

# *Using fire to control medusahead and coyote brush*

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In collaboration with Range Ecology Lab at UC Berkeley:

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# Two parts

- Medusahead (*Taeniatherum caput-medusa*)
- Coyotebrush (*Baccharus pilularis*)



# Medusahead Introduction

Nutrition comparable to cheatgrass

But with higher silica

season of use is much shorter



Typically colonizes sites where the existing perennial vegetation has been destroyed or weakened (Miller et al. 1999).

Fire-adapted species (Davies and Johnson 2008). winter annual completes lifecycle prior to the normal wildfire season.

**BUT...** prescribed fire provides opportunity

# Medusahead Identification

- Wiry stems
- A few short, narrow leaves
- Long awns that emerge from the seed head and point outward and upward
- Bright yellow-green color
- Height 6 to 24 inches



Source: [https://www.mtweed.org/weed\\_id/medusahead/](https://www.mtweed.org/weed_id/medusahead/)

Not to be  
confused with  
*Elymus*  
*multicetus*  
/ *elymoides*,  
aka  
Squirrel-tail

Native perennial  
bunchgrass

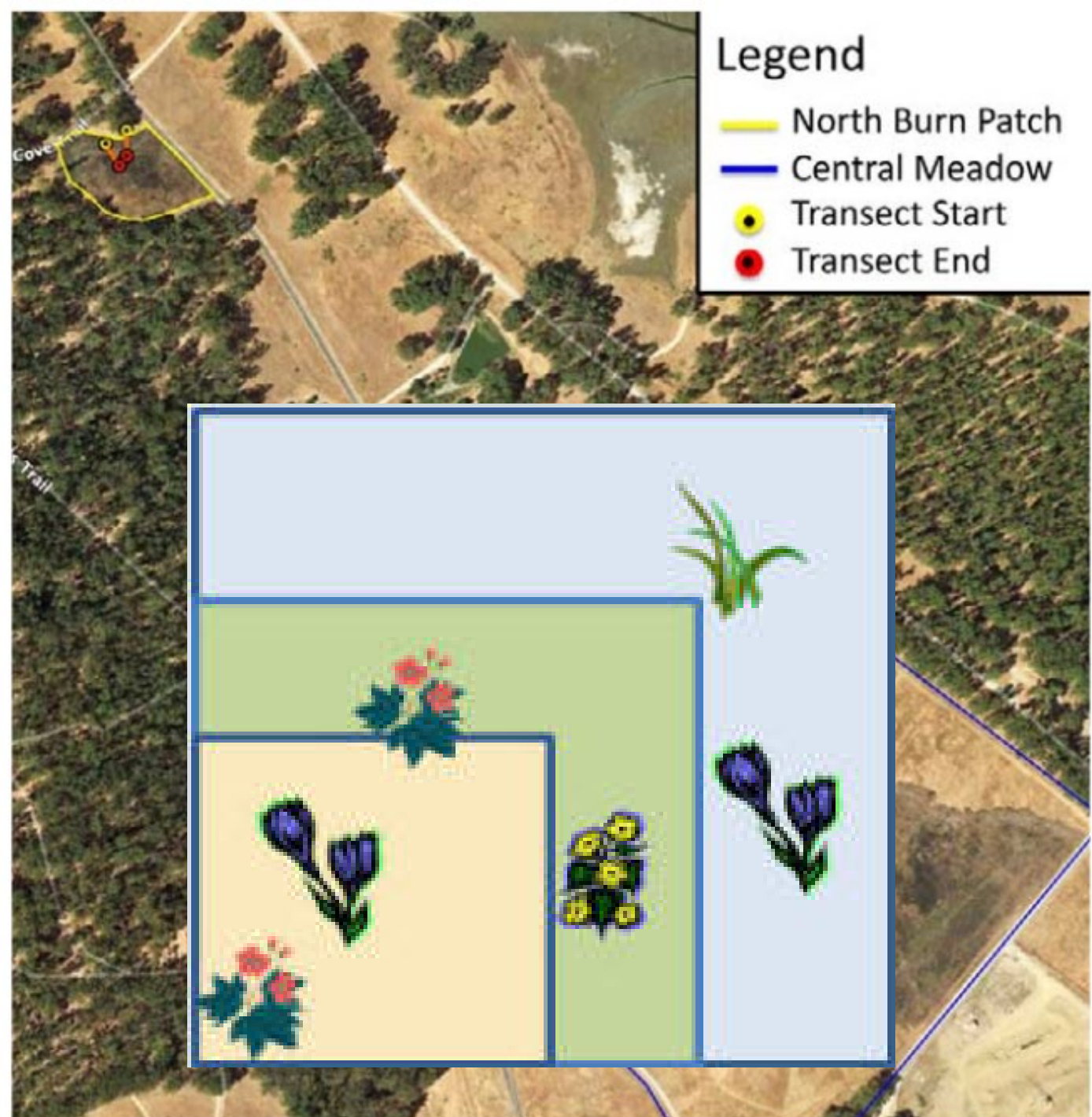


# Study objectives

- Impacts on medusa head
- Impacts on coastal herbaceous species
- Test medusahead germination after burn

