxygen flow.
- Have piles dome or teepee shaped; flat piles burn poorly.
- Keep piles free of dirt.
- Light a test fire first; Burn in good ventilation, so smoke moves up and away from neighbors.
- Burn from the top to get good consumption and reduce smoke and embers.

Tending Your Burn

- Add air with a leaf blower for better combustion.
- Keep gloves, a shovel, and water nearby.
- Stay on site and keep the pile burning hot.
- If your pile is very smoky, extinguish and burn another day.



Most escaped fires come from pile burns, not understory or broadcast burns. Piles can throw embers into nearby areas and start spot fires, especially in windy conditions. CAL FIRE requires that piles never be left unattended and that you always have a tool and water ready.

The final step is ensuring the pile is completely out before you leave.

That means using water and dirt, stirring the pile to get all the coals that may be continuing to burn below the top. Just like putting out a campfire.

If you put your hand over the top of a burned out pile, you can feel if there is any heat still there. If it is warm, you need to keep stirring and adding water to put it out.

During the fall and spring, when permits are required, you can get a permit to burn larger piles or many small piles, called a General Burn Permit, also known as LE-5. You can apply for the permits at the CAL FIRE website.

Apply for a residential burn permit on the CALFIRE website



BURN PERMITS

CAL FIRE or local fire districts can require burn permits at anytime. But usually there are certain times you need them, depending on the “season”. In general, there are three burn “seasons” that each have different burn permit requirements.

	Wildfire Season	Permitted Burning Only	Open Burning
Description	When conditions are hot, dry, or windy and wildfires are common, CAL FIRE designates this as wildfire season. This is usually late Spring to the middle of Fall.	In between wildfire season and open burning, permits may be required for burning. CAL FIRE or local fire districts decide when permitted burning is allowed. Generally, in the “shoulder” seasons after or before wildfire season (middle to late fall or late spring/early summer).	When the likelihood of wildfires is low. Generally, in late fall, winter or early spring when there has been some rain or snow and conditions are moist or wet.
Is Burning Allowed	<i>Yes, but permit requirements and complexity are higher.</i>	Yes, with permits, but it must also be a permissive burn day.	Yes, but it must be a permissive burn day.
Permits	Permits may be issued on a very limited basis. Exceptions are based on specialized needs or reasons, approved by CALFIRE or local fire agency on a case-by-case basis. Requirements for water, burn personnel are much higher.	Permits are issued by CAL FIRE or the local fire agency. Site visits are mostly required to see if there are sufficient pre-burn preparations. Ladder and heavy fuels removed. Proper control lines in place. Pressurized water sources available. You may need: - Air Pollution Permit or - Smoke Management Plan**	CAL FIRE permits are not required. The landowner is still responsible for burning in an easily controllable way. You may need: - Air Pollution Permit or - Smoke Management Plan*

****If you are burning 10 acres or more in a day, you are required to have a Smoke Management Plan.***



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 Portola, CA 96122
 (530) 832-6102 / FAX: (530) 832-6101

Air Pollution Permit APPLICATION

Return Application to: office@nysairdistrict.com

NOTE: This is NOT an Air Pollution Permit. An Air Pollution Permit is not a valid permit until signed by an Air Pollution Control Specialist. An APCS will call or email you with an approved permit.

Invoices for permits must be paid PRIOR to a permit being issued.

☐ AGRICULTURAL BURNING ☐ RANGE IMPROVEMENT BURNING ☐ WILDLAND VEGETATION MANAGEMENT
☐ FORESTRY MGMT. BURNING ☐ HAZARD REDUCTION BURNING ☐ LAND CLEARING FOR DEVELOPMENT

Applicant: _____ Phone No.: _____
 Address: _____

When do I need an Air Quality Permit?

If you plan on a residential burn of one acre or more within a year, it is required to apply for an Air Pollution Permit in this district. Both permits are listed under “Open Burning” Forms from Northern Sierra Air Quality Management District.
www.myairdistrict.com

BURN PERMITS

WHAT ARE THE BURN PERMIT TYPES AND WHERE I CAN GET THE PERMIT I NEED?

There are two types of permits: ✓ **BURN PERMIT** ✓ **AIR QUALITY PERMIT**

CAL FIRE requires permits for all types of burning (broadcast, agricultural, and residential pile burning). You will need to apply for a BURN PERMIT using the CAL FIRE online platform.

www.burnpermit.fire.ca.gov. If you'd prefer a paper application, visit your local CAL FIRE station.

There are 3 general categories of burn permits:

- Residential burn permits - LE-62A (4' x 4' piles)
- General burn permits - LE-5 (piles larger than 4'x4' or agricultural burning)
- Broadcast burn permits - LE-7/8 (broadcast or under burning in timber litter/grass)



Residential Burn Permit

This permit is intended for the disposal of the combustible or flammable vegetative material from a single- or two-family dwelling unit or residence by burning outdoors in small burn piles, no larger than 4 ft x 4 ft. Residential burning is not agricultural, nor a broadcast burn. Also referred to as dooryard burning.



General and Broadcast Burn Permits

General Burn (LE-5) and Broadcast Burn (LE-7/8) permits include those for large pile burning, agricultural burns, incinerators, hazardous projects that could cause a fire such as outdoor welding), and larger controlled applications of fire to the land for fuel reduction purposes. These permits are reviewed by Unit staff and might require a site inspection.

IMPORTANT: If you are located within city limits of Truckee, please contact Truckee Fire Protection District for specific permit requirements. Applications may be obtained through their website and residents must adhere to permissible burn days through their local air district. To find out whether your burning location is located inside Truckee Fire, Auburn Fire or CAL FIRE's jurisdiction, please reference CAL FIRE's Burn Permit Responsibility Area Viewer website.

I have my permits; can I go ahead and burn?

NO! Residents wishing to burn **MUST verify it is a permissive burn day** prior to burning by contacting their local air district.

For Nevada County, you can check at www.myairedistrict.com/burn-day-status.

Nevada County Residents: Northern Sierra Air Quality Management District 530-274-7928

www.myairedistrict.com

In the Truckee area, go to www.truckee-fire.org/

Why Have a Burn Plan?

Burn plans are not required for most private land small prescribed burns. Although not required, they are useful in several ways, including ensuring you get the results you want, and reducing your liability.

Having even a simple one or two-page burn plan shows “due diligence” and decreases your liability. Less than 1% of prescribed fires escape in California. And of these the majority are where the fire went a little beyond the control line and no damage was done. If you need to call CAL FIRE or the local fire department, even for a little fire over your control line, you are much less likely to be charged if you have shown due diligence by having and following a plan.

CAL FIRE has developed a burn plan template that is easy to fill out. But a burn plan can be even simpler than that. Here, we walk you through the process of completing a simple or a basic burn plan step by step.

We have examples of different plans available at the end of this chapter and also on our website.

What kind of a plan do I really need?

If it is permit-required season, CALFIRE or other permitting fire agencies may require at the minimum a map with the address and location of the burn. On the permit, they will specify what prescription you will use, how many people you need and experience level, and the type and amount of pressurized water. Though you can burn legally without one, it’s a good idea to have even the most basic plan. This can take an hour or less for a simple plan, or an hour and a half for a basic plan. You can demonstrate that you have planned your burn in a way to make it safe and easily controlled. Even a simple burn plan with objectives and a map helps the people volunteering know how to burn the way you want.

Type of Plan	Length	Description
Simple	1-2 pages	Includes landowner name and contact info, address, purpose of the burn and/or objectives, and a simple map. Usually handwritten and drawn.
Basic	3-5 pages	A California Prescribed Fire Template includes the burn location, landowner goals, and a brief description of vegetation and slope. It outlines safe weather conditions and expected flame lengths, explains the planned ignition pattern, notes available water and crew size, and lists required notifications such as neighbors, the fire department, and the air quality district.
Intermediate	10-15 pages	The same as a basic plan, but with more detail on the description of the site, the way you are going to burn the area and control the burn with water, and help.
Advanced	More than 15 pages	The same as an intermediate plan, but with detailed fuel descriptions including the fuel model type, and fire behavior model predictions. Most often used by agencies and professional burn bosses for prescribed burns of 10 acres or more. Used for larger or more difficult/complex prescribed burns.

BURN PLANS

HOW TO WRITE A SIMPLE BURN PLAN

Here are the steps to writing a burn plan and an example.

Draw a simple map.

- Include your name and the address at the top
- Include property coordinates, if possible
- Show the roads that lead to the burn area
- Sketch the general burn area location
- Draw the house and any other structures
- Draw the location of the water sources

Add your purpose for burning.

Common examples:

- Improve defensible space
- Make forest healthier
- Improve wildlife habitat

Example of a simple, handwritten burn plan at www.ncrcd.org That's it!

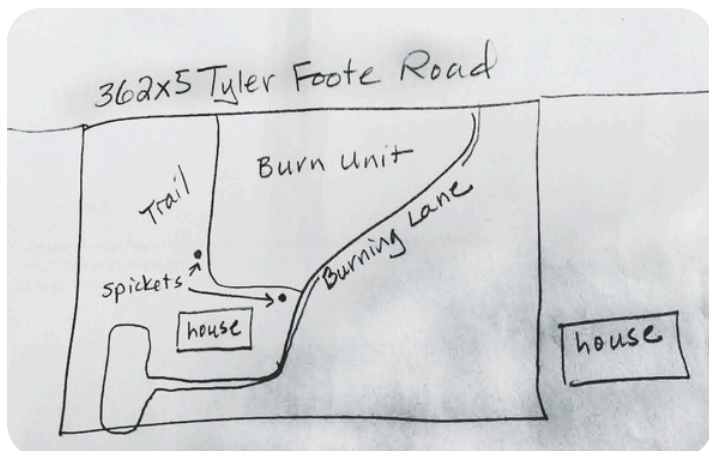
But if you want, you can add a little more...

Key people to notify

- Your neighbors - Include their names and phone numbers. Inform them of your plan.
- Local fire district - They like to know what is going on and will be the first to see the smoke or get calls about the smoke. Also it's good to know if they're available.
- Grass Valley Emergency Command Center - (530-477-0641). They want to know if you are burning a 1/4 of an acre or more. They'll see the smoke and get the calls.

Nearest hospital information

- Name, address, and phone number of nearest medical facility.



How to Write a Basic Burn Plan

The California Standardized Prescribed Fire Plan

Template makes it fairly easy to write a basic burn plan.

You just have to fill in the blanks. It's long but you don't need all the items to make a good basic plan. The key elements are listed below.

Include everything in the simple burn plan:

- Location, address, coordinates, and name of the landowner.

