Prescribed Fire in CA: Bottlenecks and Opportunities

Jeff Stackhouse, Lenya Quinn-Davidson, and Josh Davy
University of California Cooperative Extension

Permitted ranch burning in CA 1945-1977

200,000 acres!

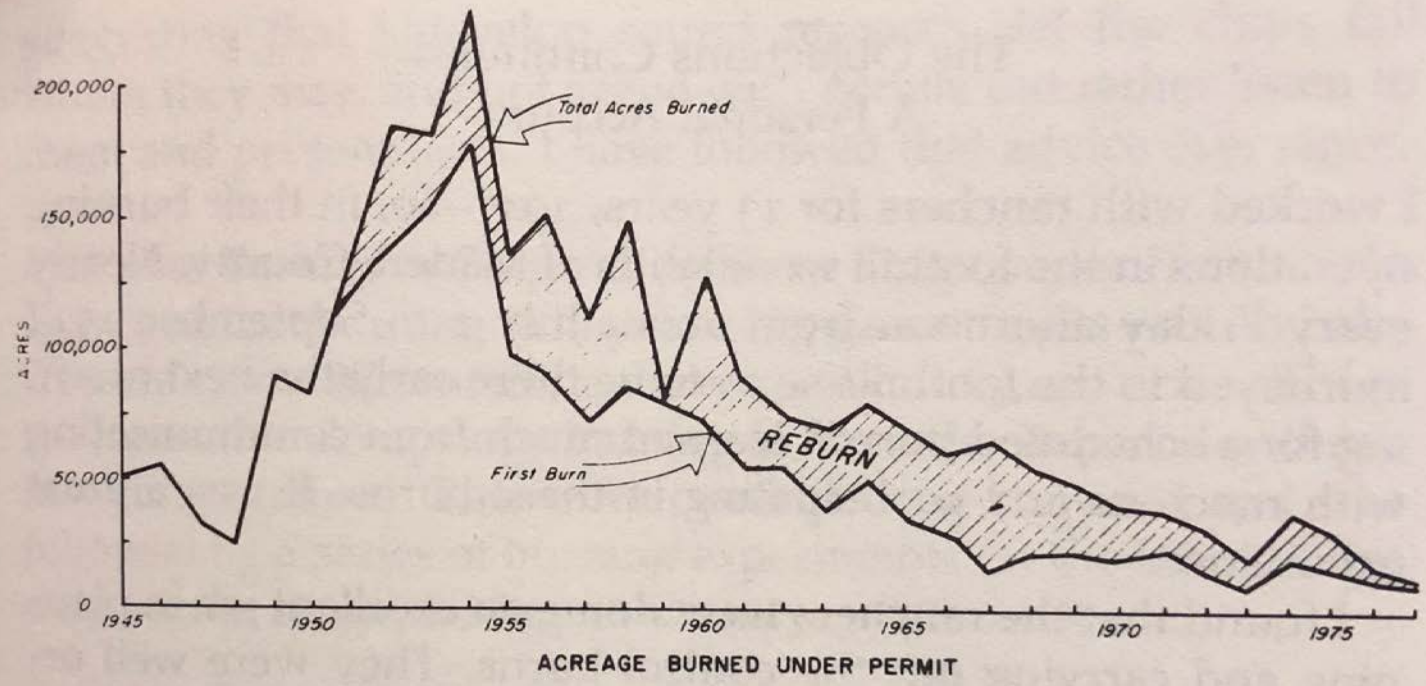
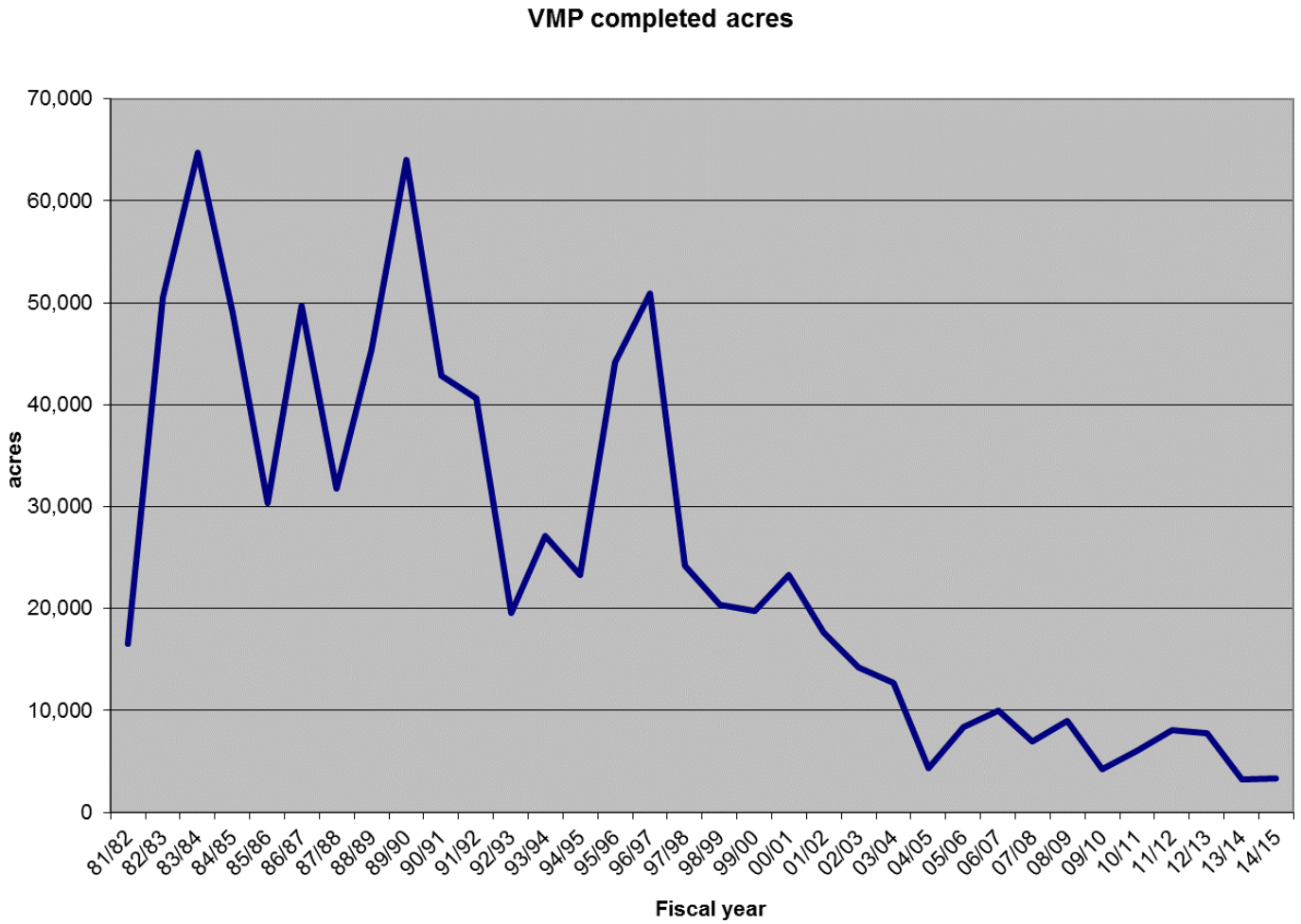


Figure 41. *Acreage burned by California ranchers under permit from 1945 to 1977 to reduce fire hazard and improve grazing for livestock and wildlife. (Graph from the California Department of Forestry.)*

**From Biswell 1999*

CAL FIRE private lands prescribed fire acres, 1981-2015

65,000 acres at height of VMP



<10k acres/year in last 15 years

Options for private lands burning

VEGETATION MANAGEMENT PROGRAM (VMP)

Pros

- Liability covered by CAL FIRE
- Low cost
- Experienced crews/resources
- Permits/air quality covered

Cons

- Limited capacity
- Planning time/environmental compliance (CEQA)
- Not guaranteed
  - Timelines recently improved

Options for private lands burning

PRIVATE CONTRACTOR

Pros

- Contractor provides insurance
- Landowner sets expectations and timeframes
- Experienced crews/resources
- Permits/air quality covered
- No CEQA

Cons

- Cost!!