# Study site

- Point Pinole Regional Park
- Nested quadrats 1-m<sup>2</sup>, 1/4 m<sup>2</sup>, and 1/16 m<sup>2</sup> and the first plant hit at the point intercept
- Samples are most powerful when the frequency is between 20 and 80% (Despain et al. 1991).



# Methods

- Limited 2-year study
- Much year-to year variation in grasslands, study could not control for annual variation in rainfall/temperature



Increase Saltgrass, *Distichlis spicata* \* 267%



# Decreases

- Medusahead, *Taeniatherum caput-medusae* -86%
- Purple false brome, *Brachypodium distachyon* -62%
- Blue-eyed Grass, *Sisyrinchium bellum*\*-37%

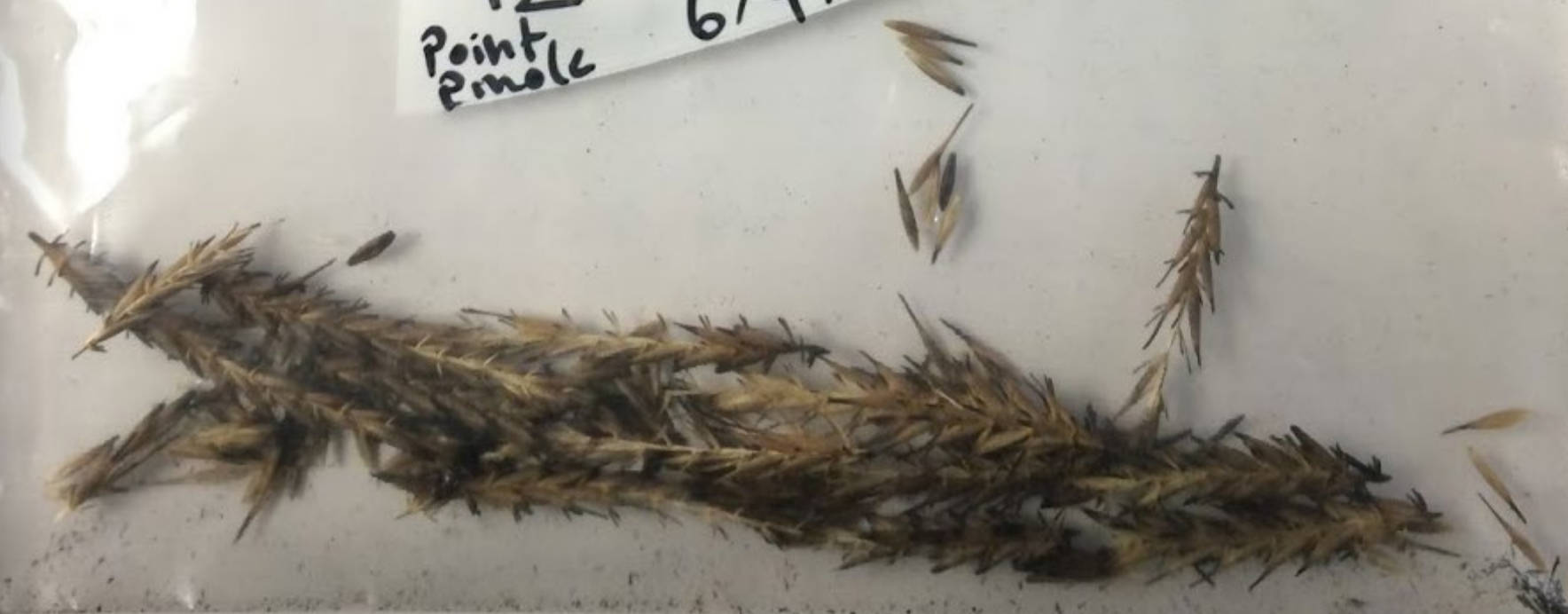


ZIPLOC  
BRAND BAGS  
SACS DE MARQUE

12  
Point  
Pinole

Heads  
6/9/16

Burned

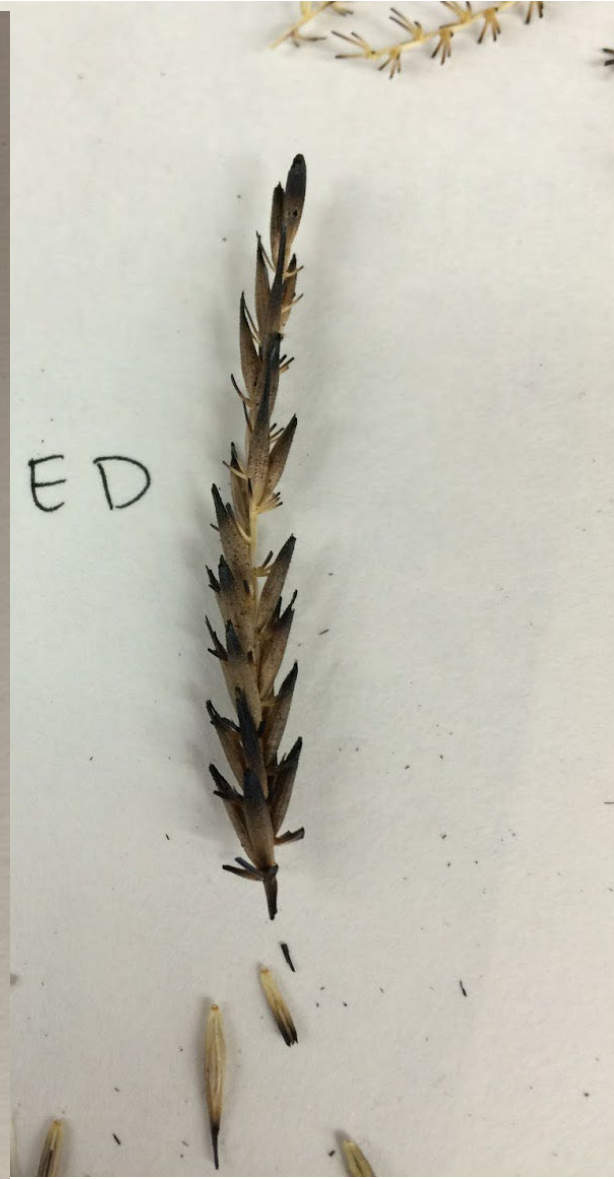


10 Heads  
Unburned

Point Pine  
6/9/16