Create a Basic map:

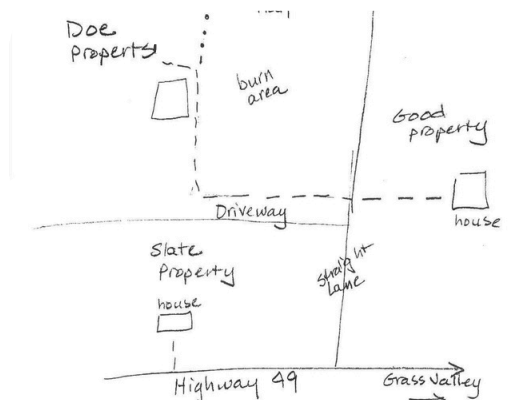
- Name of fire area with responsibility (usually CAL FIRE or Truckee Fire etc.)
- Describe the burn area, or sites. Note how steep the terrain is and the list the main trees, shrubs, and understory fuels.

List your goals and objectives. For example:

- Reduce surface fuels by 50-80%
- Protect all large trees, especially pines and oaks, more than 20 diameter
- Kill more than 90% of cedar and fir seedlings

Describe your prescription (safe weather conditions):

- List the temperatures, wind-speeds, and relative humidities, and see if they are safe conditions for a burn. Generally: 50-80 degrees, winds <7mph, humidity 25-50%
- List the main trees, shrubs and under-story fuels in the burn area.



BURN PLANS



EXAMPLES OF DESCRIPTIONS:



Open blue oak woodland over short annual grass. Recently grazed. Gentle west-facing slope.

Mature pine and black oak forest with low growing (2' tall) kitkitdizzie shrub understory. West-facing ridgetop with gentle to moderate slopes (10 to 20% grade)



Mature red and white fir forest. Surface fuels are needles and scattered logs. Scattered small seedlings and trees but otherwise, no ladder fuels.

Pretreatment Plan for your Burn Unit

- Cut and remove ladder fuels
- Remove large fuels (like logs or piles of sticks, tall shrubs)
- Build a control line around the unit that will be free of all needles, leaves and other debris the day of the burn. Clear it down to bare mineral soil, or road surface.

Access to Water

- Total amount of water available: tank (gallons) or pond.
- Provide the distance from the burn unit
- Spigots - the number and location
- The number of garden hoses and nozzles available
- Be aware of how much water pressure is available
- Do you have portable tanks or backpack pumps?

How many people will be helping?

- How many are experienced? Do they know how to put out a spot fire on their own?

What is your plan if something goes wrong?

- Being prepared is very important!
- Be ready to call 911 - decided by the landowner or designated burn boss

Temperature 40 - 80 degrees

Relative Humidity 20 - 50 %



Winds less than 7 miles per hour (eye level)



What else should you include?

Go-No-Go checklists are always useful to have in a burn plan, and especially on the day of the burn. Checking off all the boxes makes sure that you are completely ready to burn safely and legally.

Medical Plan

Property Address: ___XXX Burme Road, Grass Valley, CA 95945___

Burn Unit Location: ___39.2 acres - 120.9 acres___

Location to Meet Medical Personnel: ___Driveway of XXX Burme Rd.___

Sheriff's Office Phone Number: ___(530) 265-1471___

Closest Medical Facility: ___Dignity Health - SNMH___

Closest Medical Facility Address: ___155 Glasson Way, Grass Valley___

Closest Medical Facility Phone Number ___(530) 274-6000___

Ambulance Response Time: ___19 minutes___

Closest Helispot Location: ___Adjacent to Unit or other side of structures___

Medical Equipment on Scene: ___First Aid Kit___

Names of Medically Experienced Personnel on Scene: _____

EQUIPMENT

TOOLS OF THE TRADE

If you want to do a prescribed burn, you'll need the right equipment to get started. These tools will help you prepare both inside and outside a burn unit and help you build the control line around it. Having tools with you during a burn is just as important in case of escaped fire and controlling fire behavior.

WEARING THE RIGHT GEAR

Keeping yourself safe is important! Wearing the right protective gear when working on preparing and burning your property is the key. You need to be protected against heat and embers from the fire. Avoid wearing synthetic materials as they may melt onto your skin.

Personal Protective Equipment (PPE)		
Professional	PPE Comparison	Landowner
	Hard hat or cotton hat	
	Eye protection	
	100% cotton, wool, or Nomex shirt that is long sleeved and full-length pants	
	Leather gloves	
	Walkie talkies or agency radios	
	Leather boots	

PREPARING YOUR SITE

You need tools to prepare your site for burning. This includes limbing up branches, cutting ladder fuels (small trees and shrubs), and removing logs or other heavy fuels. You can completely remove the branches, logs and small trees through green waste removal or pile-burning.

EQUIPMENT

TOOLS COMMONLY USED FOR SITE PREPARATION:

• **Loppers or pruning shears** can be used to cut lower branches or small trees and shrubs.

• **Weed-eaters** are good for trimming down grasses, bramble, and small shrubs. They can be helpful for making your initial path for your control line.

• **Chainsaws** take more training and skill and are useful for cutting down small trees and cutting logs into smaller pieces that are easier to move or pile burn.

Control Line and Fire Tools

Once you've removed the ladder and heavy fuels in your burn unit, you'll need to construct your 4ft wide control line, or trail, around it. This involves scraping away vegetation, leaves, and duff all the way down to bare, mineral soil. Remove anything that can cause fire to burn across your control line. This includes smaller roots you may need to dig up.

It's also a good idea to scrape or rake around trees with scars, pitch, or hollows that can catch on fire and be hard to control.

You may also want to rake around large trees and other values at risk like irrigation lines in the unit. These steps are vital for keeping your fire inside the unit, protecting structures, and preventing fire escapes.

Once you are ready to burn, your tool will be important to have with you to maintain control lines, spread fire in the unit, and control fire behavior.

 Pulaski	• Cutting/grubbing out exposed roots and small stumps • Limbing small branches • Felling small diameter trees
 Shovel	• Smothering fire with dirt • Stirring up water & dirt
 Pitchfork	• Carrying/moving fire down a burn unit • Lifting piles of cut vegetation
 Leafblower	• Can clean off leaf litter off control lines • Can help catch dry out fuels
 Loppers	• Limbing and chopping small limbs, trees, and brush

EQUIPMENT

The most popular tools for preparing your control lines and working with your fire are McLeods, rakes, or plain old shovels. McLeods are the best overall tool to have as they can reach far, rake, scrape, & smother.

Tool Safety & Maintenance

It's important to use your tool safely and keep it maintained. It's part of responsible burning. When using a tool:

- Aim the sharpest side down when walking with it.
- Do not walk with a tool on your shoulder, keep it down by your side.
- Be at least a tool and half length's away or 10ft from people to avoid injuring others.
- Do not swing overhead if not necessary.
- When putting the tool down, place the tool sharpest side down, off the walking path, and outside the burn unit. Place Pulaskis on their side.
- Tools with Fiberglass handle will melt & burn near fire, so keep them away from the flames.

For maintenance

- Clean and dry after use
- Inspect blade and tines for chips and bends; get sharpened if needed.
- Inspect for bends in metal.
- Inspect handles and tighten if needed.
- Properly oil, fuel, and maintain power equipment in accordance with their manufacturer manuals. Well maintained tools are important to safely control a fire. A broken tool does no good and may make you more liable if anything goes wrong.

 Weed Eater	• Metal blade for chopping down small trees and brush • Trim down grasses near control lines and trees
 Chain Saw	• Cutting small trees, limbing up larger trees and cutting logs into manageable sizes • Wear proper personal protective equipment! Hard hat, eye protection, ear plugs, chainsaw chaps, and leather boots

Tools for Preparing and Burning	
 Hard Rake Soft Rake	• Initial control line clearing & cleanup, raking leaf litter & duff away • Carrying/moving fire down a burn unit • Clear around hazards & values at risk (i.e. larger trees, nearby shed outside burn unit)
 McCleod	• Building the control line, both scraping & raking • Carrying/moving fire down a burn unit • Stamping out fire • Scraping during mop-up <i>*Most recommended tool for prescribed fire</i>
 Rogue Hoe	• Initial fire control line clearing, specifically in heavier duff & leaf litter • Chopping small roots & trees • Stamping out fires • Scraping during mop-up

EQUIPMENT



LIGHTING YOUR FIRE

Depending on the vegetation, weather, and topography, you may need different ways to light your fire. Here are common ways to put fire down.

Fire-Specific Equipment			
	Description	Uses	Safety
 Drip Torch	Canister of fuel with wick on end for fire to ignite fuel. 3-4 parts diesel to 1 part gasoline. Only fill $\frac{3}{4}$ full.	Used for burning a unit quickly and efficiently	Always keep the wick facing upward when not igniting. Be conscious of fuel leaking from torch to clothes. Always make sure the loop in the stem of the wick is facing away from you.
 Lighter	Small device used to ignite small spots of fuel or a drip torch	Useful for burning a unit without buying lot of fuel or putting fuel on the ground. Can spread the fire with a pitchfork.	Keep lighter in your pocket and away from fire to keep it from overheating
 Lighter	Wooden sticks with red phosphorus that ignite quickly and used to ignite small amounts of fuel or drip torch	Most cost effective and safest way to burn a unit but will be very slow. Can spread the fire with a pitchfork.	Keep dry and away from heat

EQUIPMENT



BRING WATER TO YOUR BURN

Water is one of the most important things to have when burning. It helps you control the fire's behavior and prevents fire from spreading outside your burn unit. Make sure all heat is gone once your prescribed burn is done. Always make sure your water equipment is usable and has enough pressure to reach high and far into vegetation. Always make sure your water equipment is usable and has enough pressure to reach high and far into vegetation.

Water Equipment			
	Description	Uses	Maintenance & Safety
 Garden Hose	• Typically 3/4" • Attaches to house or residential spigot	• Spray water to control fire behavior • Put water on logs and stumps that typically take a long time to burn.	• Rubber & cotton hoses can melt & burn if left too close to fire.
 Spray Nozzle	• Control water flow and pressure, jet spray is essential for hard-to-reach places and metal is best	• Great for mop-up and controlling fire behavior • Puts water on smoldering stumps and logs	Rubber nozzles can melt if too close to fire; metal nozzles are preferred
 Backpack Pump	• 2–5-gallon backpack with wand used for manually dispensing water	• Extinguishes, soaks, or cools down fuels • Reaches areas easily without laying out hose	• Bags often leak • Bags can melt if too close to fire • Empty water in bag and wand and let dry when storing

Water Equipment			
	Description	Uses	Maintenance & Safety
 Portable Water Tank	Plastic or metal water tank that can be moved by hand or with a truck. Has a hole on the top to fill with water and at the bottom to attach a pump or hose directly	• Water to control and mop-up fire. Best for larger burns or areas that are not close to water lines or spigots. • Use gravity feed or pump for more water pressure.	Let dry and store in a cool, dry location after use.
 Portable Water Pump	Pump used to transport water at changeable water pressures	• Pump water over long distances • Change water pressure to increase spray distance	Follow manufacturer's manual for proper use, care, and storage

CONDUCT A BURN

When you are well prepared, you are ensuring that your burn will go well, be easier, and shows due diligence that can limit your liability.