Options for private lands burning

DO IT YOURSELF

Pros

- You're in charge—do it when and how you want
- Low cost
- No CEQA

Cons

- Liability
- People power/resources
- Permits/air quality

Options for private lands burning

PRESCRIBED BURN ASSOCIATION (PBA)

Pros

- You're in charge—do it when and how you want
- Low cost—volunteer based
- Equipment/labor pooled
- PBA can apply for grants/funding
- Every burn is a training opportunity
- No CEQA (No implementation grants…)

Cons

- Liability (You can hire a burn boss with insurance)
- Permits/air quality
- Someone has to coordinate

Option	Cost to landowner	Success rate
CALFIRE: VMP	Very little…cost of lunch for crews, equipment time for prep	Variable
Private contractor	>$10k per day?	High
Do it yourself	Equipment time/labor	High (small scale only?)
PBA	Equipment time/labor *Optional: Burn plan + burn boss ($1.5-2k)*	High

Myth 1- Liability: “It’s just too risky”

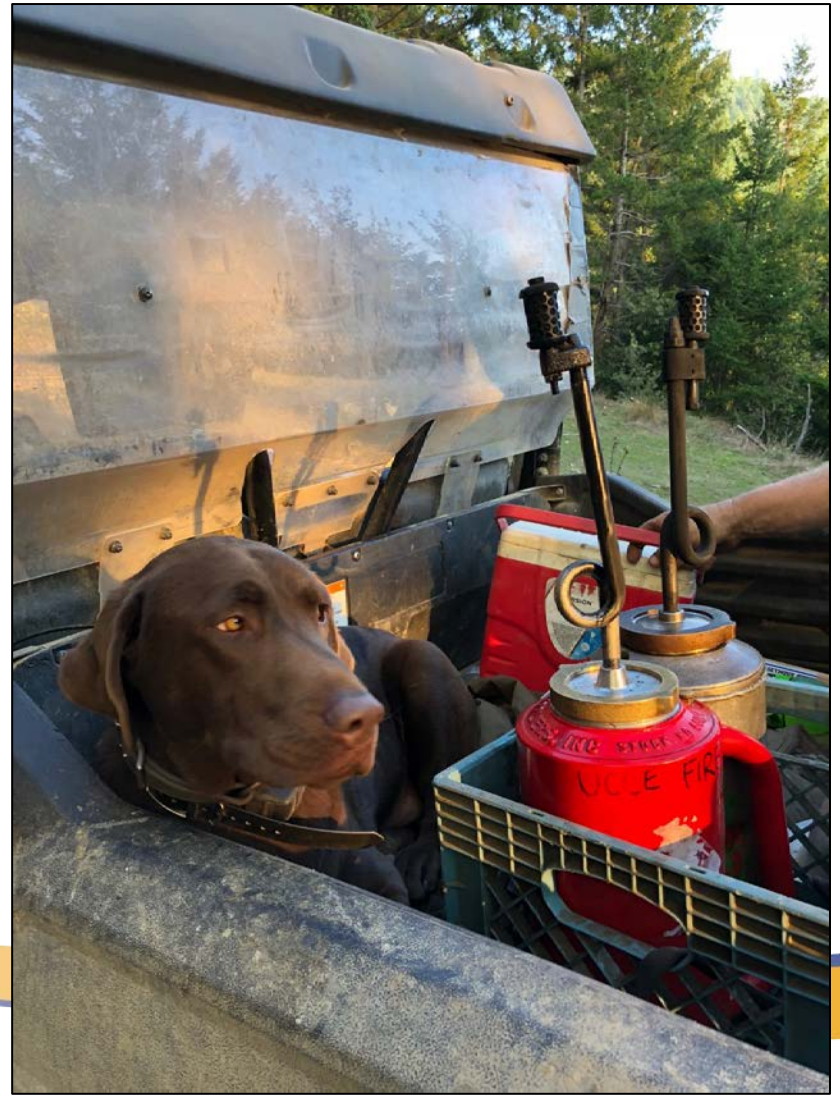
Mitigate liability:

- hire burn boss with insurance
- Rx fire often covered in farm insurance policies
- include neighbors in project planning
- start with small, simple units

Great Plains PBAs – 2015 survey

- 27 PBAs conducted **1,094 burns covering 472,235 acres** in 8 years *(430 acre avg.)*
- Only one official report of injury
- Escape rate of 1.5%, with no insurance claims or lawsuits

(Weir et al. 2015)



Myth 2- Permits: “Too much red tape”

Only **two permits** needed for Rx fire on private lands:

1. Year Round: air quality permit and smoke management plan (specifics vary by district)

2. ONLY During Fire Season (typically ~May 1-Oct. 31): CAL FIRE permit required

Myth 3- Population: “The public won’t support it”

- Studies consistently show >80-90% public approval rates across the country *(McCaffrey et al. 2015)*

Myth 4- Topography/Fuels/Houses: “California is too complex—it’s not like Nebraska or Texas”

- California has more open space and wildlands than many states where more burning happens
  - Florida has more Rx fire than any other state in the nation: ~2.5 million acres/year



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Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul

Natives & forage *Growth* *Senescence*

Medusahead, goatgrass, starthistle

Late Phenology Invasive

Typical Range Scientist view of Rx Fire:

Medusahead and Fire

Previous research:

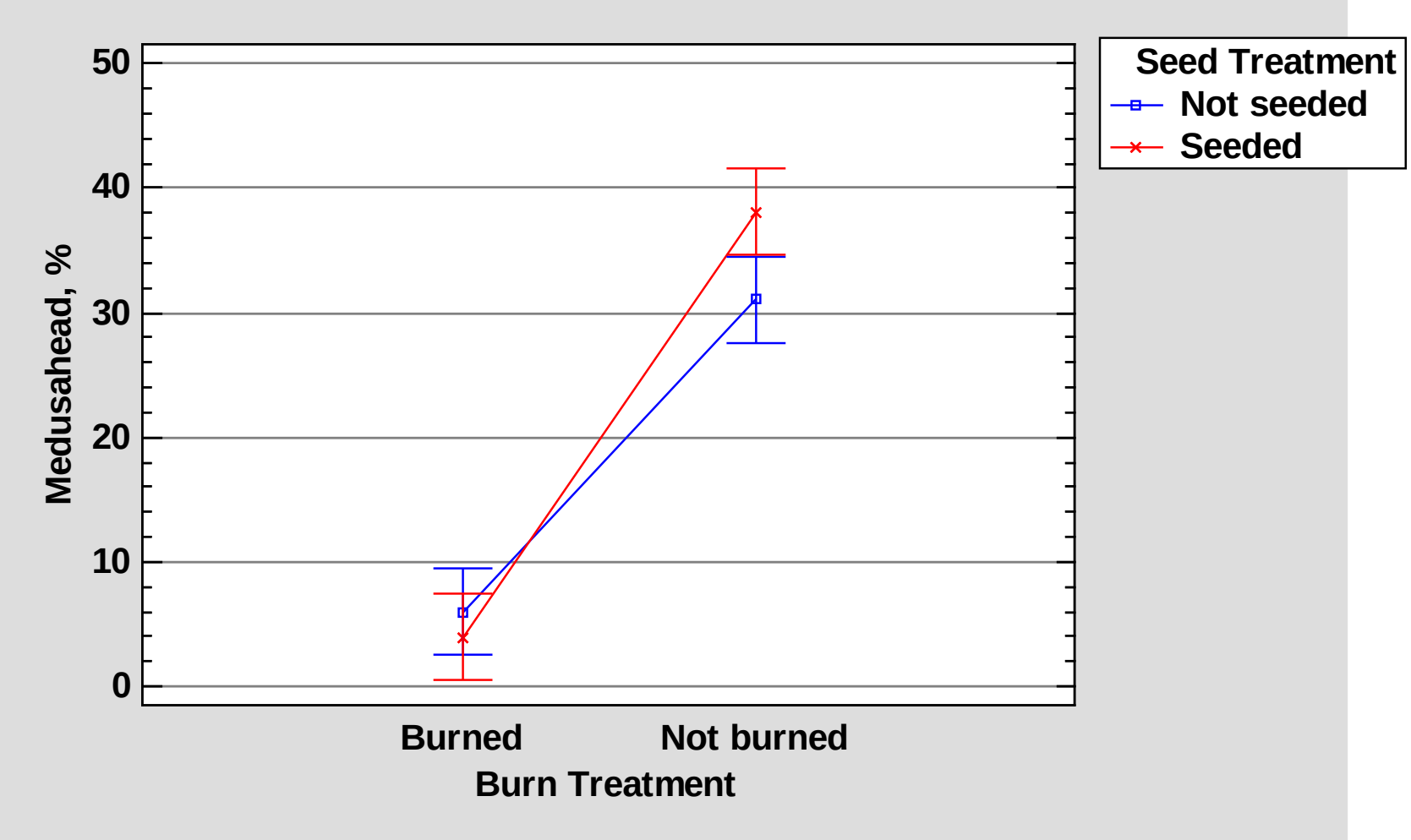
- Fire is effective at controlling medusahead, but timing is important
- Follow-up treatments needed after 3 years in Tehama County (Davy 2018)
- Size of project matters (Berleman et al. 2016)