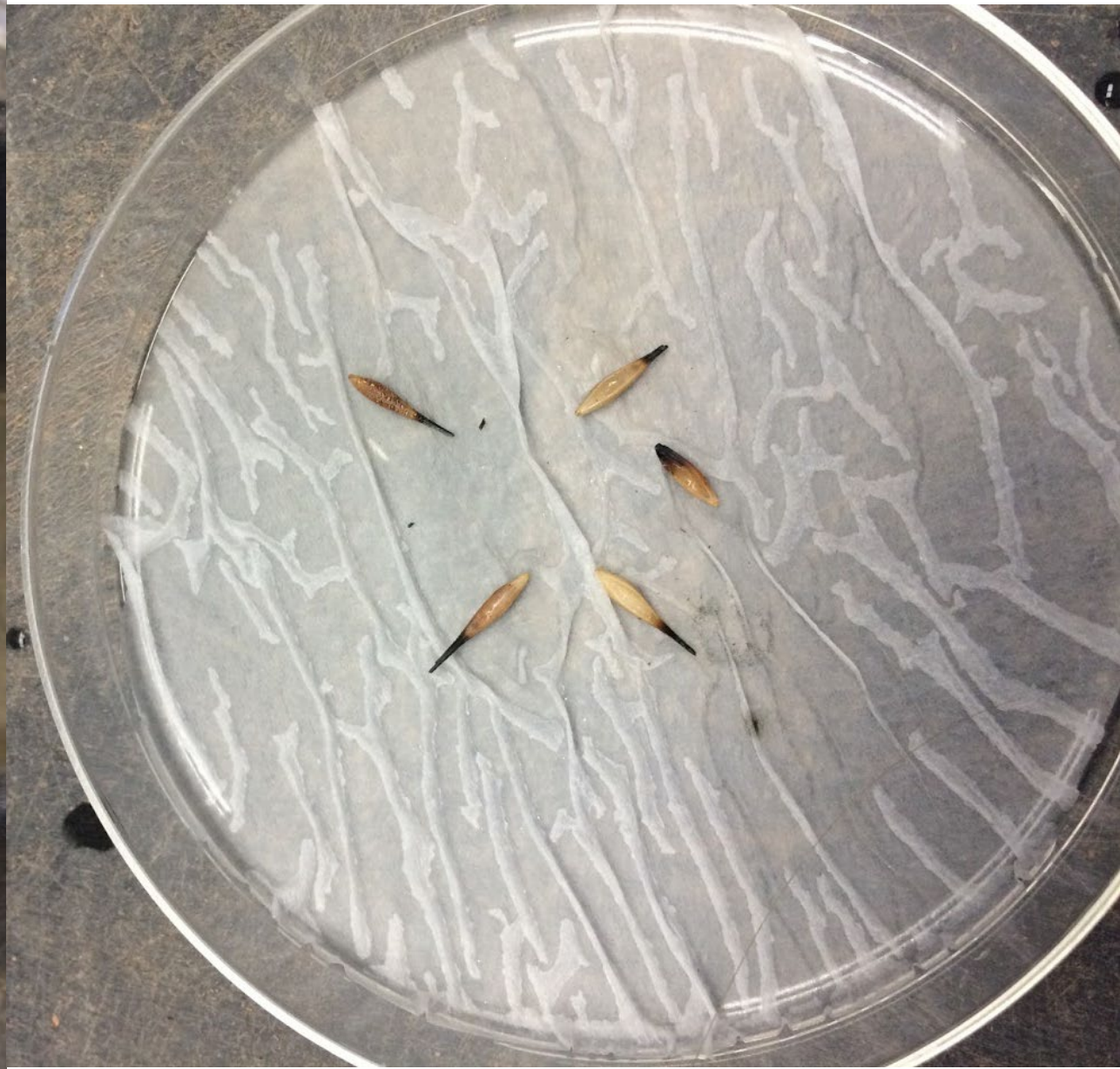
ZIPLOK  
BRAND BAGS  
SACS DE MARQUE

# Germination experiment











# Results

- 97% of the unburned seeds germinated
- **None of the burned seeds germinated**

# Discussion

- 4 significant results:
  - **Medusahead**, 19% -> 3%
  - **Blue-eyed grass\*** 17 -> 11%
  - **Purple false brome** 27% -> 10%
  - **Saltgrass\*** 8% -> 31%
- Limited 2-year study
- Much year-to year variation in grasslands, study could not control for annual variation in rainfall/temperature
- Confirms expectations, however, has not worked in drier cool desert environments, possibly not enough fuel

# Coyote brush & woody encroachment

- Once *B. pilularis* has established in grassland, herbaceous species, including native grasses, decline significantly in biomass and reproductive output (Hobbs & Mooney 1986).
- Reduced fire frequency is an important cause of woody encroachment into grassland (Twidwell et al. 2016)
- *Baccharis pilularis* (coyote brush) encroachment into the region's grasslands has occurred for at least half a century, in part because livestock grazing and fire have declined on the urbanizing landscape of the central coast (Clarke 1959; McBride & Heady 1968; Russell & McBride 2003; Ford & Hayes 2007).



# Background on this species

- Wind-borne *B. pilularis* seed can readily disperse to open grassland and establish, especially in years with wet springs (da Silva & Bartolome 1984; Williams et al. 1987).
- A single prescribed burn does not generally restore coastal prairie effectively because many shrubs, including *B. pilularis*, are able to resprout following a fire and quickly re-establish pre-burn cover (Ford & Hayes 2007; Fuhlendorf et al. 2011).