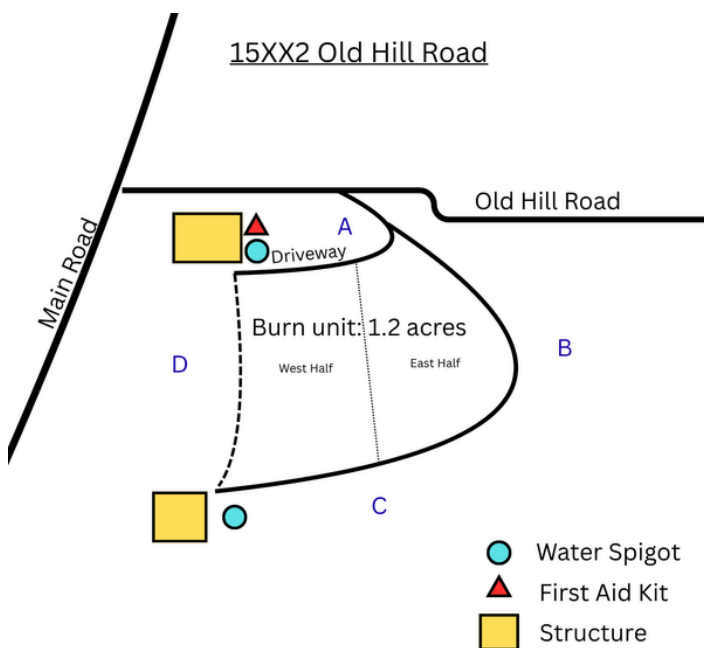
A month or more (even a year) before your burn.

Doing the burn takes the least amount of time.

There are steps that need to be taken care of well ahead of time, at least weeks if not months.

Prepare the Site. Clear heavy fuels so that the fire burns at low intensity with low flames by removing ladder fuels, hazards, and constructing control lines. See our Prepare to Burn chapter for comprehensive guidance on this topic.

Make a Plan. At some point, either now or before you even start preparing the site, it's good to have a plan. CAL FIRE has a great, simple template to fill in and there are basic examples to copy from. You can get a copy of the burn plan template from the Nevada County RCD website. A simple map of the burn area is one of the most important parts of a burn plan.



Often it is all a burn plan has. A good map includes roads, water sources, and homes or other things you want to protect. It can be hand drawn too. As long as it has those key components and the address, it will work.

This can be done online. For a broadcast prescribed burn, it is a LE-7 permit. CAL FIRE almost always makes a site visit for an LE-7 permit. They will want to see that your site is completely ready to burn. Not a pine needle on the control line!

A month to several weeks ahead of time:

At least several weeks before a burn, you need to:

- Organize people to help
- Get water lined up and ready
- Assemble tools
- Start watching the weather. This is critical because you need to burn when it is safe and at the same time not too wet. The best place to look at weather forecasts and on the day of the burn is the National Weather Service (weather.gov). Put in the zip code or name of the city where you are or nearest one for a more accurate local forecast..

The week of and days before the burn:

- Lay out water hoses; check for leaks, damaged ends, and clogged nozzles
- Notify neighbors that a burn is planned
- Review the weather forecast to confirm it fits your burn prescription
- Send reminders to your burn crew and confirm availability
- Inspect all tools to ensure they're in good working condition
- Check the hourly forecast for temperature, wind, and humidity trends leading into the burn day

CONDUCT A BURN

Day of the Burn – Before you begin:

- **Brief your team:** Review the plan for the day, reviews each person's role, confirm medical emergency helpers, discuss hazards to watch out for and answer any questions your team may have.
- **Go/No-Go Checklist** (Page 53) Make sure all steps and precautions have been done.
- **Test burn** Light a small, representative area that is surrounded by a fireline, and see how it burns. If it burns like you want (low flames), then proceed.
- **Call GVECC** Call Grass Valley Emergency Command Center (530) 477-0641 (or your local ECC) and let them know who you are, your address and that you are going to start conducting a prescribed burn.

During the Burn

Get everyone in place around the fire. Spread most people around the outside, on the control line, spaced every 50 feet or so.

- **Start lighting.** Starting slowly at the top of the burn area, or unit. Light a strip along the edge to get an initial “black line”. Let the fire back slowly own the hill, against the wind.

Use strips or dots in a line across the slope, before the first one if the fire has low flames and is slow.

- **Hold the fire.** Keep it in control. Use water or tools to slow down the fire or put out things you don't want to burn, like pitch up a tree or large logs.
- **Manage the smoke.** If the fire gets too smoky, then stop for a little or slow down. Put out burning logs or other things that are smoldering and producing too much smoke for too long.
- **Feed and water your Crew!** Make sure your helpers are staying hydrated and are well fed.

After the Burn

- **Mop up.** Put out the fire. Use water and tools to spray and stir areas still burning. Repeat until there is no smoke left.
- **Call GVECC.** Call and let them know you are done burning.
- **Monitor and Patrol.** Walk around the burn area often the day of and night after the burn to make sure it is all out, on the ground and in trees. Mop up anything that is not. It is good to keep water and equipment nearby until monitoring is complete.
- **Keep patrolling for 1-2 weeks after.** Smoldering material can reignite in the right conditons, so be on the lookout.



CONDUCT A BURN

PRESCRIBED FIRE GO/NO-GO CHECKLIST

Answer all questions in the Prescribed Fire Go/No-Go Checklist (Page 53.) Once you have answered all the question with YES, proceed with a test fire. Document the current conditions, location and results. If any questions were answered “NO”, DO NOT proceed with the test fire: Implementation is not allowed.

Circle: YES or NO

Burn Boss

Signature _____

Date _____

If all are marked “yes” make sure you or the burn boss sign to acknowledge this was received.

After evaluating the test fire, in your judgment can the prescribed fire be carried out according to the prescribed fire plan, and will it meet the planned objective? If “Yes”, proceed to sign and date your checklist.

CONTROLLING THE FIRE WITH FIRING PATTERNS

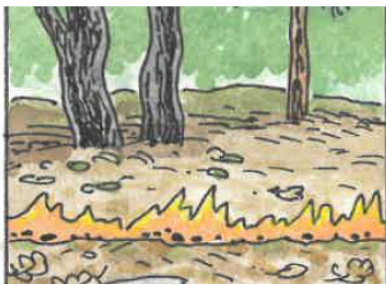
How you light the fire and spread it is the primary way to control the fire. Lighting and spreading the fire too fast can make the flames taller, the spread faster, and harder to control. There are three main patterns for burning: strip, dot, and ring firing.

Strip Fire is a continual line of fire placed. This can increase heat and is regularly used for backing fires.

Back Fire are lines of fire that are started at one end of the top of the burn unit and carried across the slope to the other end. The line is parallel to the top, meaning it doesn’t dip up or down but is straight across. It is started on the side where the wind is blowing towards it. That way, it gets “black”, or the fuels burned first in the area where the wind would push it toward. This is important, because wind can make fire burn hotter and faster. The easiest and safest way to burn, especially when you are new to burning, is to just light one strip and let it slowly burn back down the slope or against the direction of the wind. That is a “backing” fire. Backing fires have the lowest flames and slowest spread.

Dot firing is similar to strip firing but instead of a continuous line, dots of fire are lit every few feet or so. Dots are good to use where the fire may be burning hotter than you want. Sunny spots, or flashy fuels like pine needles are often burned with a dot pattern if these areas are burning hotter than you want. If the burn area has both shady areas with slower burning fuels, like oak leaves, and sunny areas or areas with flashier fuels, then strips can be used in the shade and switched to dots in the sun. Dots often leave a “mosaic” of burned and unburned fuels.

Ring firing is a useful technique to use around trees or other values at risk in the unit that you want to keep the heat of the fire away from. Most native trees in our area are resistant to fire damage. Many have thick bark, that insulates the living tissues that grows below the bark, the cambium. But even small flames or smoldering can kill these tissues and “girdle” the tree, potentially killing it, if the heat stays for a long time. This is called “residence time”. Lighting a ring around the tree from the top of the trunk and around, usually carries the fire away from the trunk of the tree. Ring fires can also be used to produce more heat if its a larger ring surrounding heavier fuels.



STRIP



DOT



RING

SMOKE MANAGEMENT



A fire always creates smoke. Smoke is made of tiny particles and trace gases from matter burning and lifting into the air. For prescribe burns, we want to make as little smoke as possible to protect our communities from its harmful effects on our health and safety.

Wildfires vs. Prescribed Fire Smoke

- Wildfire will burn anything in its path and produce a lot of smoke that is likely to stay around longer. Smoke can make the air quality very poor and can be harmful to your health.
- Because they are out of control, they don't just burn vegetation but structures and materials that may produce toxic chemicals and pollute the air.



- Prescribed fires produce a lot less smoke and for a shorter time period. There are ways to “manage” and minimize smoke on a controlled burn, but not on wildfires.

What Makes More Smoke & What Makes Smoke Move Around?

The amount and direction of smoke changes with weather, fuels, terrain, and the size of the burn.



What Are You Burning?

- Grasses, bushes, trees, and logs burn differently. Dead plants also burn differently than living plants! Also be aware of hazardous plants like poison oak burning, as its oils can be in the smoke and still give some people a rash.

How much fuel are you burning?

- Do you have vegetation all clumped together in your burn area, or are they spread out?
- Is there a continuous, connected group of fuels?
- More fuels clumped together means more smoke produced at once!



How wet is the vegetation?

- Drier fuels tend to have less smoke, burning more entirely.
- Wetter fuels will tend to produce more smoke and are less likely to burn completely.

Where is your burn area located?

- Are you in a valley, on a hill, or on a mountain side? Your terrain influences where smoke goes.

In hilly or mountainous areas, smoke moves into valleys and drainages during the night, tending to move from high points to lower points on the terrain.

How big an area are you burning?

The larger the area, the more smoke you'll make! If you have a large area you want to burn, consider burning it in smaller sections.



SMOKE MANAGEMENT



WAYS TO MANAGE SMOKE

Burn smaller burn areas at a time.

If you have a large area to burn, you can burn it in smaller sections. Less burned means less smoke for that day. Start with a section under an acre if you are new to prescribed fires.

Burn in weather good for burning.

Not too dry or wet, not too cold or hot, and not too strong or little a wind.

Understand and follow local, state, federal, and tribal prescribed fire laws and regulations.

Check online, call, or go in person to your local Air Quality District. For Nevada County, you can go to Northern Sierra Air Quality Management District.

If you have a lot of fuels, remove them from your burn unit or pile them in open areas and burn them first.

Make sure you follow regulations for pile burning. Burning piles will lower the intensity of your prescribed burn and lower the chance of it going out of control.

When you are done burning, make sure everything is out and no longer hot!

