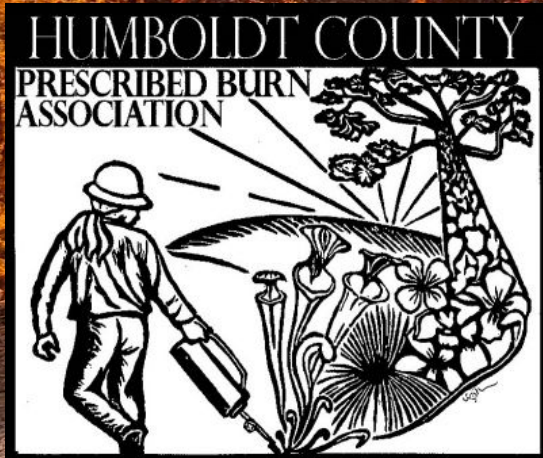


Firelighter Training

Basics of the Fire Environment and Fire Operations

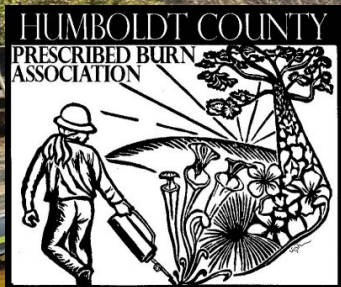


UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources

Fire Network



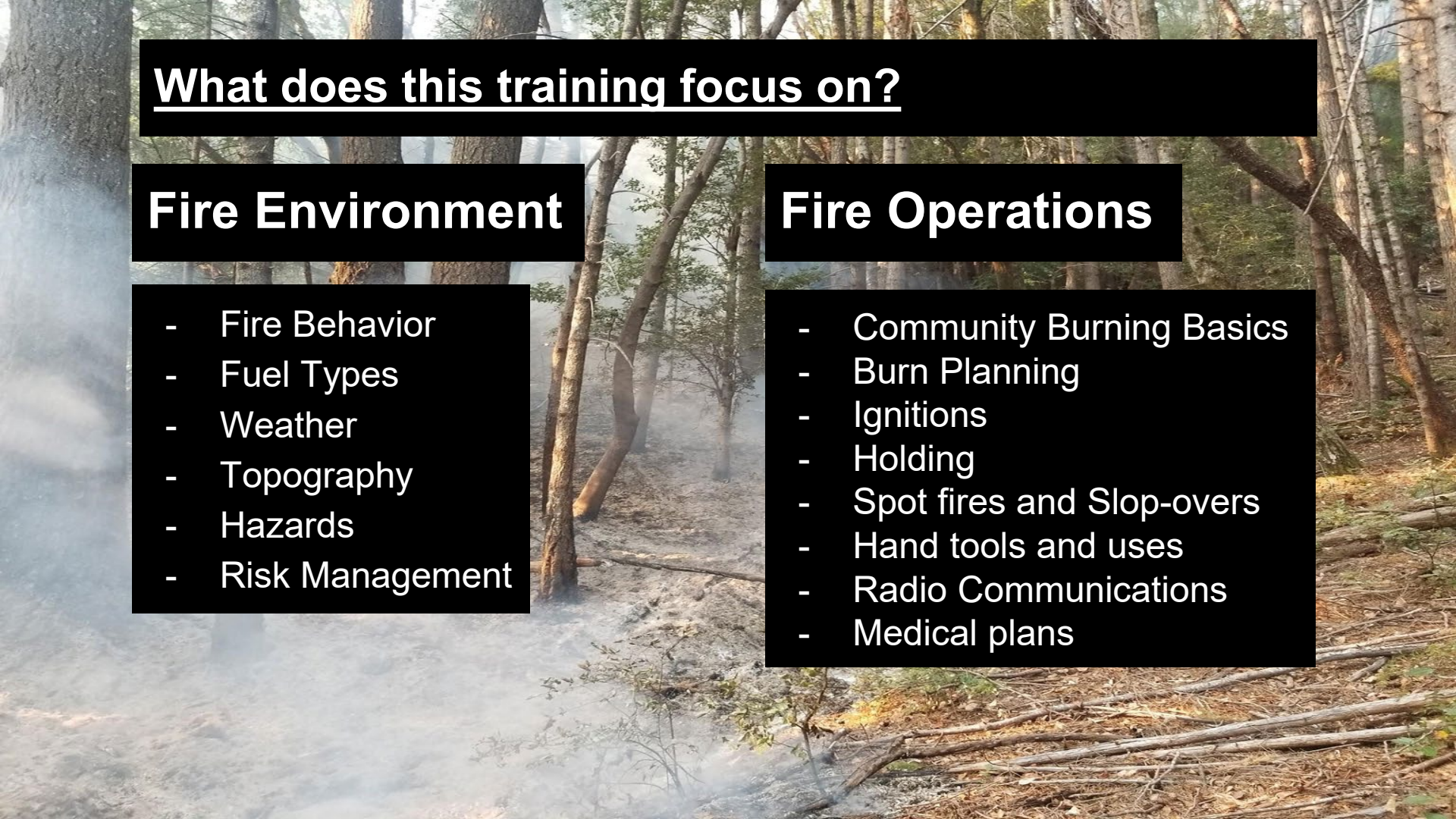
What is a Prescribed Burn Association?



Prescribed Burn Associations (PBAs) are community based, mutual aid networks that help private landowners and community members put “good fire” back on the land. While there are many things in common between PBAs, each one is different and there is no centralized “owner” of the PBA movement.

The Cal PBA website provides contact information for PBAs across the state and useful prescribed fire resources.

calpba.org



What does this training focus on?

Fire Environment

- Fire Behavior
- Fuel Types
- Weather
- Topography
- Hazards
- Risk Management

Fire Operations

- Community Burning Basics
- Burn Planning
- Ignitions
- Holding
- Spot fires and Slop-overs
- Hand tools and uses
- Radio Communications
- Medical plans

Fire 'Worlds'

Agency Fire

- Federal, State, Local Govs, Tribal Govs, Contractors, some Non-profits
- Public, Tribal, and some Private Lands
- NWCG, CICCIS, CAL FIRE
- Qualifications and extensive PPE required
- Issue 'Red Cards' or equivalent
- Government/Grant funded

Community Rx Fire

- PBA's, Non-profits, Volunteer Fire Depts, Tribal Organizations, Private Landowners
- Private Lands
- Qualifications not always required, experience based.
- Common Sense PPE
- Grassroots organizing and funding

Cultural Fire

- Planned and Lead by Cultural Fire Practitioners
- Cultural Objectives, Methods, and Meaning
- No formal burn plans, qualifications or PPE required
- SB 310

A photograph of a forest fire at night. The scene is dark, with the fire providing the primary light source. Bright orange and yellow flames are visible on the forest floor, with some smoke rising into the air. Several tall, dark tree trunks are silhouetted against the fire. A black rectangular box is centered over the image, containing white text.

Fire Environment

**Fire triangles, fire anatomy, and risk
management**

What is fire?