# Questions

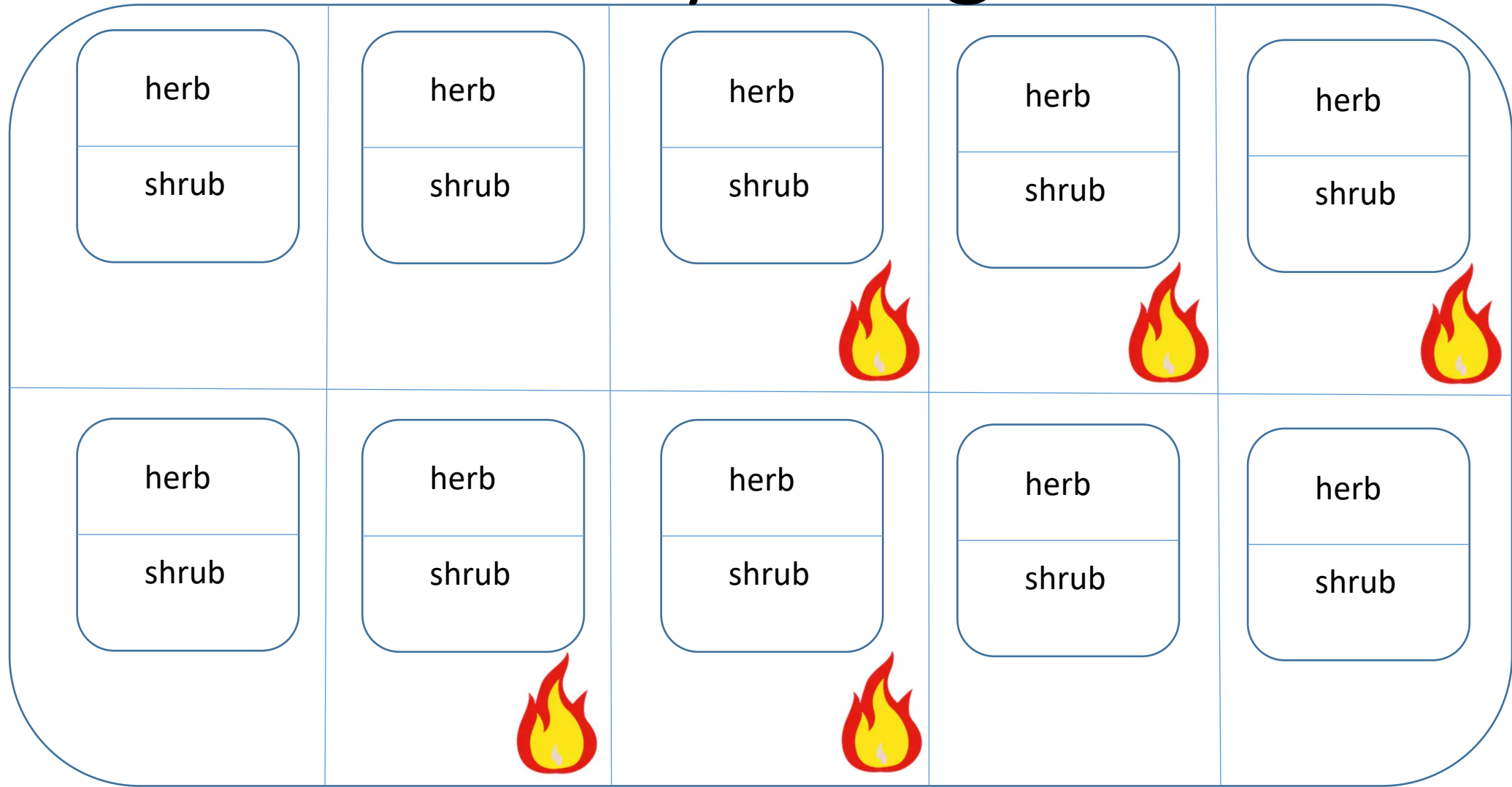
- 1) Will two consecutive prescribed burns increase shrub mortality?
- 2) Are there any other benefits or negative impacts to the herbaceous community in the face of consecutive fires.