Drown smoldering logs that are burning for a long time and dead plant material on the ground (duff). Smoldering is when there is smoke but no flames from logs and duff. It means something is still burning and can catch fire again. Put water on smoking areas and mix it with dirt until there's no more smoke.

Once you think it's no longer hot and smoking, feel the area with the back of your hand. Does it still feel hot? **Add more water, mix, and repeat!**

Basic Smoke Management Practices (BSMP)	When should the BSMP be applied?
1. Identify, map, and avoid impacting smoke sensitive areas including schools, hospitals, and major roadways.	Before/During
2. In high smoke risk areas, explore alternative methods to burning	Before
3. Understand and follow local, state, federal, and tribal prescribed fire laws and regulations.	Before/During/After
4. Enhance smoke management skills through training and experience.	Before/During/After
5. Notify appropriate parties (neighbors, public agencies, authorities) if intent to burn.	Before
6. Monitor changing weather conditions and respond to unintended smoke impacts.	Before/During/After
7. Be aware of other burning activity and sources of pollution in your area.	Before/During
8. Use a test fire to verify expected smoke dispersion.	During
9. Only burn when smoke dispersion conditions are favorable.	During
10. When possible, use ignition patterns and methods that minimize smoke production.	During
11. Minimize impacts from smoldering smoke.	During/After

SMOKE MANAGEMENT



IS YOUR BURN NEAR SENSITIVE AREAS?

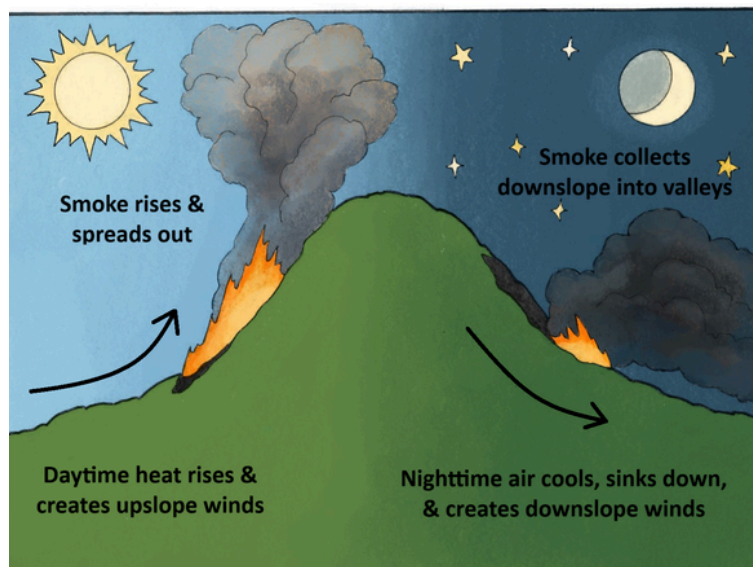
Sensitive areas include schools, daycares, nursing homes, and hospitals. Smoke can decrease visibility on roads and airports and cause delays. These are areas to be more careful of in managing the direction and amount of smoke. Also, consider the day you plan to burn (when school is out). Notifying people in advance can give them a chance to take measures to protect themselves, like closing windows or spending the day elsewhere.

How Does Weather Affect Smoke?

- Wind is the biggest weather factor influencing how smoke moves. Your position on a mountain, along with the surrounding terrain, can change how the wind behaves.

Wind:

- It's important to know which direction the wind is blowing. It may help the smoke disperse, but it also may spread the smoke and impact nearby communities.
- Little to no wind will cause smoke to spread low and not rise. Your fire may take longer to burn and spread with no wind. This is not ideal for a prescribed burn.
- Ideal winds are light. They can direct your fire in the right direction and help smoke rise.
- Strong winds will spread smoke around. It can also be dangerous and spread embers outside your burn area. This can cause fires to pop up elsewhere and turn into a wildfire.
- Be aware of the potential for wind gusts and how they can affect your fire's behavior. Note that draws and other ups and downs in topography can affect wind speed and direction.



- Heat rises and so does smoke! Smoke rises in the day, just like warmer air coming up. At night, air cools and lowers, and smoke lowers too, especially into the valleys.

HEAT MANAGEMENT & FIRE EFFECTS

How completely fuels are burned and how plants are affected are determined by how much heat the fire produces and how long that heat lasts.

When fuels are drier, weather is hotter, drier or windier, the fire will burn hotter and generate more heat. This includes both the dead fuels (the needles, leaves, sticks, and logs) and the live fuels (grass, flowering plants, shrubs, small trees, and vines). You can control the heat by how you apply fire. Applying backfiring can generate less heat but can burn surface fuels more completely if it burns slowly and stays in one place longer. More intense heat or taller flames do not necessarily cause more damage to plants. Most plants in the Sierra Nevada and much of the fire prone western US have features, or adaptations, that allow them to resist heat or easily survive fire. You can read more about this in the Fire Ecology and Behavior Chapter.

How long the heat stays near a plant is a more important indicator of damage to plants than the intensity of the heat. Smoldering next to trees for a long time can kill the smaller roots near the surface. These “feeder” roots help the tree absorb nutrients and water. For other plants, that sprout or grow back if the top is killed - sustained heat is more likely to kill the parts that sprout, like bulbs or burls. The longer the heat lasts, the deeper that heat goes down into the soil and reach roots, bulbs, and other plant parts. Firing patterns, water, and tools can be used to manage heat and residence time. Using a ring fire around trees is one way to draw the heat away. But if the duff or a log is smoldering or burning at the base of a tree for a long time, then you can spray water or use a tool to put it out.

California Standardized Prescribed Fire Plan

Project Title: _____
 Prescribed Fire Burn Boss (CARX): _____
 Author of Plan: _____
 Agency Having Jurisdiction (AHJ): _____
 Property Owner: _____
 Date Created: _____ Date Re-Evaluated* (if applicable): _____
**Burn plans should be re-evaluated as needed to account for changes in fuel/site conditions or project objectives.*

1. Project Area Description

Location Description: _____

Latitude and longitude (in Degrees Decimal Minutes (DMM)):
 Latitude: _____ Longitude: _____
 Property Ownership (private, state, etc.): _____
 Unit Size (acres): _____
Unit Description:

	Within the Unit	Adjacent to Unit
Fuel type/model		
Slope		
Aspect		
Special features		



FIRE ECOLOGY AND BEHAVIOR

Understanding fire behavior helps us control fire and anticipate its effects on plants, soil, and animals.

Fire behavior can be described by three factors:

- heat intensity
- rate of spread
- how long it burns in one area.

These factor with:

- different fuels
- weather, and
- topography or terrain

Describing Fire Behavior

Together, intensity, spread, and residence time determine how fire affects an area.

Fire Intensity – How Hot is the Fire?

The size of flames is a good measure of fire intensity. The hotter a fire is burning, the bigger the flames. The more intense a fire is, the more heat it puts out in front of the flames, on all sides and above the flames. Higher intensity fires are harder to control and can have greater impacts on plants and soil. In general, for most landowners, flames less than 2 feet high is a good target for low intensity fires that are easy to control.

Rate of Spread – How Fast is the Fire Moving?

How fast a fire is moving across an area is described as rate of spread. Can you walk faster than the fire? If so, its slow. Is it moving faster than you can? Then the rate of spread is moderate to high. Extreme wildfires move very fast. For most prescribed burns by landowners, a slow rate of spread is the best. It is easier to control.

Residence Time – How Long is the Fire Burning?

The effects of heat on you, plants, animals or soil depends a lot on how long that heat lasts. You can pick up a hot pan quickly and you won't get burned or not badly. But if you hold onto that hot handle for too long, then your skin starts to get too hot and damaged. How long a fire resides in any one spot is one of the most important factors on how it can affect plants, animals or soil. A log burning next to a tree for a long time can damage the trunk and roots, sometimes even killing the tree. The longer a fire burns, the more smoke it can produce. In prescribed burns, water, tools, and firing patterns are used to control residence time.

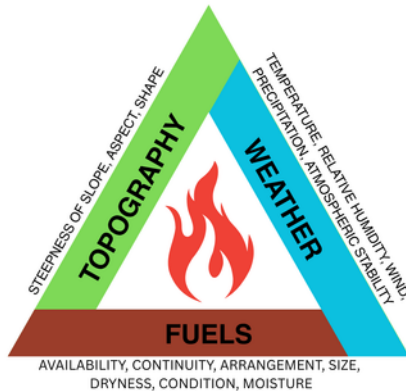


FIRE ECOLOGY AND BEHAVIOR

Surface fires are on the ground and are the lowest intensity. Almost all prescribed fires, especially by non-professionals, are low intensity surface fires.

WHAT CAUSES DIFFERENT FIRE BEHAVIOR?

There are three factors that affect fire behavior: weather, fuels, and topography. These make up the fire behavior triangle.



Weather

How hot, dry, and windy the weather is directly affects fire behavior.

- The hotter the temperature is, the more intense and faster the fire becomes
- More wind increases fire speed and intensity
- Drier air makes fire burn hotter and faster.
- Drier conditions make fuels more readily available to burn.

Fuels

Anything that will burn in a fire is fuel. For prescribed burns, all of the fuel is from vegetation, either dead or alive. Structures and other man made objects are also considered fuels to avoid during prescribed burns.

Campfires are a good way to think about how fuel affects fire behavior. Kindling and smaller sticks are needed to preheat the larger logs. Wet wood does not make good campfires. It may be hard to light. Dry wood lights easily and burns hotter. The bigger the pile of wood, the higher the flames and the hotter it burns.

FIRE TYPE

There are four types of fire.

1. Smoldering
2. Surface fire
2. Crown fire, and
3. Torching or passive crown fire

Smoldering or Creeping Ground Fire Flames are not visible and fire burns like coals, with glowing combustion.	
Surface Fire • Flames burn in the understory or on the forest floor. <i>Ideal prescribed fire.</i>	
Torching or Passive Crown Fire • Mostly surface fire but one or a group of trees may burn up in the crown. • May occur on larger professional prescribed burns or wildfires.	
Active Crown Fire • Fire is burning up into the top of trees • Also used for chaparral fires burning through the tops of tall shrubs	

FIRE ECOLOGY AND BEHAVIOR

TYPES OF FUELS

Dead fuels Includes leaves, needles, twigs, sticks, branches, logs and any other dead plant parts.	
Live fuels Includes grasses, shrubs, vines, or trees. The foliage and branches can all burn.	
Drier fuels Burn more easily, hotter, and faster. If branches sound like potato chips when you walk over them, then they are very dry. They will ignite easily and burn hotter and faster than they would wet.	

TOPOGRAPHY OR TERRAIN

Topography includes how steep slopes are, which cardinal direction – or aspect – the slopes are facing, geological features, and elevation. Topography is generally a permanent and unchanging factor.