- Exists on multiple scales (spatially, temporally)
- **Fire** = heat, oxygen, and fuel
- **Fire Behavior** = weather, topography, and fuel
- **Fire Regimes** = Climate, ignitions, vegetation



The Anatomy of a Fire

Perimeter: Front, Flanks, Heel

Fire behavior: Heading, Flanking, Backing

Inside: Islands, Fingers, Pockets

Outside: Spot fires and Slop overs



The Anatomy of a Fire



Fire Behavior Terms

- Flame Length (inches, feet)
- Rate of Spread (distance/time)
- Ground Fire, Surface Fire, Crown Fire
- Smoldering, Creeping, Running
- Torching: Single Tree, Group, or Stand



Fire Behavior

Surface
Fire



Torching



Dead Fuel Classes

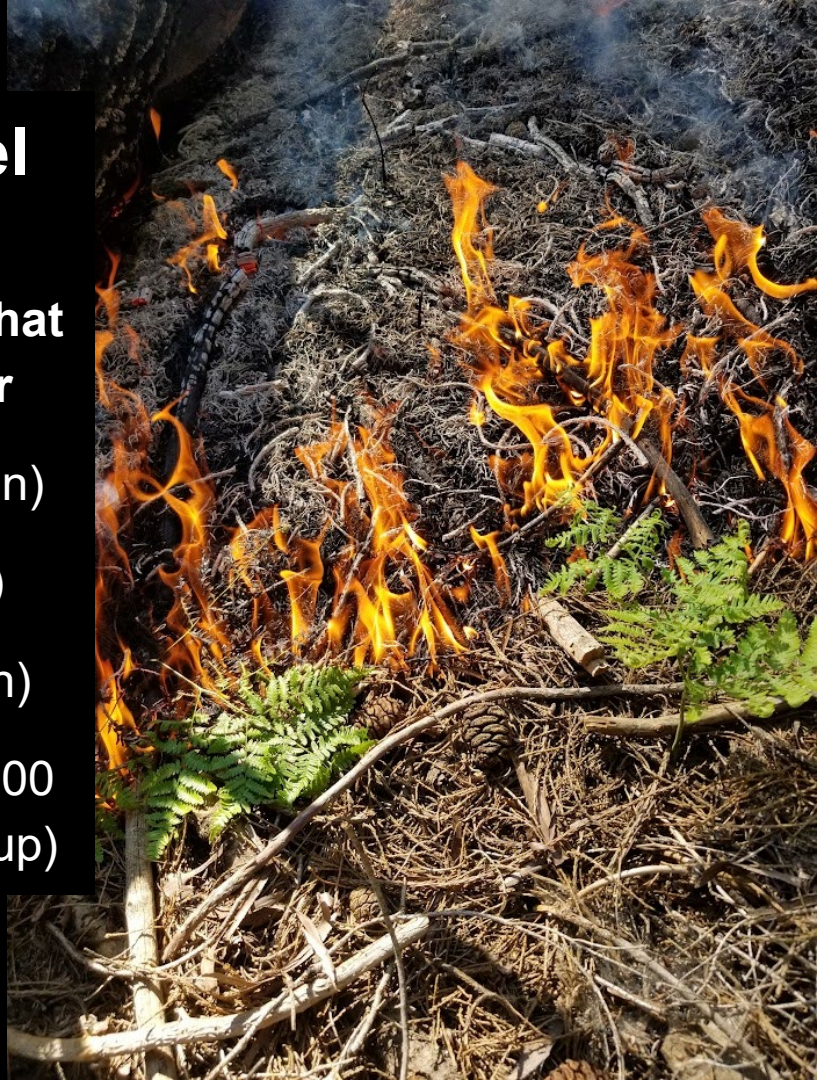
**1 hour - Less than
0.25in diameter**

10 hour (0.25-1in)

100 hour (1-3in)

1000 hour (3-8in)

“10,000-1,000,000
hour” (8in and up)





Dead Fuel Classes

1 hour - Less than
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Dead Fuel Classes

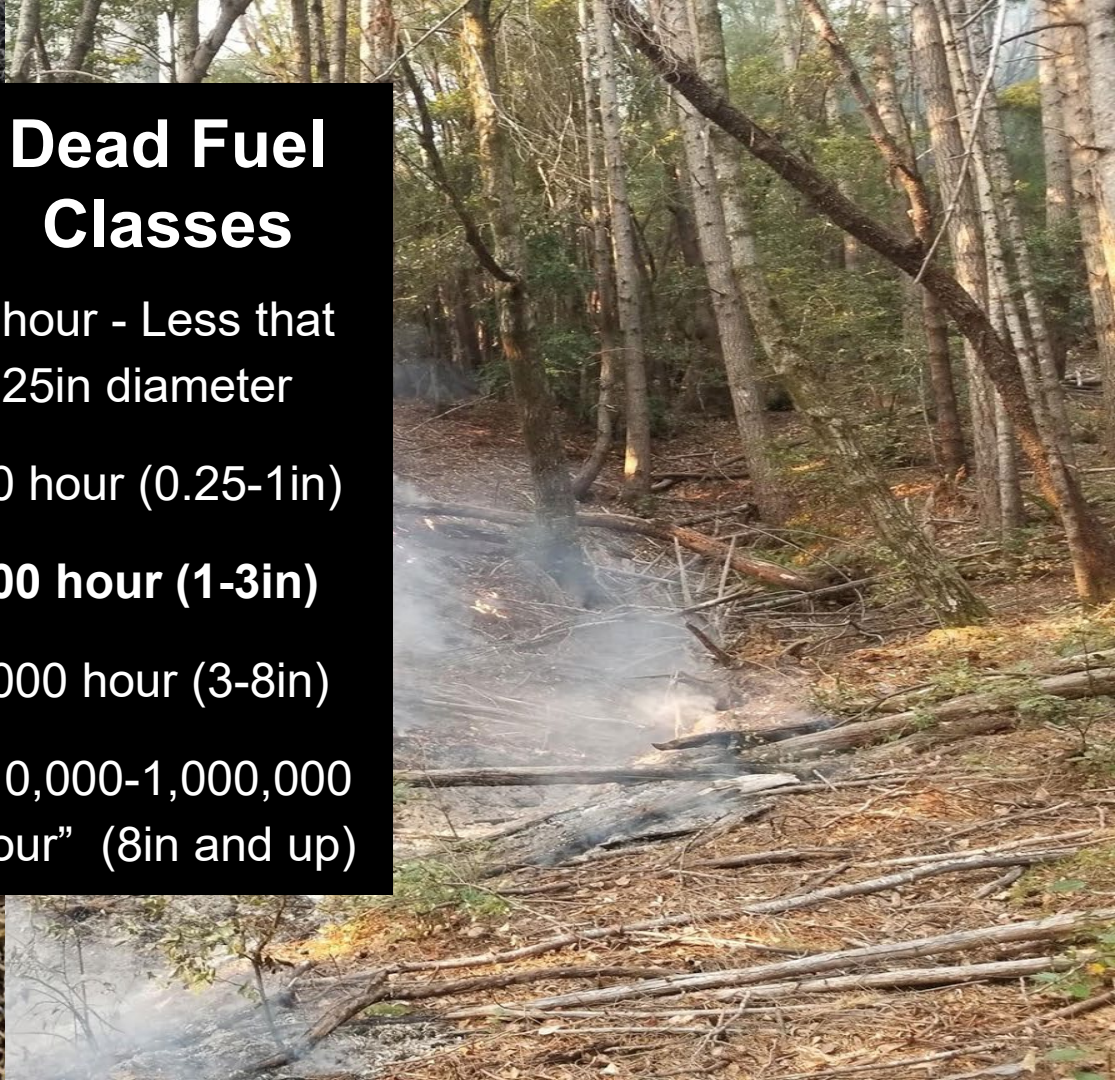
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Dead Fuel Classes

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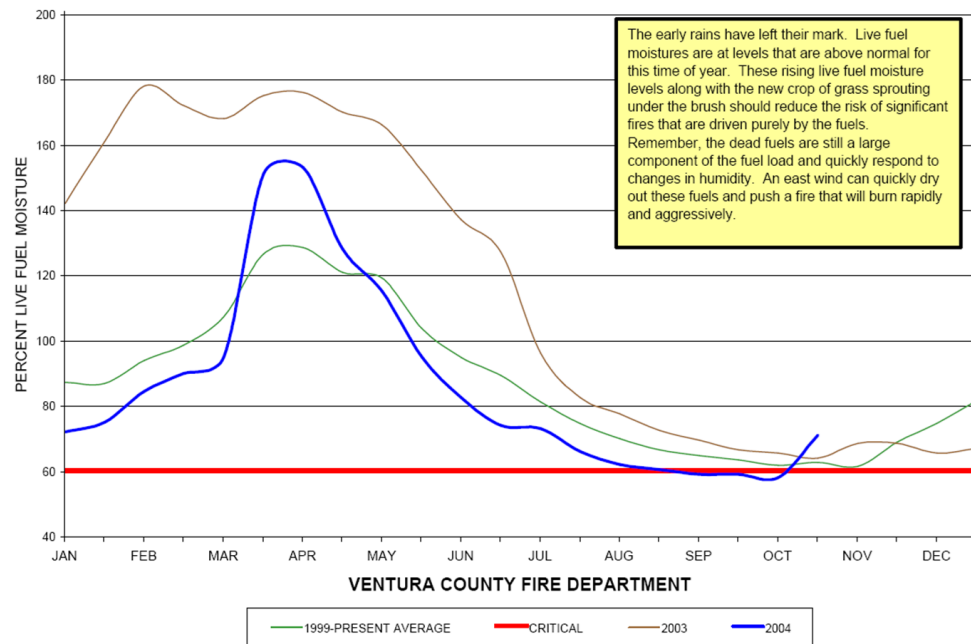
1000 hour (3-8in)