UCCE Tehama/Humboldt: *How does site and seeding affect treatment?*

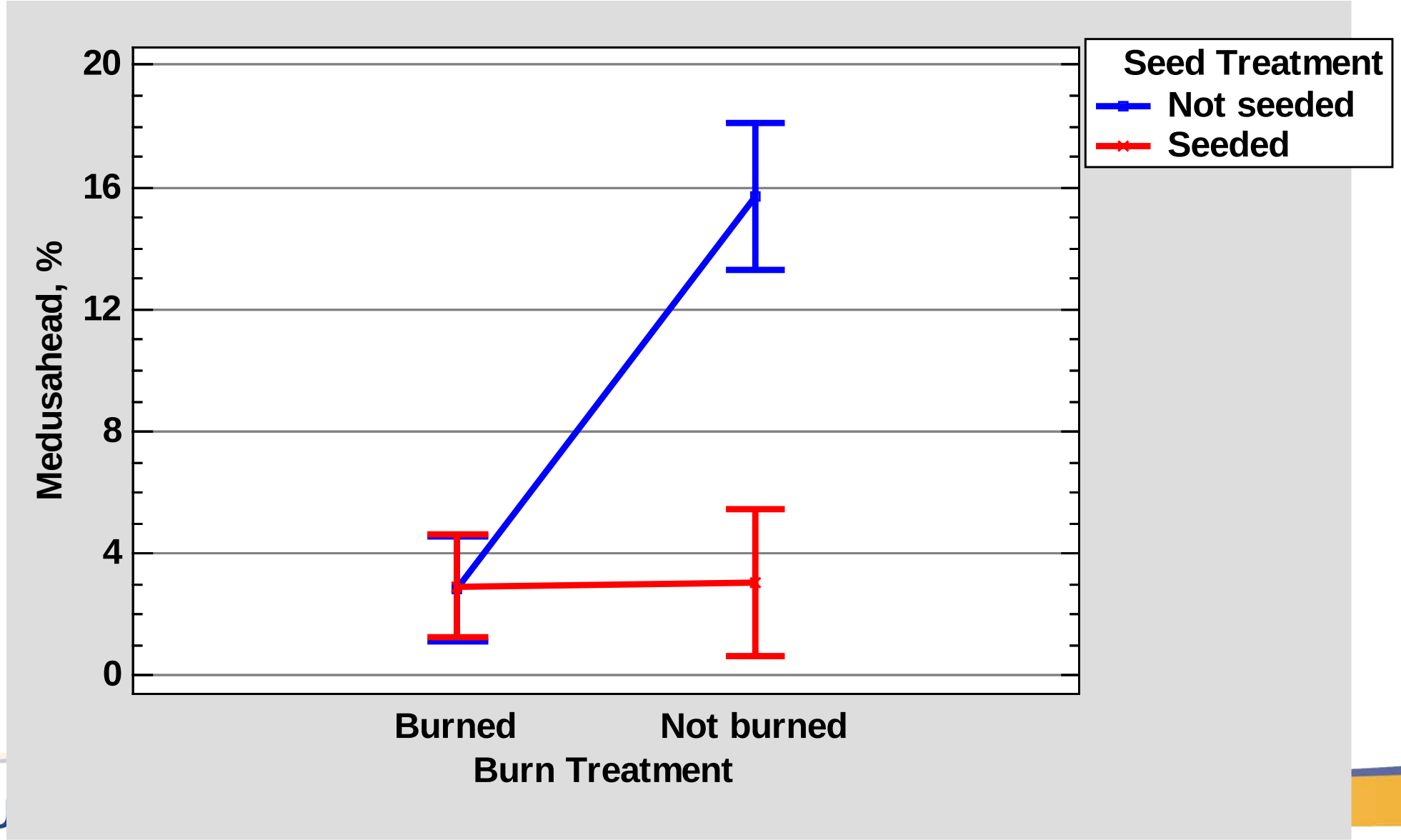
Sites in 2 counties:

- 200 ft permanent transects measured every 10 ft
  - Total cover using 1 m^2 frame
  - At the center of this frame a 1 sq ft frame was used for comparative yield
- Seeded half of the transects (Ann. Rye)
- Monitor cover prior to burn and annually after