FIRE BURNS HOTTER AND FASTER ON STEEPER SLOPES

Think of a match or lighter. Can you put your finger closer to the side or top of the flame? The hottest part of a flame is above the tip. This is where the hot gasses rise. Flames lean with a slope so that they are closer to the uphill side and the hot gasses heat the fuel ahead of the flames. This pre-heats them and makes them easier to burn.

- **The aspect**, or direction a slope is facing, affects fire behavior. South & west-facing slopes get more sun and are hotter and dry out faster. This makes fuels there easier to ignite and they will burn faster and hotter.
- **North & east-facing slopes** are cooler & wetter, which tends to make them have more vegetation. It may be harder for fire to ignite on these aspects, but there may be more vegetation acting as continuous fuel.

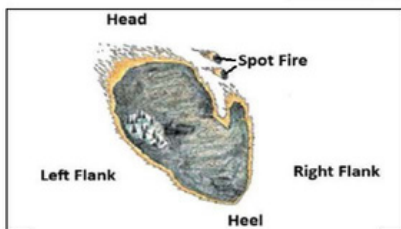


FIRE ECOLOGY AND BEHAVIOR

- **Ridges:** fires on ridges often burn the fastest. They get more wind and sun and dry out faster.
- **Drainages, ravines and canyons:** winds funnel and often increase in speed. The windier conditions leads to hotter and faster fires. Just like in a river, there can be eddies of wind in drainages. This can cause fires to burn more erratically and switch directions.

Fire Movement and Location

If a spot is ignited, fires will naturally move in a general tear drop pattern. The heel of the fire is where it starts and moves from. The head of the fire is where it is heading toward the fastest. This is generally in the direction of the wind or slope. This is the most intense or hottest burning part of the fire. Flanking fire is where it spreads to the sides. This fire burns in between the way head and backing fires burn. With prescribed fires, backing and flanking fires are the most commonly used because the heat and spread is most easily controlled.



Head Fire – moving forward with the direction of the wind or upslope	Backing fire – moving back down a hill or against the direction of the wind	Flanking Fire – fire spreading from the sides
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Managing Fire Behavior

Planned, controlled fires happen when we manage fire behavior. Fires are managed by:

- Choosing good weather conditions to burn in
- How fuels are pre-treated
- How the fire is ignited and spread

Prescribed burning is an art as much as it is a science. It all comes down to managing the heat and spread of the fire. The main focus is to watch how the fire is burning, then adjust as needed to keep the flame size and fire speed under control.

Weather Prescriptions

Burn “prescriptions” are weather conditions within which fire behavior will be readily controllable and get the desired effects. Examples are: temperatures between 40 and 80 degrees, relative humidity between 20–50%, and eye-level winds less than 8 miles per hour. In areas prepared for burning, this will usually result in flames averaging 2 feet or less.

Choosing to burn when the weather is cooler, less windy, and more humid will make the fire slower and less intense. If the fuels are damp from recent rain or snow, it may be best to wait for warmer, drier or breezy conditions.

Pre-Treating Fuels

Preparing fuels keeps fire on the surface. This is very important in managing fire. *Reducing fuels is what we can manage the most.* Removing ladder fuels, small trees, lower branches, or shrubs that can carry fire from the surface into tree crowns is critical. Piling and burning or removing large fuel accumulations, such as logs, can keep fire intensity low and prevent long residence time that is more likely to damage trees.

Fire Ignition Patterns

Lighting a fire at the top of the hill and letting it back slowly down results in low intensity, slower moving fires. Lighting strips, one at a time from the top to the bottom can produce hotter and faster moving fires. That is because there is a mix of head and backing fire. In general, the slower a fire moves, the more fuel it consumes. Since backing fires are usually the slowest, they often consume the most fuel. But if the fuels are dry, then head fires can consume a lot.

FIRE ECOLOGY AND BEHAVIOR

FIRE EFFECTS

Fire effects are how plants, soil, watersheds, wildlife and other parts of forests are affected by fire. This may be positive or negative. The effect depends on what the fire is like and the characteristics of the forest, plants, or wildlife. Knowing about the basics of fire effects is important to understanding how to conduct prescribed burns and manage fire effectively so that the results are desirable.



PLANTS

Plants have many different ways that they grow, survive, and respond to fire. As we see in the northern Sierra Nevada and in much of the western US, and other parts of the globe that experience frequent fire, plants share features and characteristics that let them survive and even thrive with fire. They have adapted to fire. This includes the ability to sprout or regrow from underground when insulated from heat by soil. Trees may have thick bark or large buds that insulate and protect living tissues from heat. Some have seeds that are stimulated to germinate with the heat or smoke from fire. Others are able to germinate better in bare soil that has been burned. Some of these characteristics for common plants in the northern Sierra Nevada are shown below.

Sprouting After Fire

Many perennial plants are able to grow new leaves and stems after their tops are lost from fire, cutting, or browsing by animals. This is the most common way that plants survive fire. When the top of a plant is removed or dies, it sends a hormonal message to the plant to grow new leaves and shoots from buds, bulbs, or tubers. All plants that sprout have some structure or part that can store energy to support the new growth. Below are examples of the common ways plants sprout after fire.



Stems

In the case of aspen, the buds may be on the roots. Others sprout from buds on stems that spread underground, like the wild rose or kitkitdizze. Oaks, madrone, and some manzanitas sprout from “burls” or swollen areas at the base of the stems. Grasses and some shrubs, such as bitterbrush, sprout from the crown of their roots, where they meet the stems.

Stems



Roots

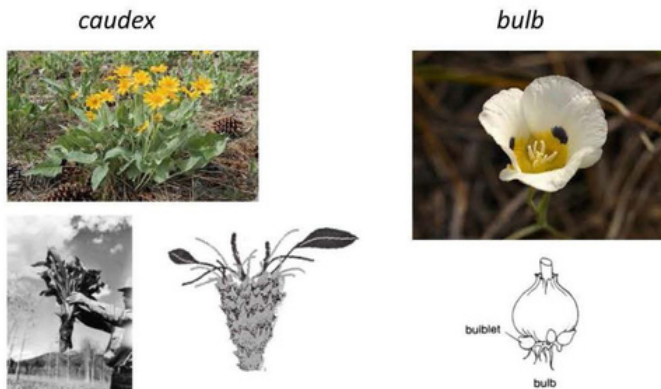
Aspen is the most wide-spread plant that sprouts from roots. An entire patch of aspen is usually all one plant, interconnected by roots that sprout following fire. Aspen are not tolerant of shade and in the absence of fire, conifers that don’t sprout are able to grow underneath them and eventually grow up and shade out the aspen. Aspen is considered a fire dependent plant.



Bitter brush, found in eastside pine forests, sprouts from the crowns of the roots where they meet the stem. Since the buds that sprout are close to the soil surface, they are not as well insulated from heat by soil. They are considered “weak” sprouter because sometimes they sprout and survive better than others, depending on how old they are and how hot the fire is. It is a favored food source for deer.

Below Ground Bulbs, Tubers, and Other Structures

Lilies are one of the best examples of plants that sprout from bulbs and can survive a long time. Many are stimulated to flower from the heat of fire. The Mariposa lily is one example. Many native plants with bulbs were an important food source for Native Americans. They tended patches of these plants with fires and other cultivation methods. Other examples include the caudex, or carrot like structure, of Mule’s Ears. Wild iris sprouts from underground corymbs and the delicate looking starflower that sprouts and spreads from little tubers are also stimulated to flower by fire.

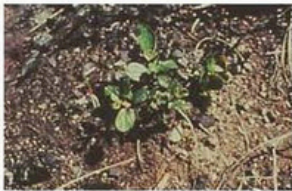


FIRE ECOLOGY AND BEHAVIOR

SEEDS AND GERMINATION

Some plants respond to fire by utilizing the bare mineral soil that is exposed. Seeds germinating on bare mineral soil are able to send their roots down into the soil where there is water and nutrients. This is especially important in dry environments and areas, where seeds need moisture from the soil. Without fire, dry deep litter and duff can cause the roots to die before they reach the nourishing soil. Pine seedlings are a good example of a plant that needs mineral soil to germinate best. Seeds travel to burned areas in different ways. Some have wings that enable them to move in the wind or air currents like pine and maple seeds. Others have barbs or are sticky and attach to the fur of animals, like bears, that walk into burned areas. Other plants have seeds that are stimulated to germinate from the heat of fire. This includes all of the types of Ceanothus including whitethorn and deerbrush. Unfortunately, the invasive scotch and French broom shrubs have seeds that also germinate from the heat of fire and germinate well on bare mineral soil. They also sprout, making it hard to get rid of them.

Heat stimulated germination



mineral soil bed



seed travel to burn area



Heat Resistance

A number of the most common trees in the Sierra Nevada are able to survive low and moderate intensity fire because they have features that protect them from heat. Thick bark and large buds protect sensitive living tissues from heat. Ponderosa pine, Jeffrey pine, and giant Sequoia have thick bark that surrounds the living cambium tissue in the stem. Cambium is vital to survival because it is how sugars made in the needles, and foliage in the crowns, are transported down to feed energy to the roots. Even if part of the stem is exposed or damaged from heat, the trees are able to grow around the scar, much like our skin heals on a wound. It is common to see large pines with triangular scars at the base, where fire has charred the bark and tissues and it grows back at the edges of the scar. These fire scars are used to reconstruct the fire history. Trees grow a “ring” of tissue around the outside of their stem below the bark each year. By counting the rings in between the scarred areas, it is possible to count which years fires occurred and how many years in between fires.

FIRE ECOLOGY AND BEHAVIOR

*Ponderosa and Jeffrey Pine
protected buds
thick bark*



*Large Red fir trees
thick bark
crowns high up*



Some trees, like incense cedar and red fir also develop thick bark but only when they are older. They survive many low intensity fires when they are larger and older but are more susceptible to low intensity fire when they are young and their bark is thin, compared to young ponderosa and Jeffrey pines. In addition to bark, fire adapted trees like ponderosa and Jeffrey pine have other growth patterns that make them less susceptible to damage from fire. They have buds at the ends of the branches that are large and have more layers of bract or protective layers than Douglas-fir or white fir. Because they require more sun, their lower branches die off naturally as they grow up, so that their living branches are higher up from the forest floor, farther away from heat. Incense cedar, white fir, and Douglas-fir tolerate more shade and keep more of their lower branches. This leaves them closer to fire on the forest floor and more likely to catch fire and spread fire up into the crowns or just get heavily damaged.

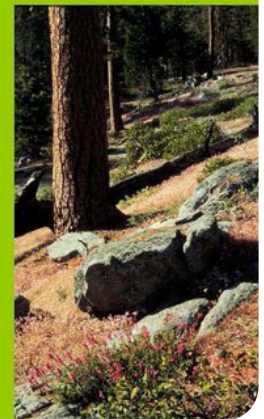
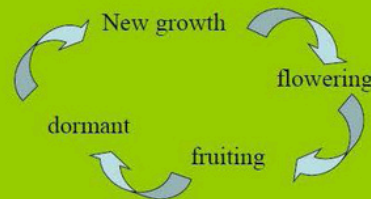
Lifestyle

Plants are more sensitive to heat and the effects of fire at different stages of their life. When plants are actively growing, they are more susceptible to damage from heat. Annual plants, that grow one year and then die, are susceptible to fire anytime because they have no means to sprout back. They are usually smaller and have fewer insulating features.