“10,000-1,000,000 hour”(8in and up)



Live Fuel Moisture

**LIVE FUEL MOISTURE 1999-2004
AVERAGE ALL AREAS - CHAMISE**



'Fuel Types' Grass



'Fuel Types' Shrub



'Fuel Types' Timber



'Fuel Types' Slash



Weather

-Temperature

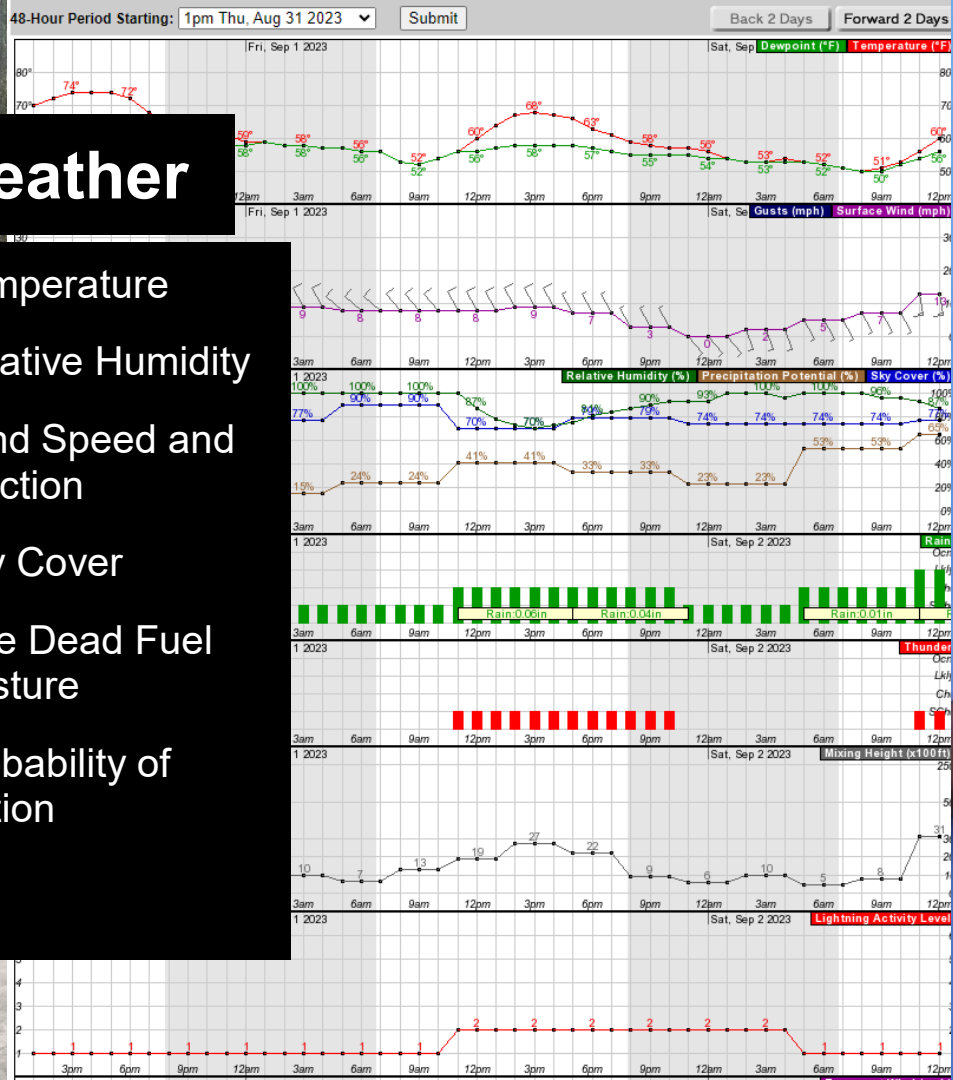
-Relative Humidity

-Wind Speed and Direction

-Sky Cover

-Fine Dead Fuel Moisture

-Probability of Ignition



KTREX SPOT Forecast

National Weather Service, Eureka, CA



Burn Location:	EMERSON
Forecast Issued:	Oct 10, 2022
Forecaster:	James White
Forecast Valid:	Oct 11, 2022

Weather Discussion:

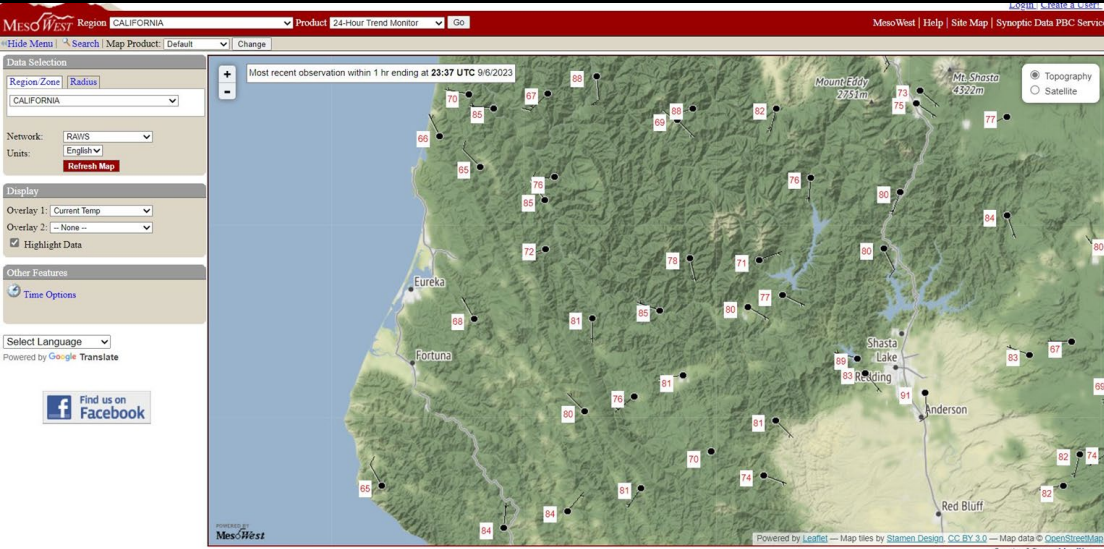
Northeast winds overnight will have disrupted the usual diurnal inversion, allowing for stronger winds and lower humidity in the morning than normal. Observations Monday night showed east winds 4-6 mph with gusts to 15 mph. Similar winds are expected to continue through the morning with speed starting to calm by mid afternoon. Temperatures will be slightly cooler than yesterday with highs in the low to mid 80s. Despite lower temperatures, conditions will remain dry with a minimum RH just below 20% late in the afternoon in direct sunlight. Calmer and more moist conditions are expected under canopy cover.

Today (Tuesday)	
Sky/Weather:	Sunny with few high clouds.
Max Temperature:	83 - 87 F
Relative Humidity:	60% late morning falling to 15-20% by mid/late afternoon.
Wind 20-foot:	Northeast 4-8 mph gusts 12-15 mph. Strongest late in the morning, decreasing by 1500.
Mixing Height:	1500-3500 feet.

Tonight (Tuesday night)	
Sky/Weather:	Clear with patchy valley fog possible.
Min Temperature:	52 - 56 F
Relative Humidity:	55-60%
Wind:	Light downvalley wind
Mixing Height:	100 feet.