Medusahead Cover 1 Year Post-Burn - **Humboldt**

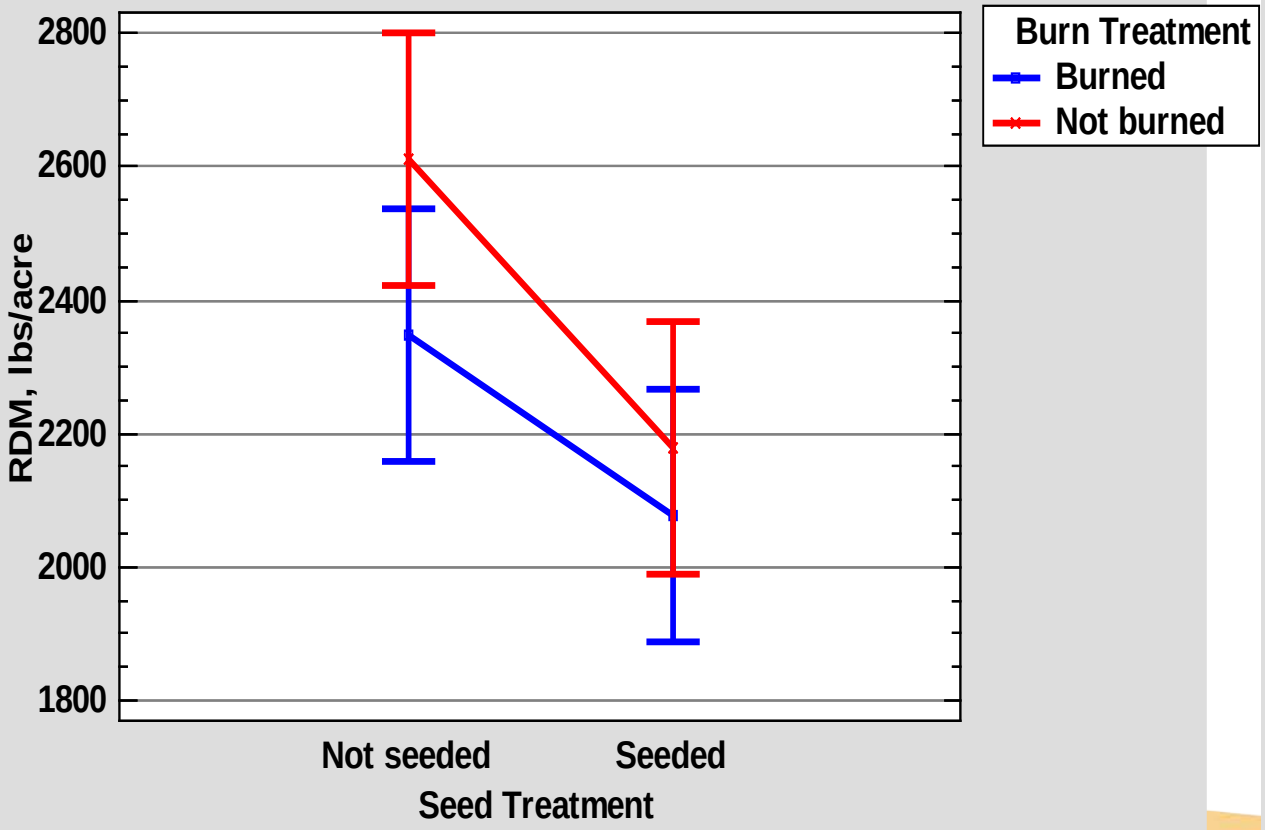


Medusahead Cover 1 Year Post-Burn - **Tehama**

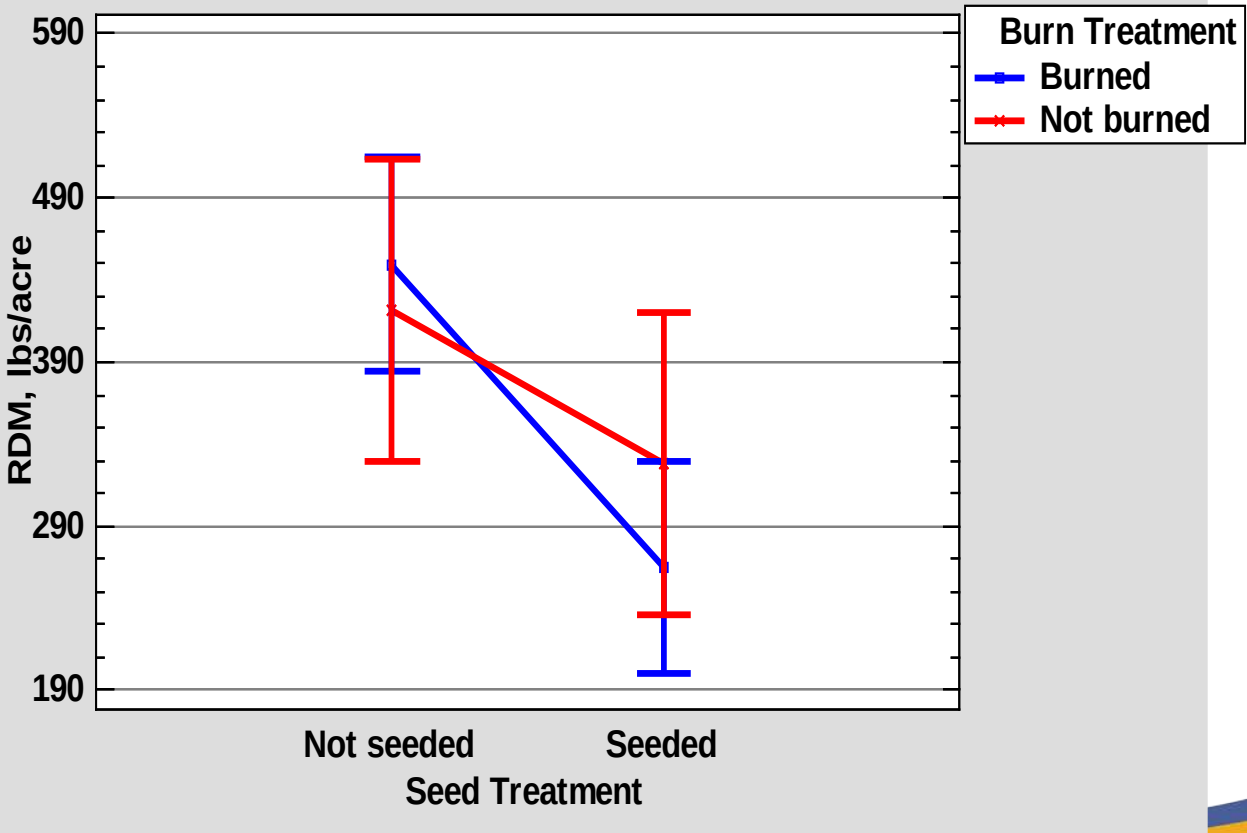


Lbs/acre 1 Year Post-Burn – Both Counties

Humboldt

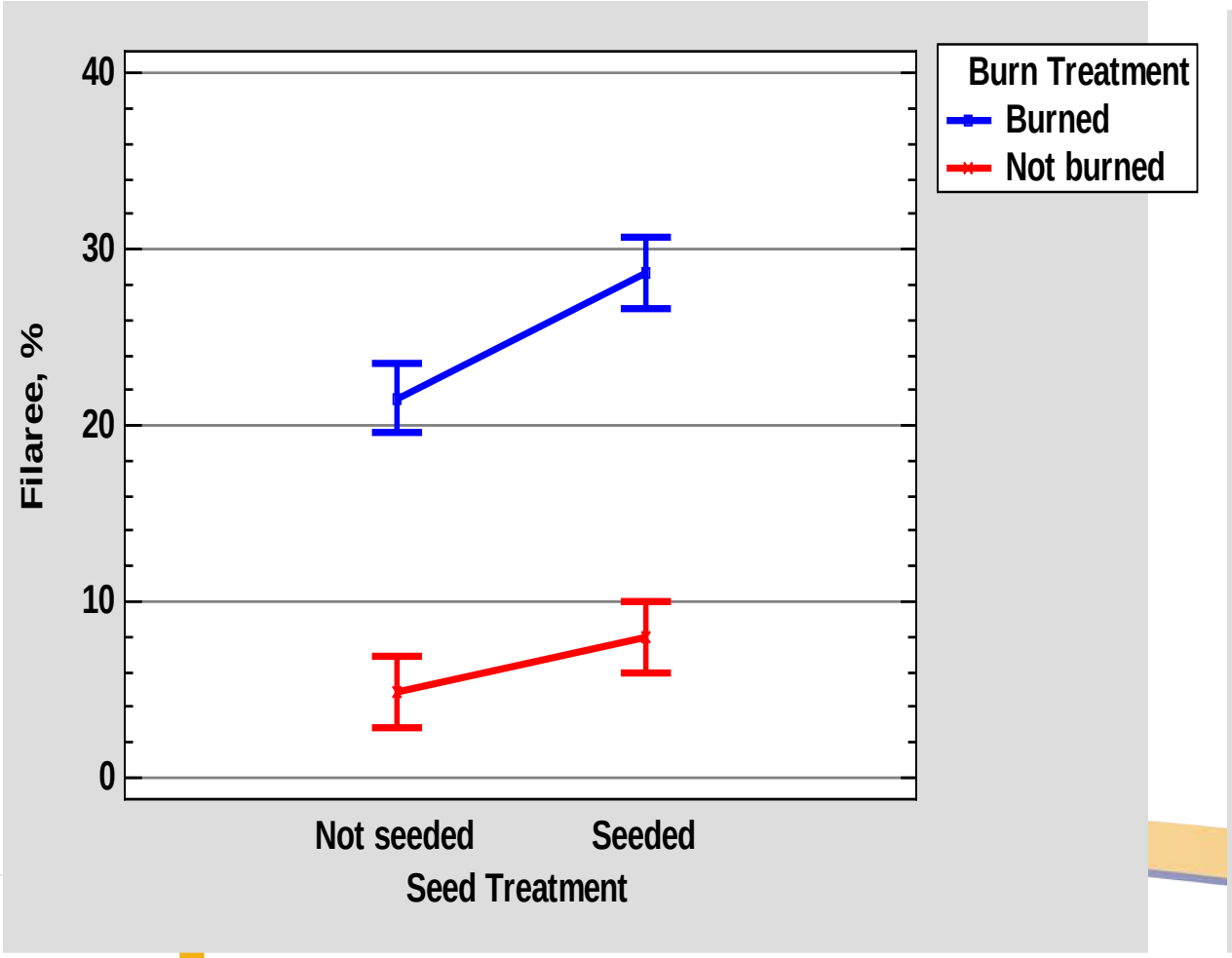


Tehama



Filaree 1 Year Post-Burn – Both Counties

Humboldt