Some annual plants survive areas with frequent fire by growing early in the year before fire season occurs. Perennial plants, that grow for more than a year, are more sensitive to heat at different stages of development. When they are flowering or developing fruits, they can be the most sensitive. That is because they are using all of their energy to make the flowers and fruits, leaving them less energy to sprout back from fire. Many still survive but they may not have as strong of a sprouting response and only grow more leaves and stems instead of flowers for that year.

Phenology = stage of plant development

Plants go through different stages with the seasons
-dormant stage is least sensitive to fire



Managing Fire Effects

There are several ways that prescribed fires can be managed to minimize negative impacts or unwanted fire effects. There will always be some plants that benefit or thrive after a fire and others that are damaged or even killed by fire. There are several ways to ensure that

FIRE ECOLOGY AND BEHAVIOR

the desired effects are achieved. This includes managing and controlling the fire behavior, including the intensity, speed, and duration of the fire. There are also many actions that can be taken ahead of time to protect key areas or plants. A fire can also be timed to avoid certain times of the year or stages of plant development.

There are usually multiple reasons that people do prescribed burning. This may include reducing fire and fuel hazard, increasing forest health, or enhancing native plants, but it may not be possible to reach all objectives on any one fire. Tradeoffs will have to be made. Most prescribed burns cover a relatively small area, and some short-term damage to some plants is not likely to negatively impact native plants in the area. The damage to some plants may be short-term in a given year and not affect long-term survival.

Effects From Fire Behavior

Controlling fire behavior can provide the desired effects, which is the goal of prescribed fire. Low intensity, low duration fires are best for both maintaining control of a prescribed burn and achieving desired effects. This means keeping flame lengths low to the ground, generally less than two feet. Plants can be damaged by low intensity fire if it is next to the plant for a long time, a long “residence time”. Large trees can be killed by smoldering around their bases for long periods of time. They have smaller feeder roots that grow just below the surface that are important for nutrient and water uptake. These roots are less

sensitive to a fast-moving fire with flames of 2 feet than a slow, smoldering burn of more than 1 hour. With large pine in particular, they tend to accumulate mounds of needles and bark at their base. Without frequent fire, the feeder roots start to grow up into this mound. There also may be key habitats for wildlife, mushrooms, or moss that a landowner may want to protect from burning.

Actions to Modify Effects

There are several ways to limit the heat and duration of heat to plants that you want to protect.

- Pre-treat the area by pile burning in areas with heavier fuel concentrations.
- Scratch little fire lines around important features that are to be protected. This may include around small patches of certain plants, like sugar pines or a patch of flowers in bloom.
- Around large pine trees:
 - Gently rake back some of the upper litter/ bark mounds. Avoid exposing the roots.
 - Scratch a line around the tree, along the dripline (outside of the crown).
 - Put out fire burning near it, using water or after it burns to keep it from smoldering.
 - Use a ring firing pattern, to draw the heat away from the tree.

Burn in a patchy pattern, leaving some areas less burned or more lightly burned than others.

Try burning different plants in different stages at different times of year and see how they respond.

Strategies

Avoid smoldering
long heat on ground



Pre-treat
Remove heavy, accumulated fuels



Burn in a mosaic
Some unburned, some light



Watch & learn
try things in small areas



NOTES: MAKE YOUR OWN BURN PLAN



Site Assessment

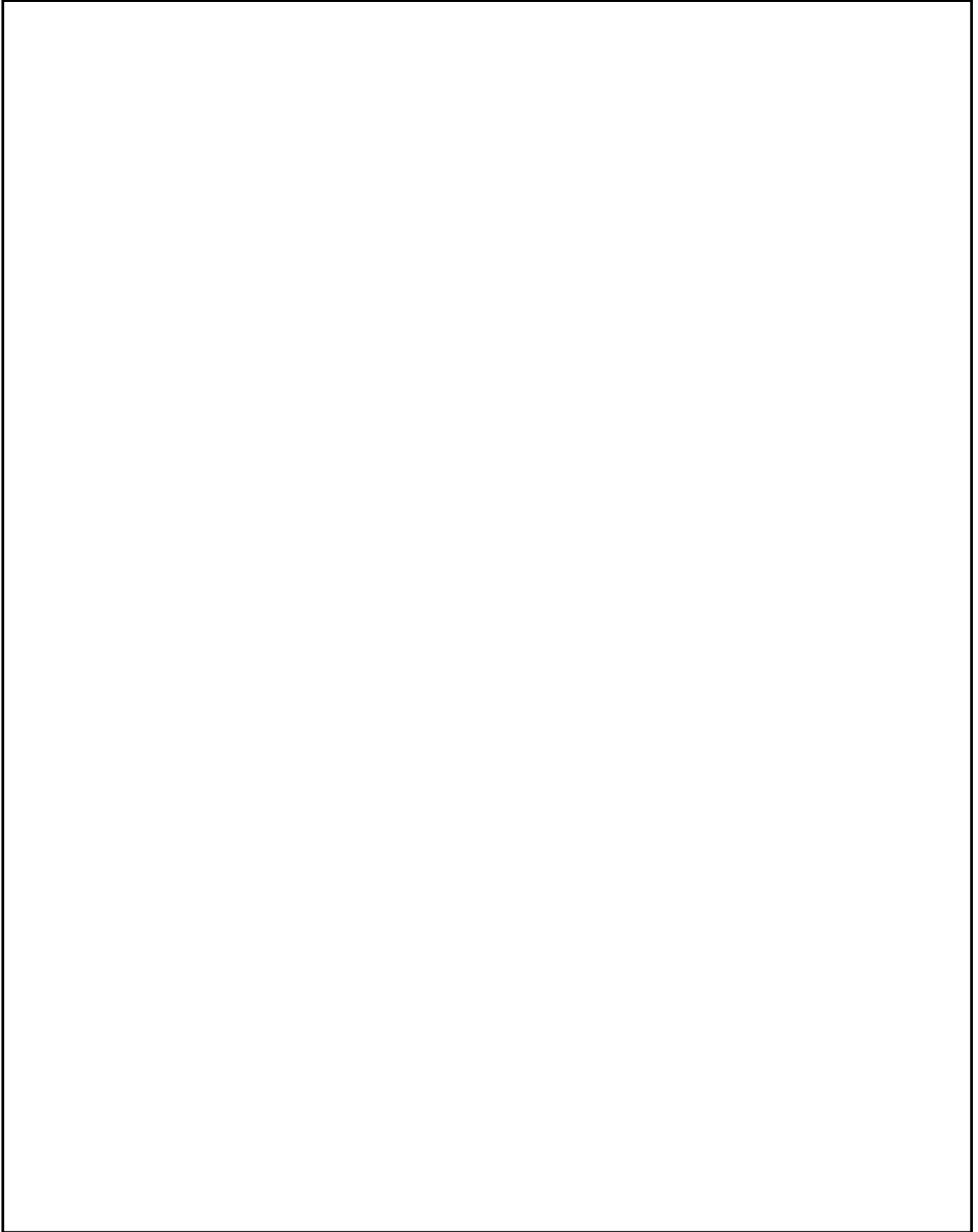
Property Name:	
Location:	
Total Acreage Available for burning:	
Topography:	
Soil Type:	
Climate Considerations:	
Primary Management Goals:	1. 2. 3. 4.
Vegetation Type:	
Native Species Present:	1. 2. 3. 4.
Invasive Species Present:	1. 2. 3. 4.

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NOTES:

[illegible]

DRAW YOUR SIMPLE MAP

A large, empty rectangular box with a black border, intended for drawing a simple map.

EXAMPLE - SIMPLE

California Standardized Prescribed Fire Plan

Project Title: Doe Property Burn

Property Owner: John and Jenny Doe

Date Created: 4/1/23 Date Re-Evaluated* (if applicable): _____

1. Project Area Description

Location Description: 25 Pretty Lane, Nevada City (unincorporated)
CA 95959

Latitude and longitude (in Degrees Decimal Minutes (DDMM)):

Property Ownership (private, state, etc.): private

Unit Size (acres): 1 1/2

Unit Description:

Pine/black oak, gentle slope, west-facing

Prescribed fire goals and objectives

Reduce fire hazard, fuels
Restore forest

2. Pre-burn Considerations

Plan for unit preparation (describe line type/construction, pre-treatment of fuels, pre-burn land management considerations (e.g., grazing deferment), etc.):

Roads or trails around area. Rake, use
blower, weed eat on road/trail edges, Trim
branches in 5 feet.

Water supply (describe quantity, location, and other considerations):

Garden hose on 2 sides. Truck with portable
water tank & pump & hose at corner on
other side.

Unit access (describe roads, signage needs, etc.): off straight road, 1-mile from Hwy 49.
Plan to protect values at risk (if applicable; e.g., structures, water lines, sensitive species, cultural sites, etc.): Defensible space around home

3. Prescription

Temperature $< 75^{\circ}$, winds < 3 miles/hour Relative humidity $> 25\%$

7. Notifications

Pre-Burn and Day of Burn Notifications:

Adjacent Landowners

☐ Name: Sue Smith Phone: 333-333-3333
☐ Name: Jeff Good Phone: 222-222-2222
☐ Name: Slate family Phone: 111-111-1111

Air Quality Management District

☐ Name/Title: N. Sierra Air Quality District Phone: 530-274-9360

Fire Agency Having Jurisdiction

☐ Name/Title: Consolidated Fire Phone: 530-265-4431 week days
or nearby station weekend

CAL FIRE Emergency Command Center (ECC):

☐ Name/Title: Grass Valley ECC Phone: 530-477-0641

8. Wildfire Conversion Plan

Person(s) to contact for declaration: -

Name/Position: John & Jenny Doe Phone/frequency: 888-888-8888

9. Risk Management Activities

Check boxes for risk management activities/plans attached to the prescribed fire plan:

☐ Contingency plan (required) Call ECC

California Standardized Prescribed Fire Plan

Project Title: _____

Prescribed Fire Burn Boss _____

Author of Plan: _____

Agency Having Jurisdiction (AHJ): CAL FIRE NEU

Property Owner: _____

Date Created: _____ Date Re-Evaluated* (if applicable): _____

**Burn plans should be re-evaluated as needed to account for changes in fuel/site conditions or project objectives.*

1. Project Area Description

Location Description: _____

Latitude and longitude (in Degrees Decimal Minutes (DDMM)):

Latitude: _____ Longitude: _____

Property Ownership (private, state, etc.): _____

Unit Size (acres): _____

Unit Description:

	Within the Unit	Adjacent to Unit
Fuel type/model		
Slope		
Aspect		
Special features		

Prescribed fire goals and objectives (include overarching project goals as well as specific project objectives. Objectives should be S.M.A.R.T. (specific, measurable, attainable, relevant, time-bound)):

2. Pre-burn Considerations

Plan for unit preparation (describe line type/construction, pre-treatment of fuels, pre-burn land management considerations (e.g., grazing deferment), etc.):

Water supply (describe quantity, location, and other considerations):

Unit access (describe roads, signage needs, etc.):

3. Prescription

Element	Minimum (cool)	Desired	Maximum (hot)
Temperature (F)			
Relative Humidity (%)			
Mid-Flame Wind Speed (mph)			
Fine Dead Fuel Moisture (%)			
Probability of Ignition (%)			
Flamelength (ft)			
Rate of Spread (ch/hr)			

**Include other prescription elements as appropriate*

Wind direction (acceptable range and optimal): _____

Seasonality of burn (if applicable; in many cases, implementation will be appropriate at any time that prescription parameters are met): _____ needed.