Weather Reading Devices

- Belt Weather Kit
- Kestrel
- RAWS Station



Topography

Slope

Aspect

Position



Topographic Features

Chutes

Saddles

Knobs

Local
Examples?

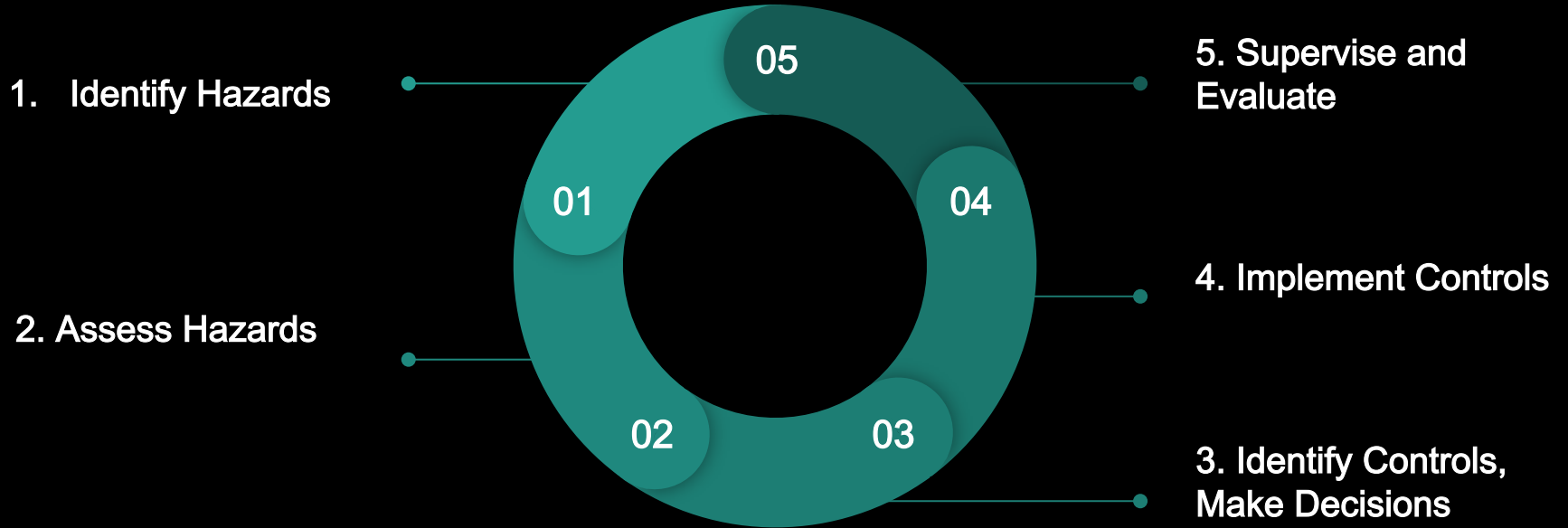
Slope
Reversal



Hazards - Identifying and Managing Risk - Situational Awareness



Risk Management Process



Hazards



Hazards



Hazards



Hazards



A photograph of a forest fire. Thick white smoke rises from the ground and around the base of several trees. The ground is covered in dry leaves and fallen branches. The trees are mostly thin, with some larger ones in the background. The overall scene is hazy due to the smoke.

Rx Fire Planning, Phases, and Accountability

Burn Plans

Goals and Objectives

- S.M.A.R.T (specific, measurable, attainable, relevant, and time bound)

Prescription

IAP - Incident Action Plan

Project Name: Humboldt County Private Lands Prescribed Burning

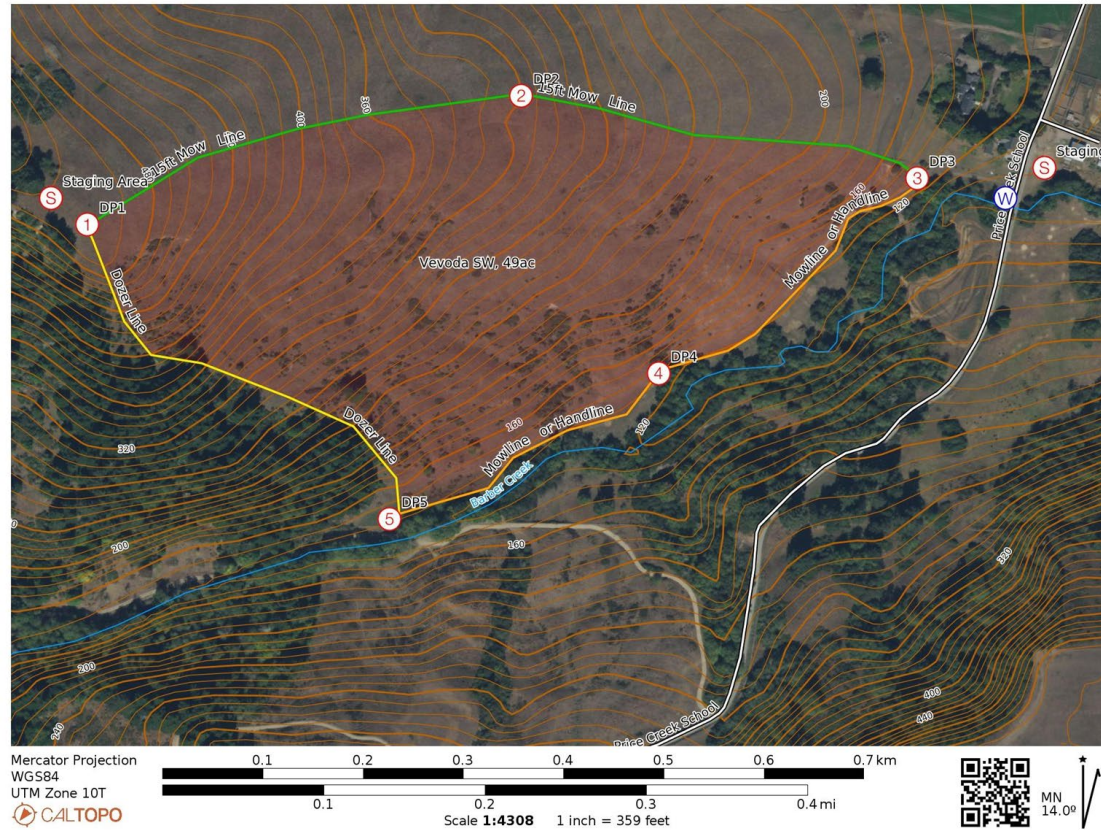
ELEMENT 7: PRESCRIPTION

A. Environmental and Fire Behavior Prescription for both units

	Low (cool) end	Desired	High (hot) end
FUEL MODELS (FBPS)	SH7/GR4	SH7/GR4	SH7/GR4
1 HR FUELS %	10	7	5
TEMPERATURE (F)	50	70	90
RELATIVE HUMIDITY %	40	30	20
20 FT WIND SPEED (mph)	10	10	10
20 FT WIND SPEED DIRECTION	Any	Any	Any
TRANSPORT W/S DIRECTION	10 mph/Any	10 mph/Any	10 mph/Any
MIXING HEIGHT (feet)	>500	>2000	>5000
PROBABILITY OF IGNITION (%)	30	50	70
DAYS SINCE RAIN	2	5	>7
AMOUNT (inches)	≤ 0.2	0.1	None
FIRING TECHNIQUE	Backing/Flanking/ Head	Backing/Flanking/ Head	Backing/Flanking/ Head
SLOPE (AVERAGE) %	25	25	25
FLAME LENGTH (ft)	7 - backing 8 - flanking 8 -head	10 - backing 11 - flanking 11 -head	11- backing 11 - flanking 12 -head
RATE OF SPREAD (chs/hr)	13 - backing 15 - flanking 17 -head	18 - backing 21 - flanking 23 -head	19 - backing 22 - flanking 24 -head

Rx Unit Layout

Holding features, firing and holding plans.