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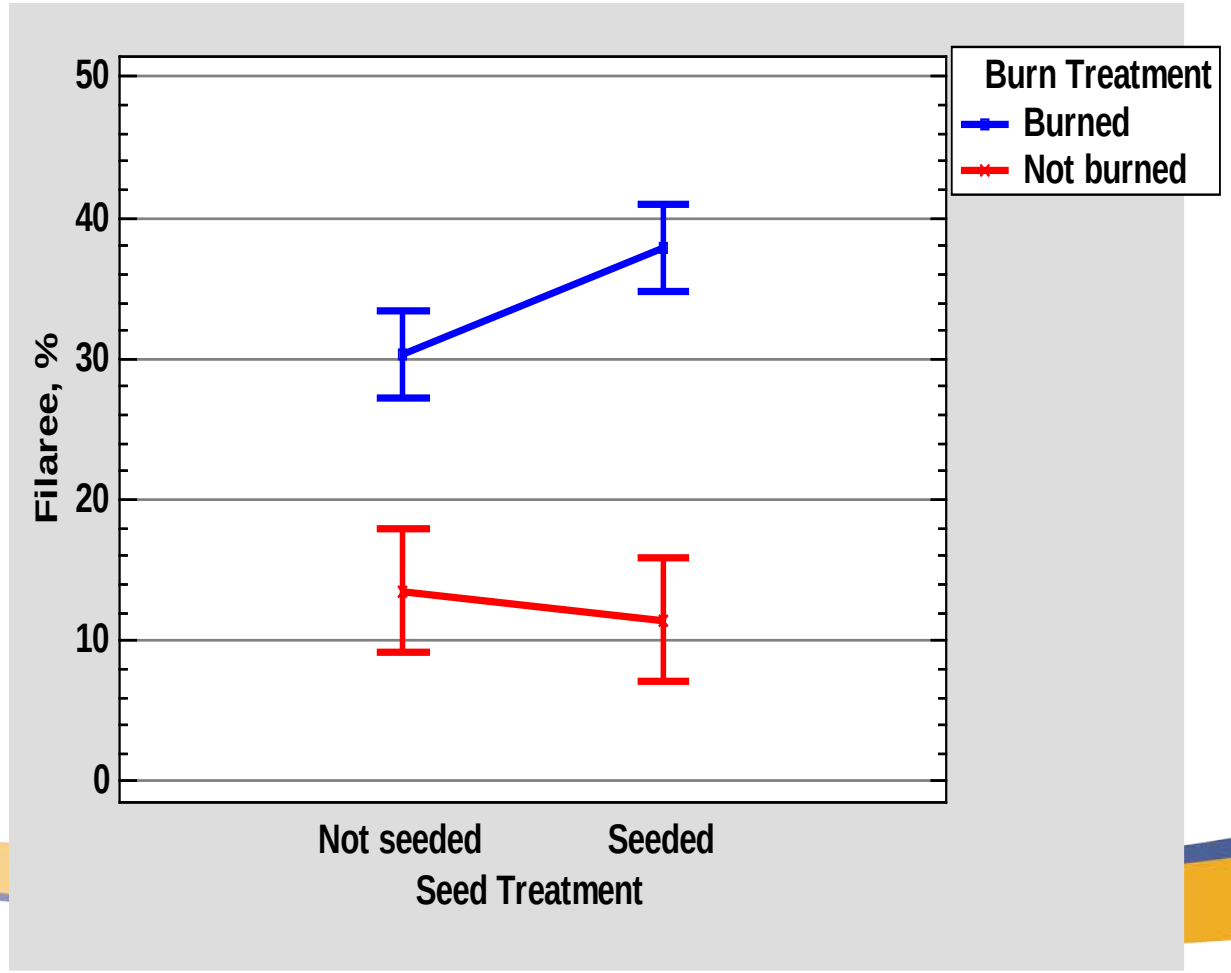
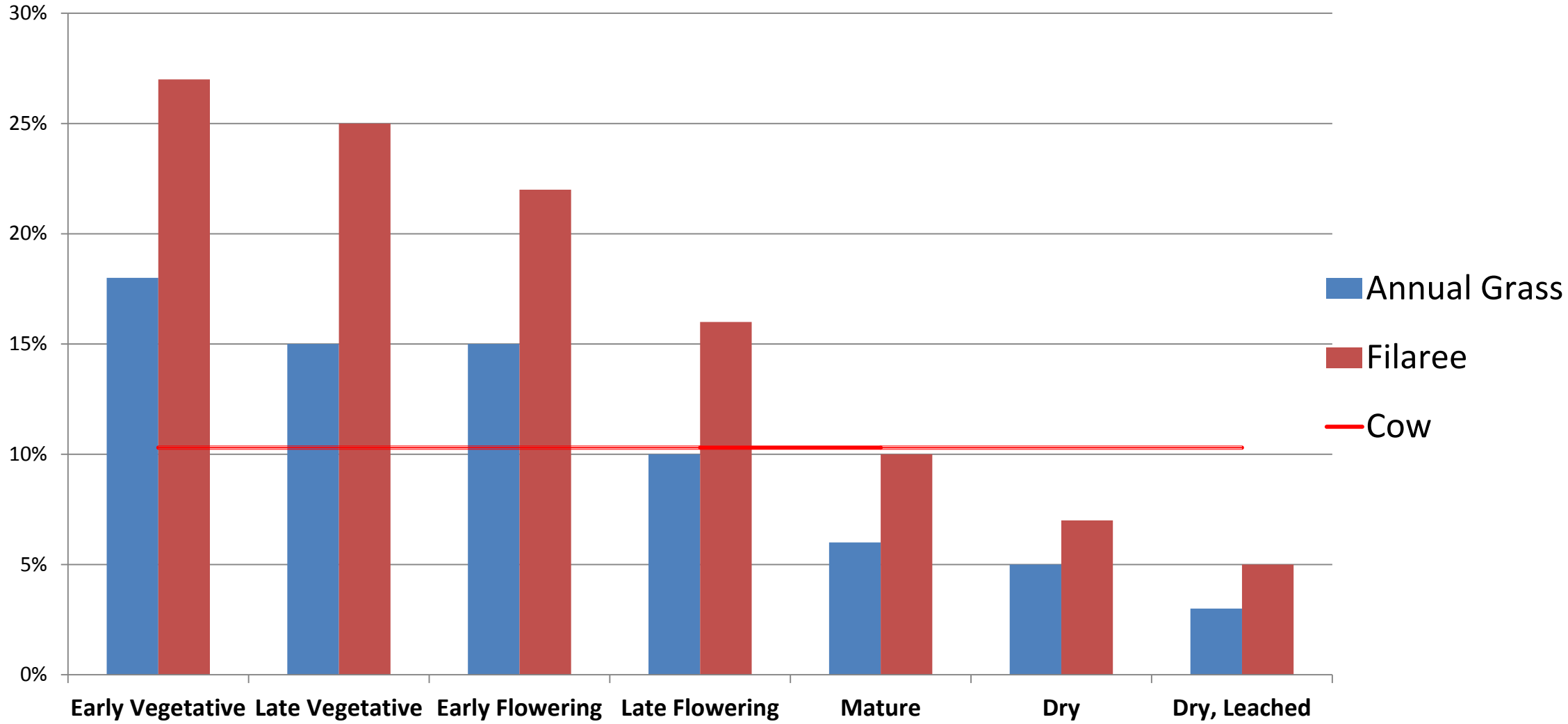


Cow Lactating 1st 90 days – % Crude Protein



Medusahead and Fire: Key Take-Aways

- Burning severely decreases medusahead in yr 1… duh.
- Seeding increases yr 1 consumption
- Site is important
- Deferment Not Required!
- Time will tell longevity…project to be continued.