# Study site

- Point Pinole Regional Park



# Study design



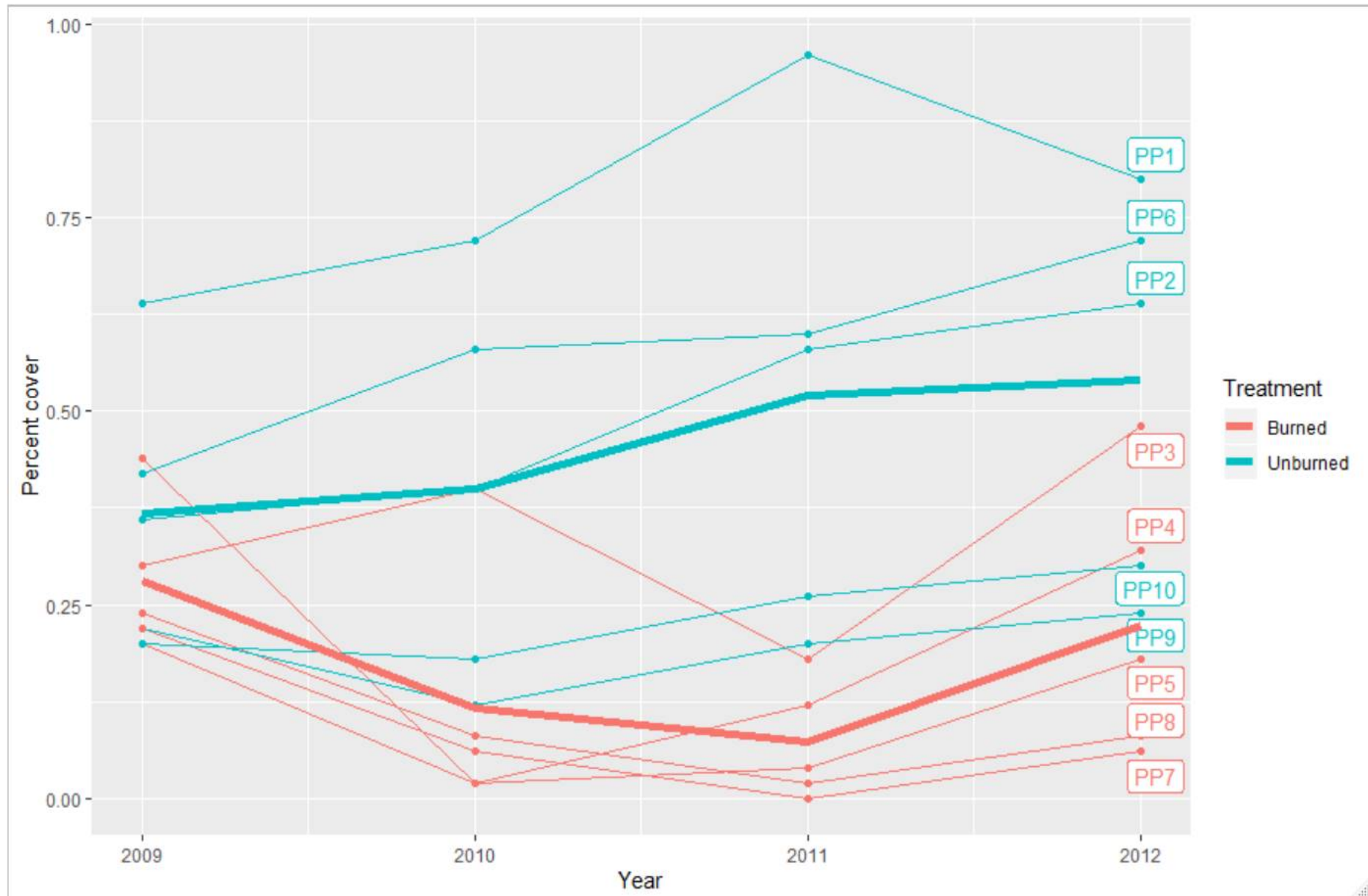
# Methods

- 20m Point line transects in each plot, every .2 m = 100 points
- 250 individual shrubs tagged