Phases of a Prescribed Fire

1. Planning (months-years)
2. Preparation (weeks-months)
3. Ignitions (hours-days)
4. Burn-down (hours-days)
5. Securing (days-weeks)
6. Patrol (days-months)
7. Declared out (3 days no heat, no smoke)



Community Prescribed Fire Basics

Personal Protective Equipment (PPE)

- Leather Shoes
- Leather Gloves
- Natural Fiber or FR Clothing
 - cotton, wool, nomex, etc.
- Long Sleeves and Pants
- Hat, or Hard Hat in Timber
- Eye Protection
- 2L Water Minimum
- Pocket Snacks



What to Expect

- Long work days
- Hot, sooty, smokey, and muddy work
- No structured breaks (rest when you can)
- Expect the unexpected
- Expect to have **fun** (even if it's type 2)!

“We’re on the fire’s schedule now..”

Burner Expectations

- Arrive Hydrated, Healthy, Happy, and Helpful
- Bring required PPE and sufficient water
- Be accountable for yourself, your gear, and crew
- Occasionally assist with duties outside of burn day



Accountability

- Know who you work for
- Know who you work with
- Stay with your group, unless directed
- Communicate actively

AT ALL TIMES:

- Make sure your leader knows where you are
- Keep track of gear assigned to you

On ALL fires, **Accountability = Safety**



Time for Operations!



Incident Action Plan - IAP

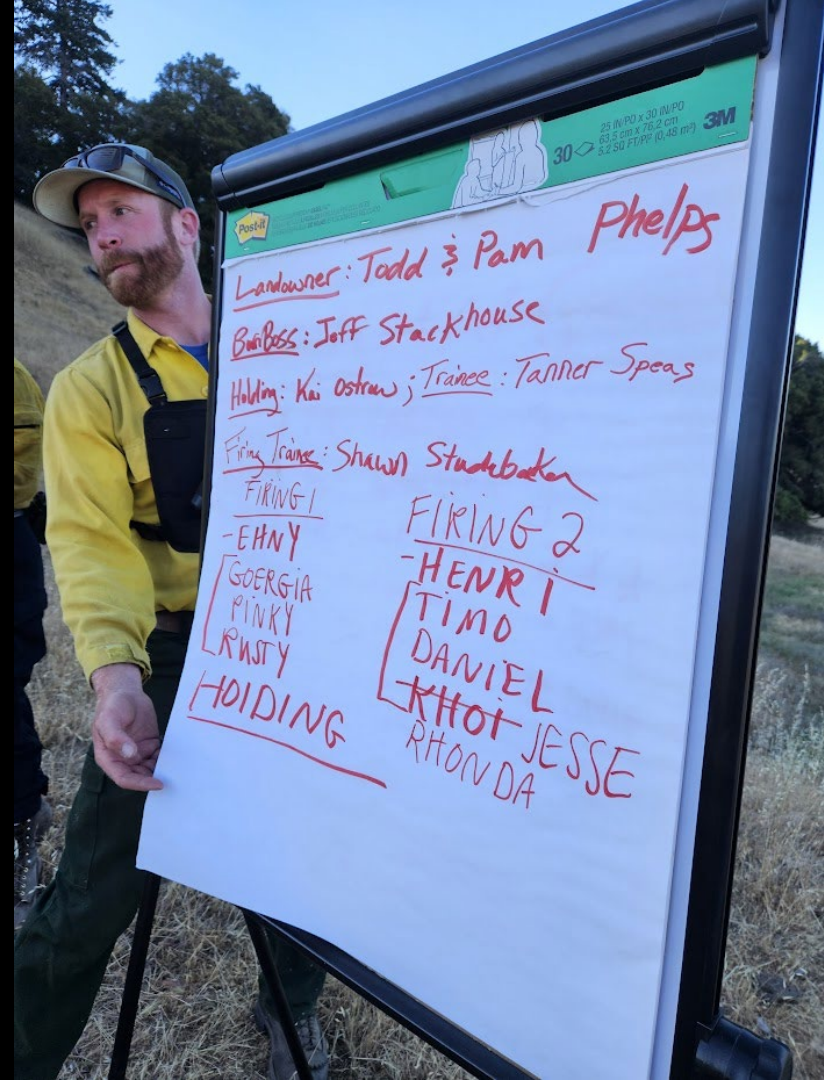
Free Rx - Pac Rim 1 and 2		IAP	3.29.2026
Landowner: Josh Free		Burn Boss: Henri Holbrook (CARX)	
Goals/Objectives			
- Reduce 1-hr fuels by 65-90%; 10-hour and 100-hr fuels 20-80 %; and 1000-hour fuels by 30-70% - Kill 30-90% of seedling and sapling Douglas-fir up to 3" DBH - Less than 20% mortality in mature trees over 16" DBH - Provide safe learning opportunities for all participants.			
Considerations:			
- Maintain situation awareness of other burners, weather conditions and hazards at all times. - Be aware of snags, stumps, logs and other rollout potential on the lower road. - Reduce fire intensity around legacy Douglas-fir trees and unstable slopes - Keep fire within the project area.			
Unit Specific Safety		General Safety	
- Watch for snags, dead tops, and limbs - Heavy Fuels and Old Trees, East Line Unit 1 - Be careful with Hot Drip Torches		- Watch footing, wear PPE - Stay Hydrated - Take breaks whenever needed	
Communications: -HCPBA Tac- (Channel 16) Freq: 159.72, Tx and Rx Guard: 151.4			
Wx Forecast:			
General Forecast: Sky/weather.....Partly Sunny CWR.....0 percent. Max temperature.....61f. Min humidity.....55 percent. Wind (20 ft).....North 9-13 mph gusts to 21 mph in the evening. Mixing height.....300-500 ft AGL Transport winds.....North 14 to 18 mph.		Spot Forecast: See Printed Spot Forecast	
Medical Plan			
Chris Gilda - Medical Unit Leader - Utilize 8-line - Follow PVFD Procedure - BLS Equipment on Agency Engines RED Trauma bag on back seat of PBA Green Dodge Truck If no fire agencies are on site, CALL 911!		Closest Cell Reception: DP1 40.89418, -123.80079 Closest LZ: Homestead Area 40.90133, -123.80404 Closest Hospital: St. Josephs Hospital 2330 Buhne St, Eureka, 95501 Travel (ground) 2.5hr Travel (air) 15 minutes	

Name	Apparatus	Crew #	Organization	Assignment	Notes
Henri Holbrook		1	PBA	CARX	
Ali Freelund		1	MRC	PIO	Project Lead
Joseph Sandoval		1	MRC	HOLB	EMT
Gabe Goff		5	PBA	FRIB	
Zoe Ziegler			RCD	Firing Team Leader	
Michelle Kunst			PBA	Firing	
Monika Richardson			PBA	Firing	
Aiden Fraley			PBA	Firing	
Chris Gilda		1	PVFD	Med Unit	EMT
Lindsey Holm		1	PBA	Lead FEMO	
Sarah Vroom		1	MRC	FEMO	
Coleman Colucci		1	PBA	FEMO	
Lars Samuels	E6549 (Type 6)	3	HVFD	Holding	
Brett Panta	E6646 (Type 6)	3	PVFD	Holding	
FC Conner Hartz	1262 (Type 3)	3	CAL FIRE	Holding	EMT
Josh Free	Free Type 3	3	Landowner	Holding	DP4 Pumping Platform
Artur G			MRC	Holding	
Amanda M			MRC	Holding	
Clarke Stevenson		5	PBA	Squad 1	
Jake Olson			PBA	Squad 1 Crew	Heavy Equipment Operator
Nathan Davidson			PBA	Squad 1 Crew	
Derek Sanford			MRC/PBA	Squad 1 Crew	
Jamie Ornelas			PBA	Squad 1 Crew	
Austin Smet			PBA	Squad 1 Crew	
Steve Knoble		5	CPH/PBA	Squad 2	
Josephine Kent			CPH/PBA	Squad 2 Crew	
Maguire Casey			CPH/PBA	Squad 2 Crew	
Sophia Tong			CPH/PBA	Squad 2 Crew	
Nate Beck			CPH/PBA	Squad 2 Crew	
Jacob McDaniel		6	PBA	Squad 3	
Christian Calinsky			PVFD/PBA	Squad 3 Trainee	
Nari Carmody			PVFD/PBA	Squad 3 Crew	EMT
Ryan Gilbert			CPH/PBA	Squad 3 Crew	
Daniel Orejon			PBA	Squad 3 Crew	
Bill Leach			MRC	Squad 3 Crew	
Ethan Carter		5	CPH/PBA	Squad 4	
Christina Cortez			MRC	Squad 4 Crew	
Tristan Fritsch			CPH/PBA	Squad 4 Crew	
Skyler Wigley			PBA	Squad 4 Crew	
Chloe Merry			CPH/PBA	Squad 4 Crew	
	Petrolia WT 666			Contingency	2 hrs
	PBA Pumper			Reserve	55gal slip-in
	MRC Pumper			Reserve	55gal slip-in

Firing Organization

Burn Boss (strategy) > Firing Boss (strategy/tactics) >
Firing Team Leader (tactics) > Igniter (implements tactics)

Mission: Utilize firing personnel, devices, patterns and techniques to ignite in a way that accomplishes unit goals and objectives.