4. Smoke Management Plan

(to be prepared according to local air district rules; refer to SMP for detailed plan):

- ☐ Submitted through PFIRS
- ☐ Submitted in hard copy to air district (on-line digital application of N. Sierra AQM)
- ☒ Not required by air district based on project size/emissions

5. Ignition Plan

- ☒ Firing Boss to be designated

Test fire will be conducted in a location that is representative of the burn unit. Location to be determined by Burn Boss on the day of burn based on environmental conditions. Usually, this will be the uphill portion of the unit, in a more open area representative of the drier parts of the unit to reflect the higher end of potential fire behavior. The test fire will be used to determine if fire behavior is expected to be within an acceptable range for the prescription and objectives. If it is not, the test burn will be suppressed and the burn postponed.

Firing plan (describe sequence, patterns, techniques, and devices needed to meet objectives):

Holding plan

- ☒ Holding Specialist to be designated

Anticipated Fire Behavior (head fire)	Flame length (FL) (feet)	Rate of spread (ROS) (chains/hour)
Within the unit		
Adjacent to unit		
Production Rates	Chains/hour	
Crews/resources		

Resources (describe total number and type of resources needed to implement burn safely, based on production rates outlined above. Include description of plan for on-site weather observations and weather forecasting):

6. Post-Burn Activities

Mop-up and patrol plan (describe activities, timeframes, and standards):

Other post-burn activities (optional; include appendices for marked activities):

- ☐ Fire effects monitoring plan
- ☐ Project rehabilitation plan (including infrastructure, improvements, and land rehabilitation)
- ☐ Other (describe): _____

7. Notifications

Pre-Burn Notifications:

Adjacent Landowners

- ☐ Name: _____ Phone: _____
- ☐ Name: _____ Phone: _____
- ☐ Name: _____ Phone: _____
- ☐ Name: _____ Phone: _____
- ☐ Name: _____ Phone: _____
- ☐ Name: _____ Phone: _____

Air Quality Management District

- ☐ Name/Title: N Sierra Air Quality Mgt District Phone: 530-274-9360

Fire Agency Having Jurisdiction

- ☐ Name/Title: CAL FIRE GVECC Phone: 530-477-0641

Other notifications may be required based on parameters outlined in the smoke management plan (e.g., schools and other sensitive receptors). Record additional notifications on separate page and include in appendices.

Day-of-Burn Notifications:

CAL FIRE Emergency Command Center (ECC):

- ☐ Name/Title: _____ Phone: 530-477-0641

Air Quality Management District

☐ Name/Title: N Sierra Air Quality Mgt District Phone: 530-274-9360

Other Fire Agency Having Jurisdiction (if applicable):

☐ Name/Title: _____ Phone: _____

Other (if applicable; e.g., law enforcement, adjacent landowners, etc.):

☐ Name/Agency: _____ Phone: _____

☐ Name/Agency: _____ Phone: _____

☐ Name/Agency: _____ Phone: _____

8. Wildfire Conversion Plan

Person designated to make declaration: GVECC

Designated Incident Commander in case of wildfire: _____

Person(s) to contact for declaration:

Name/Position: Amber Cone/landowner Phone/frequency: 530-575-0075

Name/Position: _____ Phone/frequency: _____

Name/Position: _____ Phone/frequency: _____

Size-up/reporting considerations:

- Rate of spread
- Fuel type
- Structure threat
- Potential acreage
- Current actions being taken

9. Risk Management Activities

Check boxes for risk management activities/plans attached to the prescribed fire plan:

☒ Contingency plan (required) Call 911

☒ Medical plan

☐ Communications plan

☐ Management Action Points (M.A.P.)

☐ Briefing checklist

☐ Safety plan (e.g., safety review, onsite assessment, 215A, etc.)

☐ Other (describe): _____

10. Other Attachments

Check boxes for other pertinent attachments included with the prescribed fire plan:

☒ Project and area maps (required)

☒ Go-no-go checklist (recommended)

☐ Other (describe): _____

Attachment II – Go-No-go list

ELEMENT 2B - PRESCRIBED FIRE GO-NO-GO CHECKLIST

Preliminary Questions	Circle YES or NO
A. Have conditions in or adjacent to the ignition unit changed, (for example: drought conditions or fuel loadings), which were not considered in the prescription development? If NO proceed with the Go/NO-GO Checklist below, if YES go to item E.	YES NO
B. Has the prescribed fire plan been reviewed and an amendment been approved; or has it been determined that no amendment is necessary? If YES, proceed with checklist below. If NO, STOP: Implementation is not allowed. An amendment is needed.	YES NO
GO/NO-GO Checklist	Circle YES or NO
Have ALL permits and clearances been obtained?	YES NO
Have ALL the required notifications been made?	YES NO
Have ALL the pre-burn considerations and preparation work identified in the prescribed fire plan been completed or addressed and checked?	YES NO
Have ALL required current and projected fire weather forecast been obtained and are they favorable?	YES NO
Are ALL prescription parameters met?	YES NO
Are ALL smoke management specifications met?	YES NO

Are ALL planned operations personnel and equipment on-site, available and operational?	YES NO
Has the availability of contingency resources applicable to today's implementation been checked and are they available?	YES NO
Have ALL personnel been briefed on the project objectives, their assignment, safety hazards, escape routes, and safety zones?	YES NO
If all the questions were answered "YES" proceed with a test fire. Document the current conditions, location and results. If any questions were answered "NO", DO NOT proceed with the test fire: Implementation is not allowed.	
After evaluating the test fire, in your judgment can the prescribed fire be carried out according to the prescribed fire plan and will it meet the planned objective? Circle: YES or NO	

Attachments III. Medical Plan

Property Address: _____

Burn Unit Location: _____

Location to meet Medical Personnel: _____

Sheriff's Office Phone Number: _____ 530-265-1471 _____

Closest Medical Facility Name: _____ Sierra Nevada Memorial Hospital _____

Closest Medical Facility Address: _____ 155 Glasson Way, Grass Valley, CA 95945 _____

Closest Medical Facility Phone Number: _____ 530-274-6000 _____

Ambulance Response Time to Property: _____ 30 min _____

Closest Helispot Location: _____

Medical Equipment on Scene: _____ First Aid Kit _____

Names of Medically Experienced Personnel on Scene: _____ TBD Day of burn _____

MEDICAL INCIDENT REPORT

BE ALERT, KEEP CALM, THINK CLEARLY, ACT DECISIVELY

1. Activate Medical Plan

- Someone who is not doing patient care is in charge

2. Contact 911

- Location (send someone to meet responding medical personnel)
- Severity of injury
 - Life Threatening (unconscious, severe bleeding, trouble breathing)
 - Serious Injury (can't walk)
 - Minor injury (sprain, strain)

3. Nature or Mechanism of Injury

- Struck by falling tree, burns, chainsaw cut

4. Transport Request

- Air Ambulance or Ground Transport?
- Confirm ETA of Medical Personnel

5. Contingency Plan

Remember, you still have live fire on the ground!

BE ALERT, KEEP CALM, THINK CLEARLY, ACT DECISIVELY

- Current size (acreage)
- Rate of spread
 - low, moderate, high
- Fuel type
- Structures threaten?
- Potential growth
 - low, moderate, high
- Current actions being taken
 - what flank, how many personnel, what equipment

Attachment IV. Contingency Plan

1. Injury Requiring Medical Attention

Injury will be evaluated by nearest person and notify the burn boss immediately. For injuries requiring immediate medical attention, the closest first responder or most appropriate EMT will render immediate care and supervise treatment. If the injury warrants it, 911 will be called. The burn boss will designate the most qualified person to manage any further medical response. A basic medical emergency plan is attached including key, pertinent information such as location

of nearest hospital. Wherever possible, a certified first responder will be present at burns > 1 acre.

2. Excessive Smoke Production

Smoke production and direction will be constantly monitored to limit negative public health effects and nuisance. Actions that will be considered and applied if excessive smoke production occurs include the following.

- Delay ignition until fuels burn down.
- Smaller areas of burn could be ignited and allowed to burn down before igniting additional areas.
- Large woody piles can be pulled apart if safe to do so.
- As a last resort, suppression can be initiated.

3. Fire Behavior Exceeds Prescription

Fire behavior will be constantly monitored to ensure that it is within the prescription. Firing and holding techniques may be modified to increase or decrease fire behavior. If possible, ignition can be delayed until fire behavior returns to desired conditions. As a last resort, ignition may need to stop, and mop-up and patrol should begin.

4. Fire Escape

If fire escapes the burn unit and cannot be contained by onsite resources, then 911 and the Grass Valley ECC will be contacted immediately.

In California and beyond, prescribed fire is increasingly being recognized as one of the most cost-effective and ecologically appropriate tools for restoring and maintaining resilient landscapes, habitats, and communities. However, the prescribed fire discourse is riddled with questions, concerns, and uncertainty about liability, and liability is often cited as a primary barrier to the use of prescribed fire in California. With this paper, we aim to clarify basic liability laws in California, using state law and case examples to further the collective understanding and comfort around prescribed fire liability.

The national context for liability

Across the United States, there are four general categories of state liability law (from Melvin 2018³):

- **Strict Liability** holds a person legally responsible for harm even if no negligence was found;
- **Simple Negligence** holds a person legally responsible for harm if reasonable care was not taken;
- **Gross Negligence** holds a person legally responsible for harm only if it can be shown that they took less care than even a careless person would use (i.e., reckless disregard for safety);
- Liability is **uncertain** in states where laws and administrative codes are vague regarding prescribed fire.

Generally speaking, strict liability laws are the least conducive to prescribed fire and gross negligence laws are the most conducive. Simple negligence laws fall in between, and states with uncertain liability laws often default to something similar to simple negligence.