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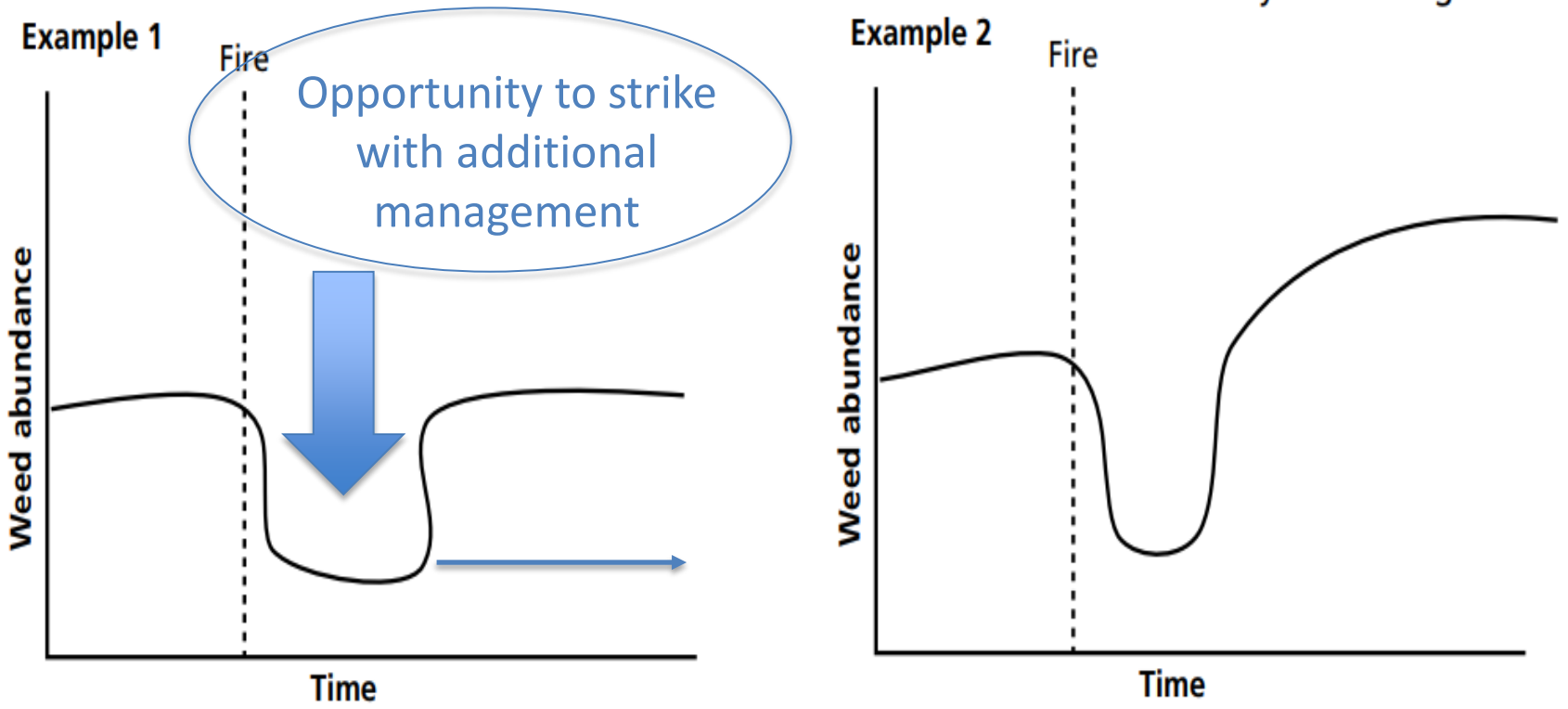
Most weed species require numerous treatments for control

Figure 2. B-type hypothetical weed response to fire. Examples 1 and 2 show species which undergo short-term decrease post-fire. Example 1 shows a species which then recovers to an abundance similar to pre-fire, while example 2 shows a species which continues to increase in abundance post-fire.

(B) Post-fire short-term decrease (control opportunity):
weakened in the short-term abundance will remain the same or increase slowly in the longer term



Goatgrass: jointed, barbed, ovate

- Take-homes: It takes 2 years of burning to control goatgrass. . . But treatment tends to lasts longer than medusahead! (>3 yrs)
  - Year 2 with 100% burn = 100% control
  - Year 2 with 75% burn = 46% reduction vs cont.
    - Suggests: seeds do not live more than 2 years in soil.

    Other results:

    - *Total cover was decreased*
    - *Fire increased native species diversity and it too is long-term.*

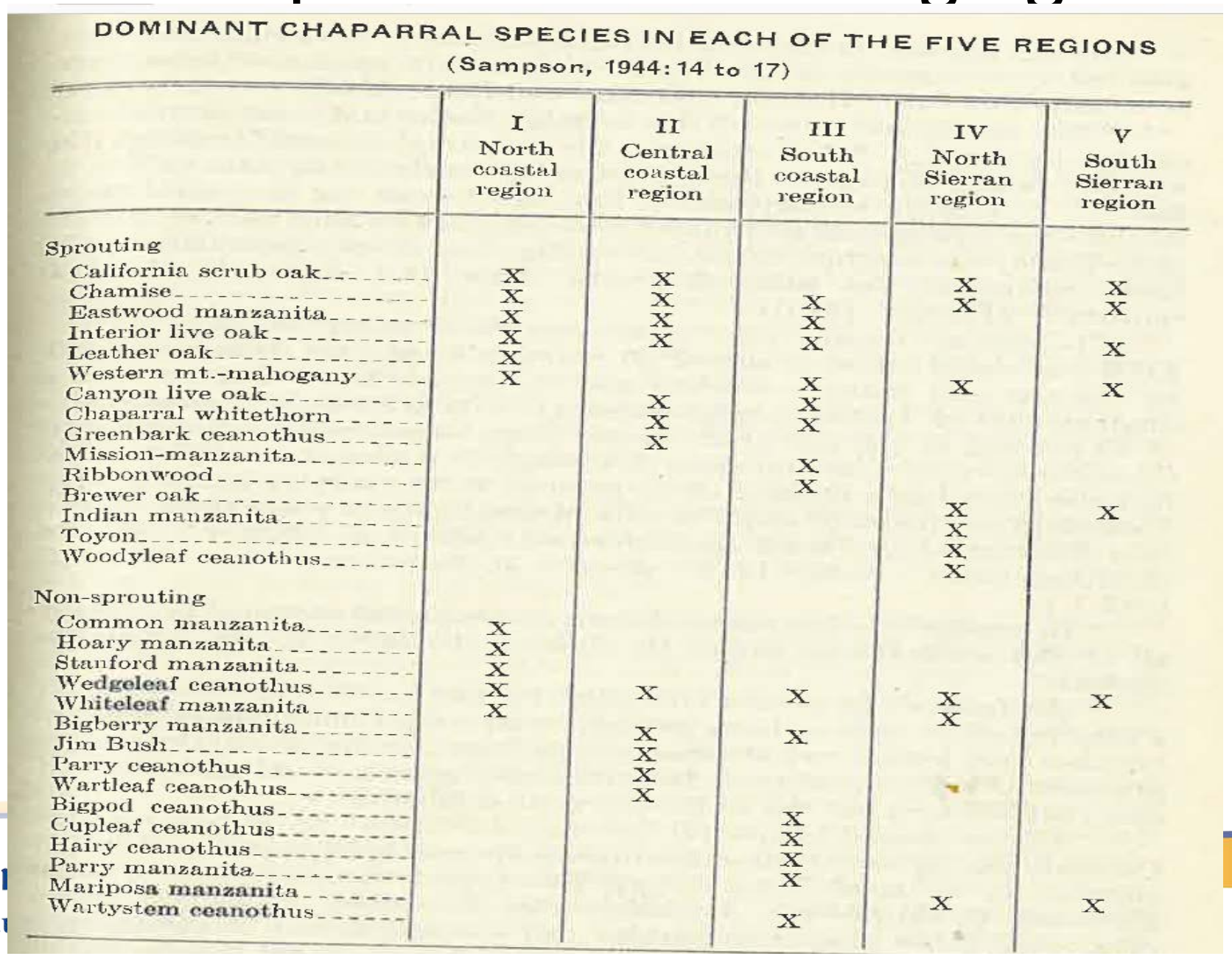
Yellow Starthistle (DiTomaso et al. 2006)

- Treatments: Recurring Burns, Transline/Burn, Burn/Transline, Transline/Transline, Control
  - **Best:** Year 1 = Burn; Year 2 = Transline (late winter/early spring)
    - Year one's burn stimulates germination of YST just to wipe them out with herbicide
      - Added benefit of forage yr 2!
- ***Take-home message: In a 2-3 year YST treatment program, the final treatment should not be a burn.
  - Spot-Spraying will be necessary for lifetimes to follow.