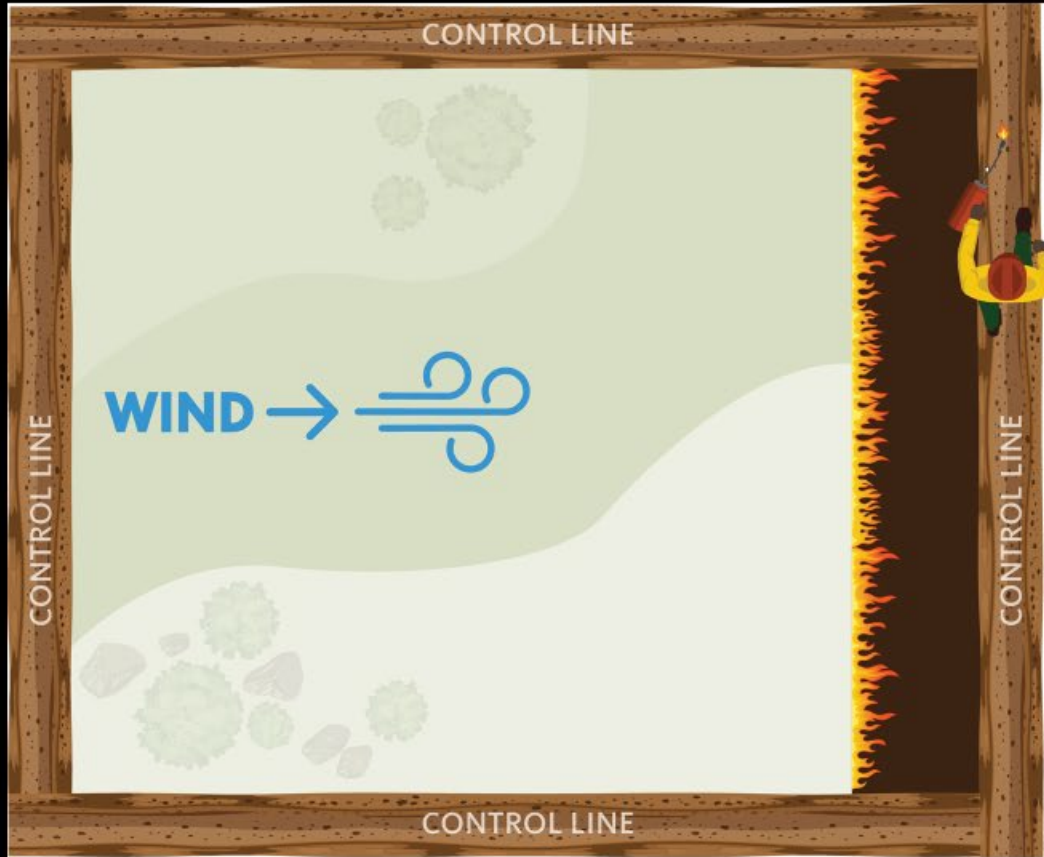


Firing Devices

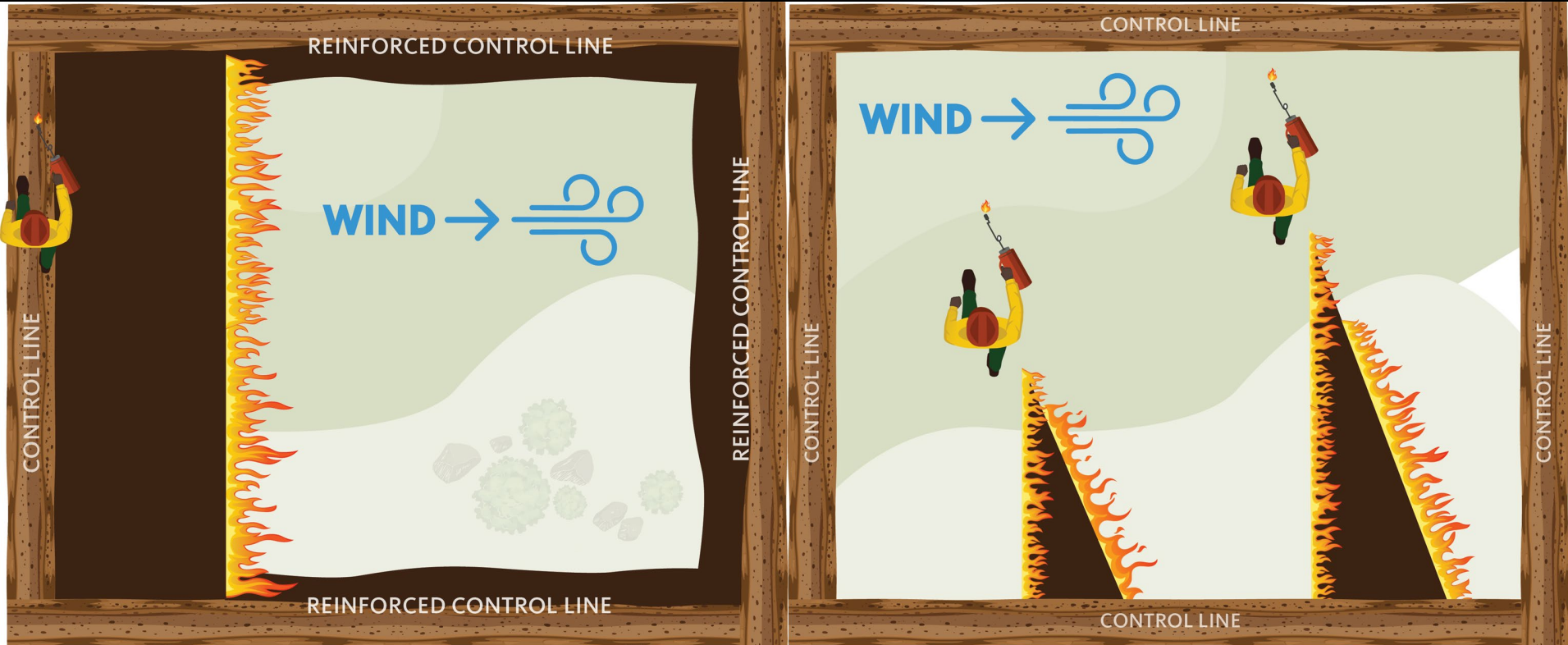
- Drip torch
- Propane torch
- Very pistol
- Fusee
- Stubbies (aka chubbies, chuckers, Flares, etc.)