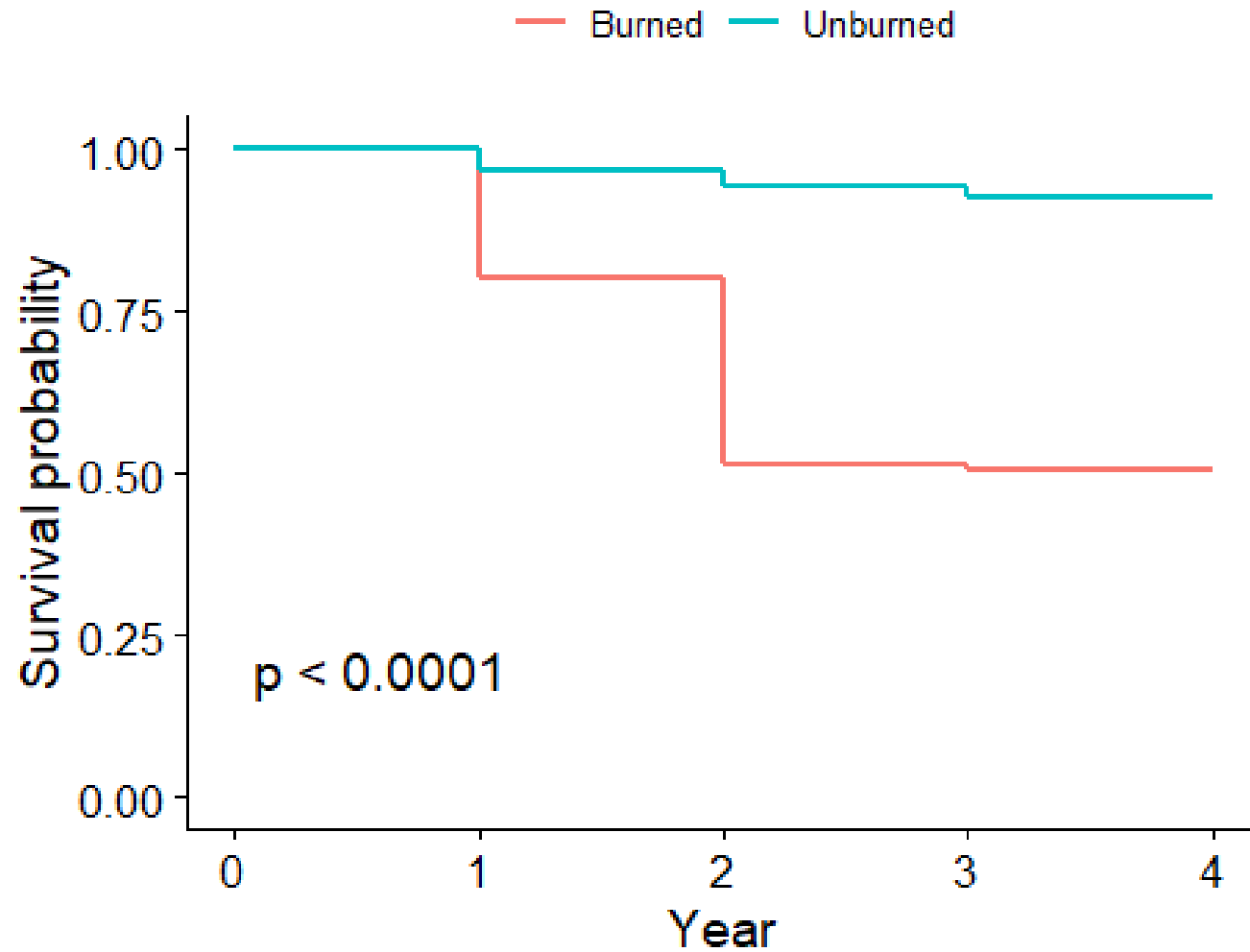




# Results: Coyote brush cover



# Coyote brush survival

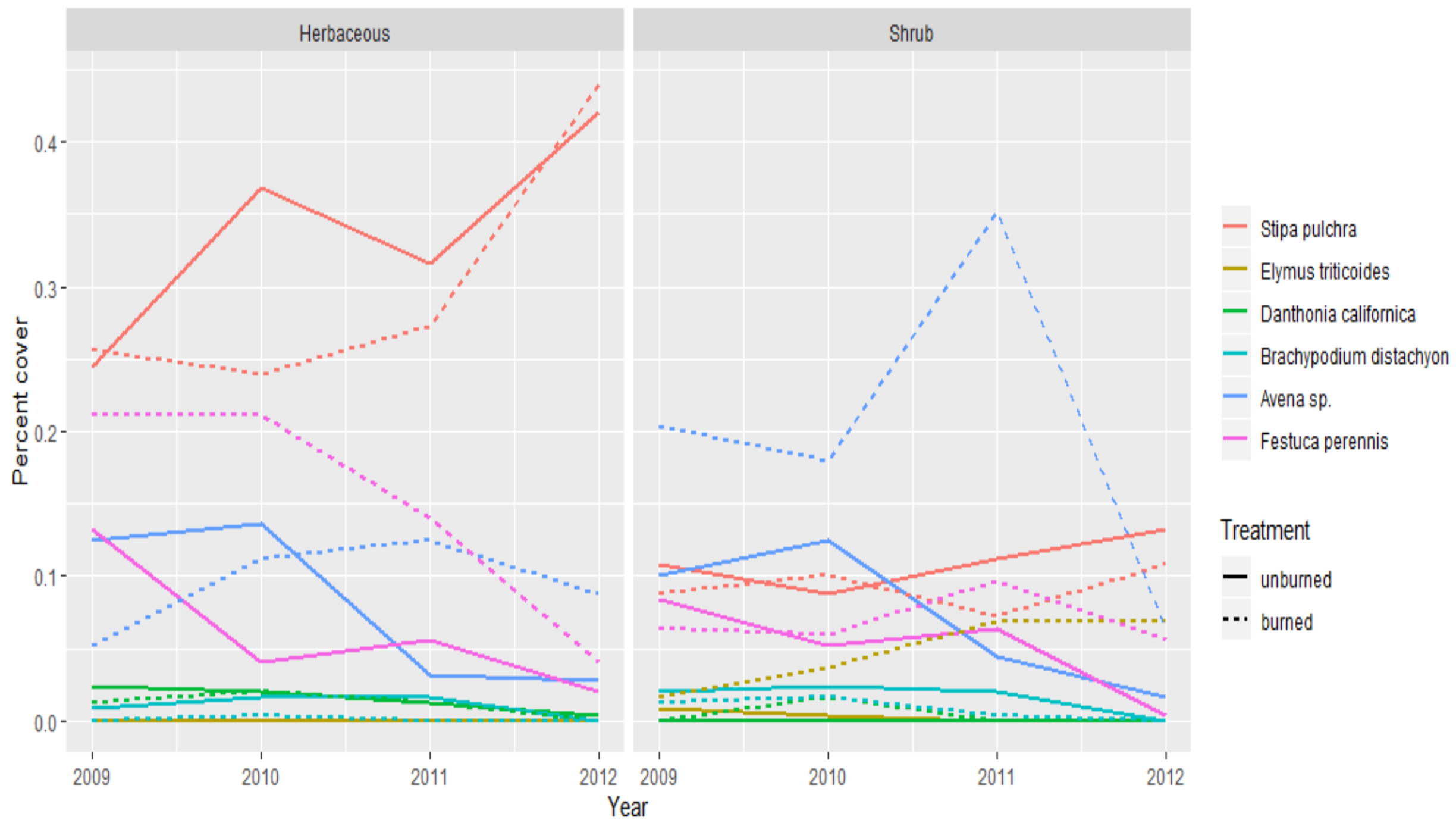


# Herbaceous results

# Herbaceous results

	Dependent variable:			
	Baccharis pilularis	Stipa pulchra	Elymus triticoides	Avena sp.
	(1)	(2)	(3)	(4)
<b>2010</b>	0.17	0.36**	-0.7	0.18
	(0.2)	(0.17)	(1.23)	(0.2)
<b>2011</b>	0.92***	0.27	-15.86	-1.2***
	(0.19)	(0.17)	(33.82)	(0.28)
<b>2012</b>	1.02***	0.66***	-15.83	-1.77***
	(0.19)	(0.16)	(44.15)	(0.34)
<b>Burned</b>	-0.36	-0.01	0.75	0.32
	(0.58)	(0.4)	(1.1)	(0.51)
<b>Shrub Plots</b>	3.76***	-1.51***	3.99***	0.54***
	(0.19)	(0.09)	(1.01)	(0.11)
<b>2010:Burned</b>	-1.32***	-0.38	1.65	-0.02
	(0.32)	(0.24)	(1.37)	(0.27)
<b>2011:Burned</b>	-2.61***	-0.27	17.38	1.99***
	(0.35)	(0.24)	(33.83)	(0.33)
<b>2012:Burned</b>	-1.34***	0.02	17.35	1.17***
	(0.29)	(0.23)	(44.16)	(0.4)
<b>Constant</b>	-4.49***	-1.06***	-9.21***	-2.63***
	(0.45)	(0.28)	(1.34)	(0.37)

	Dependent variable:		
	Danthonia californica	Brachypodium distachyon	Festuca perennis
	(1)	(2)	(3)
<b>2010</b>	0.49	0.42	-0.41**
	(0.45)	(0.42)	(0.16)
<b>2011</b>	-0.43	0	-0.44***
	(0.54)	(0.45)	(0.16)
<b>2012</b>	-2.27**	-19.32	-1.72***
	(1.06)	(70.33)	(0.22)
<b>Burned</b>	0	-1.46	1.2
	(4.06)	(1.34)	(1.05)
<b>Shrub Plots</b>	-1.96***	0.8**	-0.74***