Fire for the rangeland ecosystem

- Ungulate forage value
- Increased forbs
- Pollinator response
- Fight against woody encroachment
- Healthy acorn crop
- Heterogeneity increases biodiversity
  - Can favor native plants!

Resprouts are challenging



DOMINANT CHAPARRAL SPECIES IN EACH OF THE FIVE REGIONS

(Sampson, 1944: 14 to 17)

	I North coastal region	II Central coastal region	III South coastal region	IV North Sierran region	V South Sierran region
Sprouting					
California scrub oak	X	X		X	X
Chamise	X	X	X	X	X
Eastwood manzanita	X	X	X		
Interior live oak	X	X	X		X
Leather oak	X				
Western mt.-mahogany	X		X	X	X
Canyon live oak		X	X		
Chaparral whitethorn		X	X		
Greenbark ceanothus		X			
Mission-manzanita			X		
Ribbonwood			X		
Brewer oak				X	X
Indian manzanita				X	
Toyon				X	
Woodyleaf ceanothus				X	
Non-sprouting					
Common manzanita	X				
Hoary manzanita	X				
Stanford manzanita	X				
Wedgeleaf ceanothus	X	X	X	X	X
Whiteleaf manzanita	X			X	
Bigberry manzanita		X	X		
Jim Bush		X			
Parry ceanothus		X			
Wartleaf ceanothus		X			
Bigpod ceanothus			X		
Cupleaf ceanothus			X		
Hairy ceanothus			X		
Parry manzanita			X		
Mariposa manzanita				X	X
Wartystem ceanothus			X		

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Chemical Alternative to Fire

- Pros:
  - Cheap
  - Relatively easy (1 person)
  - Reduces resprouting
  - Can have residual
  - Retain RDM
- Cons:
  - Need to make the right match
  - Scale!

Weather dependent.
(Neighbors will hate you no matter what you do…)

Chemical Treatment Cost Estimates

Broadleaf-Herbaceous Plants

- Shark @ 1 and 2 oz/acre
  - ~$6/oz = $6 to $12/acre
- Milestone @ 3 and 7 oz/acre
  - ~$2.90/oz = $8.5 to $20/acre
- Transline @ 3 and 7 oz/acre
  - ~$1.47/oz = $4.5 to $10.5/acre
- 2, 4-D @ 32 and 64 oz/acre
  - ~$0.15/oz = $4.5 to $9/acre
- Triclopyr @ 32 and 64 oz/acre
  - ~$0.50/oz = $16 to $32/acre
- Crossbow @ 64 and 128 oz/acre
  - ~$0.48/oz = $31 to $62/acre

Woody Plants

- 2,4-D @ $16.67/gal
  - Spray (47 gal*5%)= ~$39.17/acre
- Triclopyr @ $54.82/gal
  - Spray (47 gal*5%)= ~$128.83/acre
- Imazapyr @ $49.10/gal
  - Spray (47 gal*5%)= ~$115.38/acre
- Glyphosate @ $31.64/gal
  - Spray (47 gal*5%)= ~$74.35/acre

Grass Only

- Poast @ 16 to 24 oz/acre
  - ~$0.78/oz = $13 to $19/acre

Mechanical Alternative Cost Estimates

- Cat: $85/hr – $150/hr ($340-$600/acre)
- Hired Saw: $15 - $25/hr ($487-$812/acre)
- Excavator: $125 - $200/hr ($975- $1560/acre)

Mostly independent of weather and neighbors tend to be OK with it…

Table 1: LSD mean frequency and cover reduction of Baccharis and bare ground by treatment

Treatment	Plants/M^2	*Baccharis* reduction, %	Bare ground, %
Exc	0.07[a1]	68b	22b
Cat	0.45[a]	65b	19b
Saw	1.32[b]	53a	3a

[1]Within a column means with a similar letter do not differ

Humboldt County Prescribed Burn Association

- Neighbors helping neighbors—similar to old rangeland associations
- VFD involvement + training
- CAL FIRE support, but limited involvement
- Private burn bosses as needed
- UCCE: research, education, and outreach on burning
- Grants and equipment

Burn trailer!

- California Deer Association
  - $24k in 2017 for purchase of a burn trailer and 3 slip-in units.
  - Another $12k in 2018 for radios.
- Redwood National Park also donated used hand-tools, hose, and other items

So, how much does it cost to implement a burn?

Wait!... Remember your Chemical Treatment Costs!

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Grass Only

- Poast @ 16 to 24 oz/acre
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- Hunt: June 29, 2017
  - 18 acres: Medusahead
  - $500: Burn Plan
  - $1500: Burn Boss
  - $600: VFD Stipends
  - $100: Air Quality + other
    - $150/acre +~30 people

*** Required Prep/Cleanup costs not included in any example!

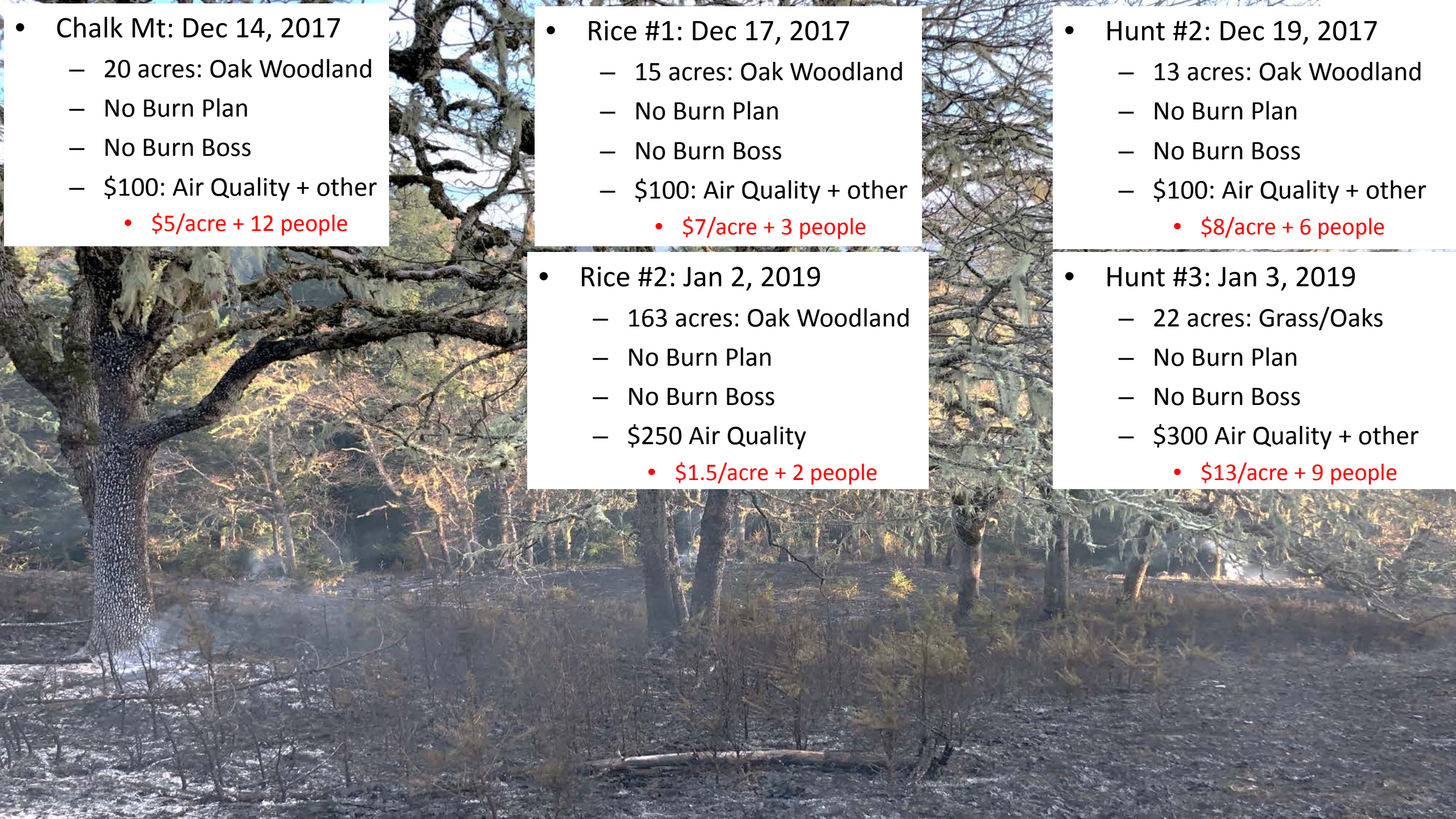
More Medusahead burns scheduled for 2019!