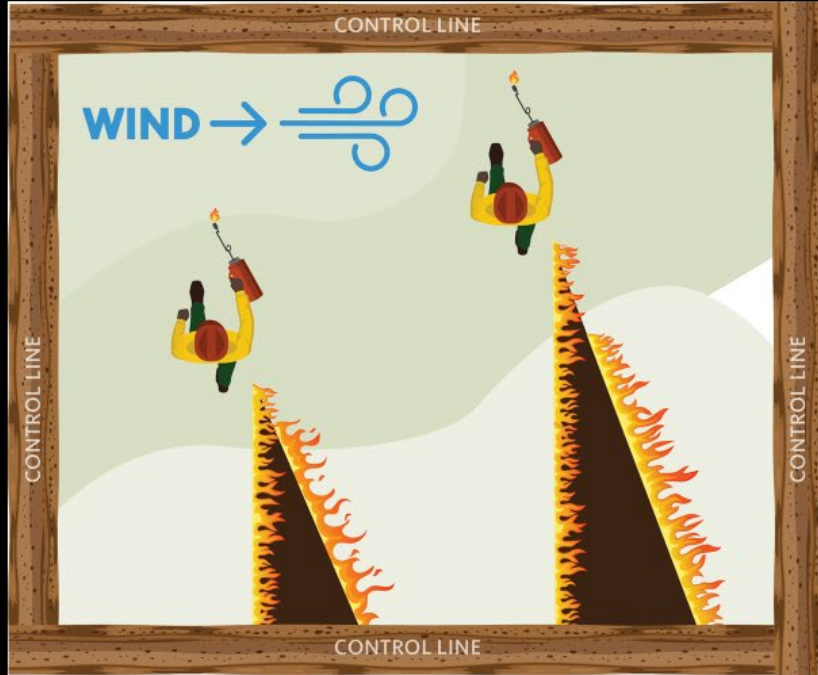
Firing Patterns - Backing or Black Lining



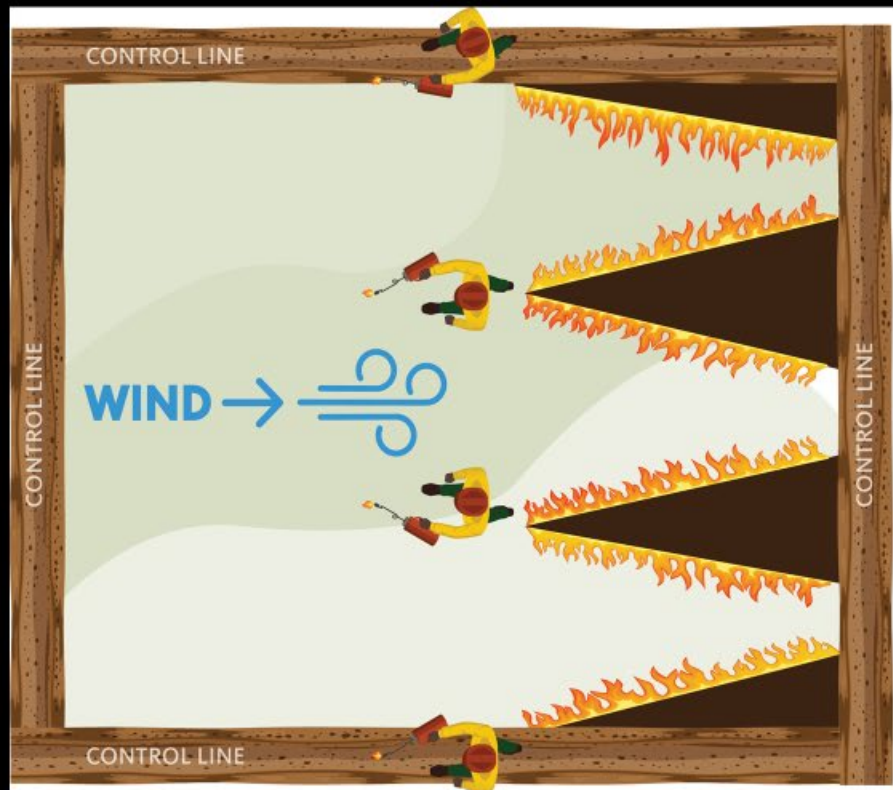
Firing Patterns - Head and Strip Head Firing



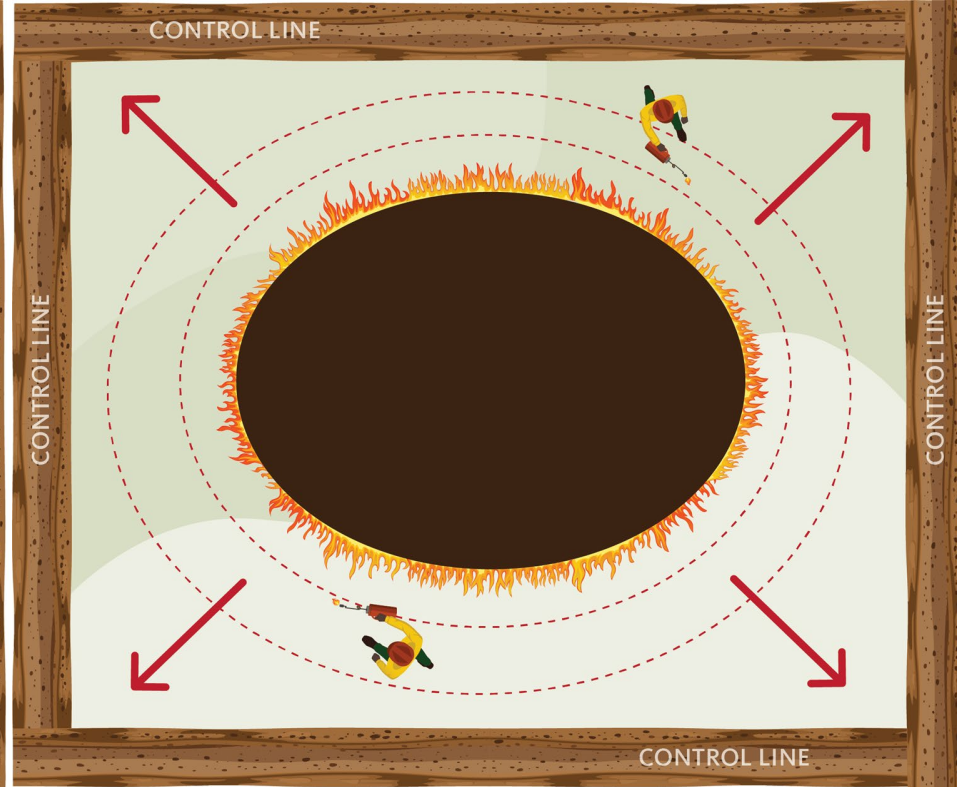
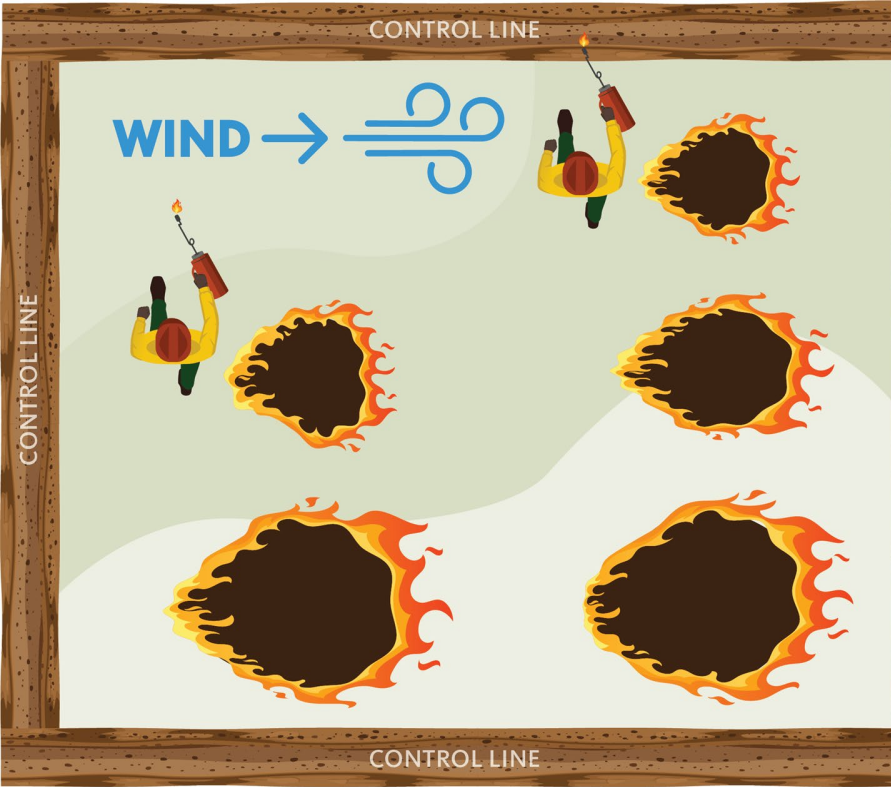
Firing Patterns - Head and Strip Head Firing