	(0.54)	(0.37)	(0.13)
<b>Constant</b>	-12.11***	-5.53***	-3.09***
	(3.83)	(1.02)	(0.76)



# Discussion

- Coyote brush does resprout
- However, it does experience ~25-35% mortality/year under fire as opposed to ~3% mortality/year
- Shrub areas have very different herbaceous cover
- *Avena* sp. (wild oats) slightly increased in burn areas
- All other herbaceous species had high inter-annual variability

# Conclusions

- Fire at the right timing for medusahead can substantially reduce cover in lower elevation areas
- Fire can be used to increase mortality of coyote brush



# Questions

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Prescribed Burn Association Meeting, January 15-16, 2020





☀ 17°N (T)   ● 40°29'56"N, 123°48'39"W ±16.4ft   ▲ 1945ft



27 Jun 2019, 14:51:27

# Results

## Northern Patch

- **Saltgrass, *Distichlis spicata* \* 267%**
- *Danthonia californica*\* -40%
- *Stipa pulchra*\* -75%
- **Medusahead, *Taeniatherum caput-medusae* -86%**

## Southern Patch

- **Purple false brome, *Brachypodium distachyon* -62%**
- *Danthonia californica*\* -53%
- *Elymus multisetus*\* -45%
- *Eschscholzia californica*\* -42%
- **Blue-eyed Grass, *Sisyrinchium bellum*\*-37%**
- *Rubus armeniacus* -36%
- *Stipa pulchra*\* -3%
- *Holcus lanatus* 11%
- *Foeniculum vulgare* 31%