- Phelps Burn: June 26, 2018
  - 3 acres: Vineyard Edge
  - 3 acres: Medusahead
  - No Burn Plan
  - $1500 Burn Boss
  - $100: Air Quality + other
    - $267/acre + ~25 people

- Evenson Seeding Trial: Oct 15, 2018
  - 1.5 acres: Clover + CA Brome Trial
  - $100: Air Quality + other
    - $66/acre + 3 people

- Moore Burns: April 25, 2018
  - 5 acres (over 2k acres): Scattered Blackberry
  - $500: Burn Plan
  - $1500: Burn Boss
    - (NRCS Requirement)
  - $100: Air Quality + other
    - $420/acre + 10 people

- Cocking: October 20, 2018
  - 3 acres: Forest/Urban
  - $1000 Burn Plan
  - $1500 Burn Boss
  - $830 Air Quality + other
    - $1110/acre + 25 people



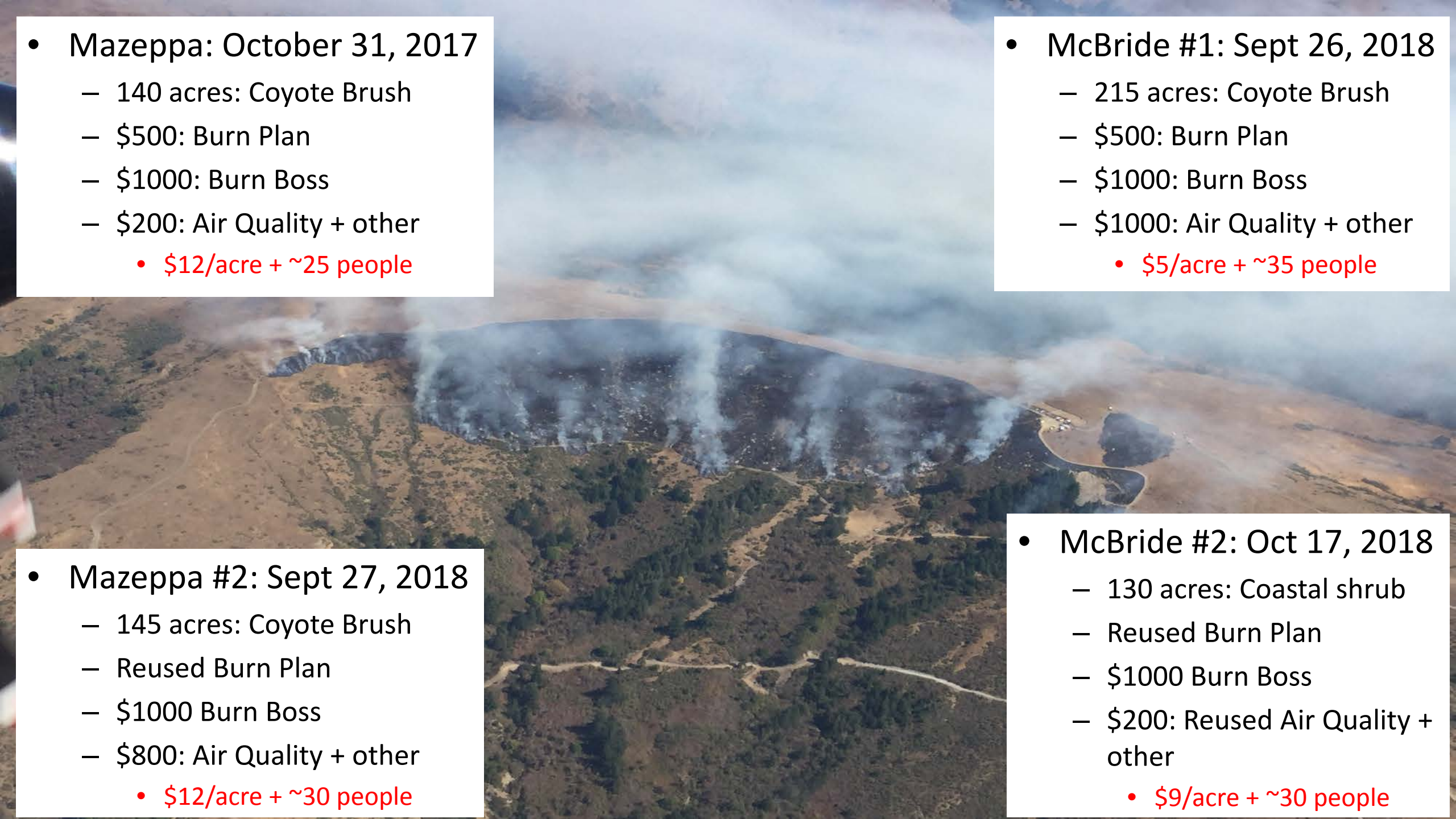
- Chalk Mt: Dec 14, 2017
  - 20 acres: Oak Woodland
  - No Burn Plan
  - No Burn Boss
  - $100: Air Quality + other
    - $5/acre + 12 people

- Rice #1: Dec 17, 2017
  - 15 acres: Oak Woodland
  - No Burn Plan
  - No Burn Boss
  - $100: Air Quality + other
    - $7/acre + 3 people

- Hunt #2: Dec 19, 2017
  - 13 acres: Oak Woodland
  - No Burn Plan
  - No Burn Boss
  - $100: Air Quality + other
    - $8/acre + 6 people

- Rice #2: Jan 2, 2019
  - 163 acres: Oak Woodland
  - No Burn Plan
  - No Burn Boss
  - $250 Air Quality
    - $1.5/acre + 2 people

- Hunt #3: Jan 3, 2019
  - 22 acres: Grass/Oaks
  - No Burn Plan
  - No Burn Boss
  - $300 Air Quality + other
    - $13/acre + 9 people



- Mazeppa: October 31, 2017
  - 140 acres: Coyote Brush
  - $500: Burn Plan
  - $1000: Burn Boss
  - $200: Air Quality + other
    - $12/acre + ~25 people

- McBride #1: Sept 26, 2018
  - 215 acres: Coyote Brush
  - $500: Burn Plan
  - $1000: Burn Boss
  - $1000: Air Quality + other
    - $5/acre + ~35 people

- Mazeppa #2: Sept 27, 2018
  - 145 acres: Coyote Brush
  - Reused Burn Plan
  - $1000 Burn Boss
  - $800: Air Quality + other
    - $12/acre + ~30 people

- McBride #2: Oct 17, 2018
  - 130 acres: Coastal shrub
  - Reused Burn Plan
  - $1000 Burn Boss
  - $200: Reused Air Quality + other
    - $9/acre + ~30 people

FY 18 EQIP Rates:

Prescribed Burning	Understory Burn	ac	$8.55	$11.84
Prescribed Burning	Site Preparation	ac	$35.34	$48.93
Prescribed Burning	Level Terrain, Tall Herbaceous Fuel, < 640 ac.	ac	$36.61	$50.69
Prescribed Burning	Level Terrain, Volatile fuels < 4 ft tall, <640 ac	ac	$7.84	$10.85
Prescribed Burning	Steep Terrain, Volatile Fuels <4 ft tall	ac	$6.97	$9.66
Prescribed Burning	Steep Terrain, Volatile fuels >4 ft tall, <10% Canopy Cover	ac	$46.81	$64.81
Prescribed Burning	Steep Terrain, Volatile fuels >4 ft tall, >10% Canopy Cover	ac	$92.90	$128.63
Prescribed Burning		ac	$63.22	$75.86

- McBride was the largest NRCS burn completed in the state of California!

Final thoughts:

- Everyone has a role with Rx fire.
  - Branding culture already exists

- Bigger the burn, cheaper the costs, we can beat the herbicide costs with fire on larger acreages and/or during non-fire season.

The more success we have, the easier it gets!

Questions?

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