Firing Patterns - Flanking or 'Chevrons'



Firing Patterns - Dots and Rings



Firing Patterns - Dots and Rings

- Minimize intensity
- Protect values
- 'Hunt and Peck' or 'Seek and Destroy'



Firing Terminology

Spacing - distance between igniters/strips

Stagger - distance each ignitor lags behind each other

3-2-1 - Firing team formation (1 is always closest to the line)

Black lining - utilizing backing fires to reinforce or create a fireline

Depth - distance of black between control line and unburned fuels

Good Black - Burned area with no reburn potential

Dirty burn - Burned area with reburn potential

Patchy burn - Mix of burned and unburned within fire area

Bellies - pockets of unburned fuel encompassed by fire
(created by uneven ROS)

“Paint the corner”- (Jeff-ism) build depth in right angle corners before progressing



Torch Techniques

- Boxes
- Rings or half rings
- Zig-Zags
- The Flick'
- Dots



Firing Principals

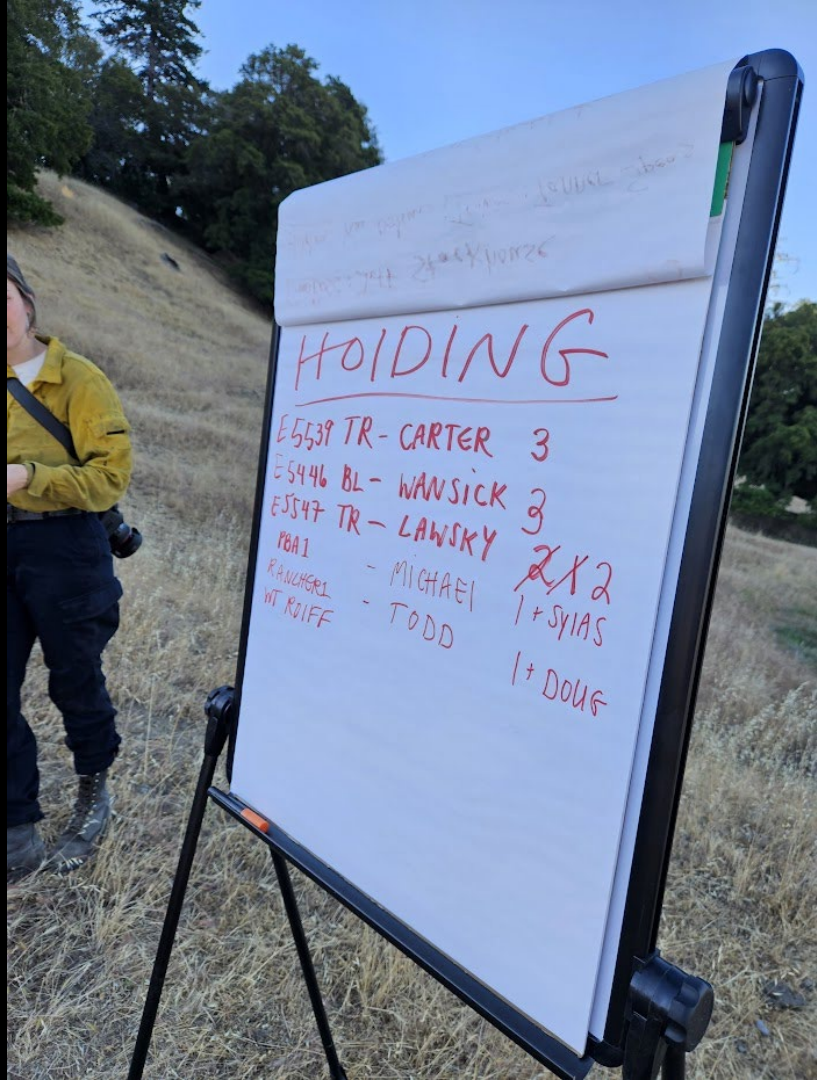
- Light as you walk. Pay attention to your path, then look back to evaluate behavior
- Ensure you have a path forward or path of escape before lighting
- Never light below or upwind of someone
- Never send head fire toward an unburned control line
- Keep edge fire ahead of interior fire
- Always tie in to existing black or control lines
- Practice good torch etiquette



Holding Organization

Burn Boss (strategy) > Holding Boss (strategy/tactics) >
Holding resources (Crews, Engines, Water Tenders, Heavy
Equipment, Aircraft)

Mission: Utilize resources not assigned to firing
or contingency to keep the fire within the control
lines.



Holding Tools

Cutting Tools - Removes vegetation
(Chainsaw, Brush Hook, Pulaski)

Grubbing Tools - Removes roots and
loosens dirt
(Pulaski, Rhino, Hoe)

Scraping Tools - moves loose material out
of the line
(Hoe, Mcleod, Shovel)



Holding Principals

- Eyes on the Green!
(Especially when smoke is blowing over the line)
- Stay active and alert.
(You're not needed until you're very needed)
- Alert line supervisor to any holding concerns, issues or hazards.
- Mitigate holding concerns before they are ignited, when possible.
- Practice size-up reports, know how to describe your location.



Holding Resources

Hand Crews (Hotshot, Type 2IA, Type 2, Wildland Fire Module, Suppression Module)

Fire Engines (Types 3, 4, 5, 6, 7)

Water tenders (various tank sizes and capabilities)

Heavy Equipment (Type 1, 2 and 3 Dozers, Skidders, Feller Bunchers, Skidgeons)

Aircraft (Type 1 and 2 Helicopter, Tanker, LAT, VLAT)

Portable Tanks (Blivits, Bladders, Pumpkins, Fold-a-Tanks)



Spot Fire - An independent fire outside of the designated fire area (in the green).

Slop-over - A fire edge that crosses a control line.



Causes of Control Issues

- Embers blown across the line
- Snags / aerial dead wood
- Falling trees
- Rolling material
- Flare ups of unburned material near the line
- Roots
- Animals
- **Burner Error**



Spot Fires and Slop-overs

- Utilize chain of command
- Give good size up to supervisor
 - **Where am I, what do I have, what do I need**
 - Fire size up: **Size, ROS, fuel type, behavior, cause, hazards**
- Do not engage until properly briefed
- Knock down flames with water or hand tools, if possible, then construct direct line.
- Anchor and flank



Firefighting SOP's and SOG's

- Maintain Situational Awareness
- “See Something, Say Something”
- LCES
- 10 Standard Fire Orders
- 18 Watch Out Situations



Firefighting SOP's and SOG's

Lookouts

Communications

Escape Routes

Safety Zones



Radio Communication

“Hello you, this is me” or “To: > From:”

Like addressing a letter.

Use identifiers, not names

(especially in a medical emergency)

Clear text - no codes

Clear and concise - think, press, talk

Command (repeater) and **Tactical** (talk-around) channels

In case of emergency, let supervisor know:

Where you are, what you have, and what you need



Incident Within an Incident (IWI)

Medical Plan (found in the IAP)

Steps:

- Take a deep breath
- Begin patient care
- Give accurate size-up to supervisor
(**Where you are, what you have, what you need**)
- Come up with transport plan

8-line (medical report to dispatch)

Or **CALL 911**



Final Thoughts

Work hard, have fun, stay hydrated
and learn something new every
day!



On to the fireline!

Station #1: Firing



Station #2: Holding



Station #3:
Weather/Radios