California is a *simple negligence state*, and this is made clear by language in both the California Health and Safety Code and the Public Resources Code. Whether in reference to personal liability for property damage (Health and Safety Code § 13007), landowner liability for property damage (Health and Safety Code § 13008), personal liability for suppression costs (Health and Safety Code § 13009), liability for the cost of investigations and reports (Health and Safety Code § 13009.1), or permits for burning (Public Resources Code § 4494), the codes all refer to concepts of due diligence and negligence. But what do those words mean in practice?

Case examples

In a case from 1957, a California court found a landowner guilty for causing damages to a neighbor's property due to negligence and carelessness (*Leuteneker v. Fisher*, 155 Cal.App.2d 33, 1957). In this case, the defendants did not comply with all of the specific elements of their burn permit, which had been issued to them by the California Department of Forestry and Fire Protection (CDF, now CAL FIRE). The permit required that the landowner remove a swath of brush at least 60 feet from the road, which was to serve as the fireline, and provide notification of burning to adjacent landowners. The defendant did neither of these things, and they had no one stationed on the side of the burn where the risk of escape was highest. The fire, ignited on a warm day in August, burned through brush and trees on the edge of the unit, eventually burning across the road and onto the neighbor's property. Interestingly, a CDF ranger directed and supervised the burning, but was not implicated in the case because the burn was ignited by the landowner on their land and was intended for their sole use and benefit. Public Resources Code 4491 does require that the Department provide standby fire protection for prescribed fire if resources are available; however, it was determined in this case that the decision to burn ultimately falls on the landowner in cases where they are the permittee, and it is the landowner's responsibility to ensure that permit requirements are met and conditions are appropriate for burning.

A more recent case offers similar lessons in due diligence and negligence (Massa 2019). In this case, a Monterey County landowner was conducting a winter burn in chaparral, and the burn escaped his control, burned onto an adjacent property, and caused the Encinal Fire, which burned approximately 190 acres over four days and involved a significant

¹ Lenya Quinn-Davidson, Area Fire Advisor, UCCE, lquinndavidson@ucanr.edu

² Jeffery Stackhouse, Livestock and Natural Resources Advisor, UCCE, jwstackhouse@ucanr.edu

³ Melvin, M.A. 2018. 2018 national prescribed fire use survey report. Technical Report 03-18. The Coalition of Prescribed Fire Councils, Inc. 23 pp.

and costly suppression response by the state. The landowner had obtained permits from the local air quality district as well as CAL FIRE, and provided notification to both agencies on the day of the burn. However, upon investigation, a number of factors emerged that pointed to negligence by the landowner: unit preparation was limited, and the control lines that had been established were not entirely on the landowner's property; the burn was ignited from the bottom of the slope in the absence of sufficient control lines at the top; the planned prescribed burn area was outside of the area outlined in his permit; he had a bulldozer on site with known fuel filter issues, and it was dysfunctional when the fire escaped and it was most needed; and the landowner waited until the evening to report the fire to CAL FIRE, at which point there was little daylight to allow for a sufficient or effective response. Other factors also supported the idea that the landowner wasn't sufficiently prepared for the burn; for example, the fire experience of his workers was unknown, external and internal communications were limited because they had no cell service or radios, no firing plan was outlined prior to ignitions, and the adjacent landowners had not been notified of the day's activities. In this case, the landowner was found negligent and held liable for a portion of the costs associated with the suppression of the Encinal Fire.

Lessons learned

In both of the aforementioned cases, it is clear that the landowners did not comply with the specifications of their permits. In California, Senate Bill 1260 (Jackson 2018) recently clarified that "compliance with a permit issued pursuant to this article shall constitute prima facie evidence of due diligence" (Public Resources Code § 4494). This new language did not represent a change to state law, but it did offer helpful clarification.

However, due diligence and negligence relate not only to the language in a permit; as we see in the cases above, other factors may also be considered during a determination of negligence. According to California law, a person is not negligent if "the person did what might reasonably be expected of a person of ordinary prudence, acting under similar circumstances, who desired to comply with the law." In consideration of an escaped prescribed fire, the court may seek expertise on the types of actions that would be reasonably expected of a diligent prescribed fire practitioner, and these actions would likely include some level of prescribed fire planning, unit preparation, and forethought on issues of staffing, equipment, and communications. In times of year when CAL FIRE permits are not required,⁴ these considerations may be even more critical to determinations of negligence and due diligence, as there is no permit for reference.

Recommendations for mitigating prescribed fire liability concerns in California

- Include neighbors in the planning and implementation of projects whenever possible.
- Always obtain and comply with relevant permits, including air quality permits (year-round) and CAL FIRE permits (during declared fire season). Take an active role in the development of permit parameters, and strive for specific parameters rather than generalized statements. For example, request a permit that outlines the number of personnel and engines that CAL FIRE would recommend for controlling the fire rather than a permit that says you need to have enough resources to keep the fire under control. (In effect, the latter is a backdoor way of imposing a strict liability framework in a simple negligence state, and it should be avoided.)
- Ensure that you have planned and prepared your unit adequately for the time of year and the conditions under which you will be burning. Even under mild winter conditions, it is wise to have a basic burn plan/prescription, control and/or contingency lines, and a water resource on site.
- Consider using release of liability forms if you have volunteers or others working on your prescribed burn; injuries could be an additional liability for the landowner.
- Request that CAL FIRE provide contingency resources for your burn, as outlined in PRC § 4491. If your CAL FIRE unit has resources available, they are required by law to support prescribed fire projects on private lands.
- Consider the types of additional actions that you should take as a reasonable, prudent prescribed burner. Working with a community group like a prescribed burn association, having functional equipment, ensuring good communications with crew members and neighbors, and other similar actions can help demonstrate due diligence and responsible behavior.

⁴In the upper 2/3 of the state, CAL FIRE permits are only required during declared fire season, May 1~late fall. See PRC § 4423, PRC § 4413, and PRC § 4414 for guidance on permit requirements in different parts of the state.



PREScribed FIRE GO/NO-GO CHECKLIST

Preliminary Questions:	YES	NO
A. Have conditions in or adjacent to the ignition unit changed, (for example: drought conditions or fuel loadings), which were not considered in the prescription development? If YES, go to B If No, proceed with the Go/No-Go Checklist below.		
B. Has the prescribed fire plan been reviewed and an amendment approved; or has it been determined that no amendment is necessary? If YES proceed with the checklist below If NO, STOP; Implementation is not allowed. An amendment is needed.		
Checklist:	YES	NO
Have ALL permits and clearances been obtained?		
Have ALL the required notifications been made?		
Have ALL the pre-burn considerations and preparation work identified in the prescribed fire plan been completed or addressed and checked?		
Have ALL required current and near-term fire weather forecasts been obtained and are they favorable?		
Are ALL prescription parameters met?		
Are ALL smoke specifications met?		
Are ALL panned personnel and equipment on-site, available, and operational?		
Has the availability of planned contingency resources been checked and are they available?		
Have ALL personnel been briefed on the project objectives, their assignments, safety hazards, escape routes, and safety zones?		

If all questions were answered “YES” proceed with a test fire. Document the current conditions, location and results.
If any questions were answered “NO”, DO NOT proceed with the test fire: Implementation is not allowed.
After evaluating the test fire, in your judgment can the prescribed fire be carried out according to the prescribed fire plan and will it meet the planned objective? **Circle: YES or NO**

Burn Boss Signature _____ Date _____



ADDITIONAL RESOURCES

NATURAL RESOURCE CONSERVATION SERVICE

Environmental Quality Incentive Program (EQIP)
nrcs.usda.gov/programs-initiatives

Conservation Stewardship Program (CSP)
nrcs.usda.gov/program-initiatives

PRESCRIBED (RX) FIRE RESOURCES

Depending on your location, community-led burning efforts may be coordinated by RCDs, UCCE, nonprofits, Fire Safe Councils, Prescribed Burn Associations, or others.

CAL FIRE Rx Fire Information
readyforwildfire.org

California Prescribed Burn Association
calpba.org
calpba.org/rx-burn-planning

Nevada County Prescribed Burn Association
nevadacountypba.org

Release of Liability Forms (for volunteers to sign)
calpba.org/liability-documents

WEATHER RESOURCES

National Weather Service
weather.gov
weather.gov/fire

Weather Underground
wunderground.com

**Northern California Geographic Area
Coordination Center (GACC)**
gacc-fifc.gov/oncc

Remote Area Weather Stations (RAWS)
raws.dri.edu/wraws/ncaF.html

Windy (mobile app)
windy.app

NATIVE PLANT RESOURCES

Fire Effects Information System (FEIS)
feis-crs.org/feis
or
research.fs.usda.gov/feis

Cal Flora
calflora.org

California Native Plant Society
(CNPS) Calscape.org



ADDITIONAL RESOURCES

UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION (UCCE) FORESTRY ADVISORS

For your area advisor, visit:
ucanr.edu/sites/forestry

BURN PERMITS

CAL FIRE reviews and approves burn permits
<https://burnpermit.fire.ca.gov/>

COST SHARE RESOURCES

California Forest Improvement Program (CFIP)
fire.ca.gov/grants

Vegetation Management Program (CAL VMP)
fire.ca.gov/what-we-do/natural-resource-management/vegetation-management-program

AIR QUALITY

Northern Sierra Air Quality Management
www.myairstdistrict.com (530) 274-9360

Prescribed Fire Incident Reporting System (PFIRS)
ssl.arb.ca.gov/pfirs

TRIBAL CONSULTATION

If landowners find or know of archaeological resources on their lands, they are strongly encouraged to reach out to the local tribe for consultation. CAL FIRE maintains a list of **Native American Contacts under their Cultural Resources Management Program**.
fire.ca.gov/programs



Nevada County Resource Conservation District (NCRCD)
113 Presley Way, Suite 1, Grass Valley, CA 95945
www.ncrcd.org
(530) 798-5529

Nevada County Resource Conservation District (NCRCD) is dedicated to promoting responsible resource management by supporting landowners and land managers in achieving a balance between a healthy economy, a diverse landscape, and a high-quality rural environment. This work is made possible through a strong partnership and fiscal sponsorship from the Nevada County Office of Emergency Services. The Nevada County Resource Conservation District is authorized under Division 9 of the Public Resources Code, are special districts of the state of California, set up under California law to be locally governed agencies with their own locally appointed or elected, independent boards of directors. California RCDs implement projects on public and private lands and educate landowners and the public about resource conservation.



Nevada County Agricultural Commissioner/Sealer
950 Maidu Ave, Suite 170, Nevada City, CA 95959
<https://www.nevadacountyca.gov/982/Agricultural-Commissioner>
(530) 470-2690

Nevada County Agricultural Commissioner

Nevada County's Department of Agriculture is dedicated to sustaining a healthy agricultural industry while protecting the environment, the agricultural workforce, and the community. The mission of the Nevada County Department of Weights & Measures is to provide fair compensation and equity in the marketplace and to ensure that the interest of the buyer and seller are protected through education, inspection, and enforcement.