

Using fire to control medusahead and coyote brush

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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



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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



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Source: https://www.mtweed.org/weed_id/medusahead/

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

Native perennial
bunchgrass

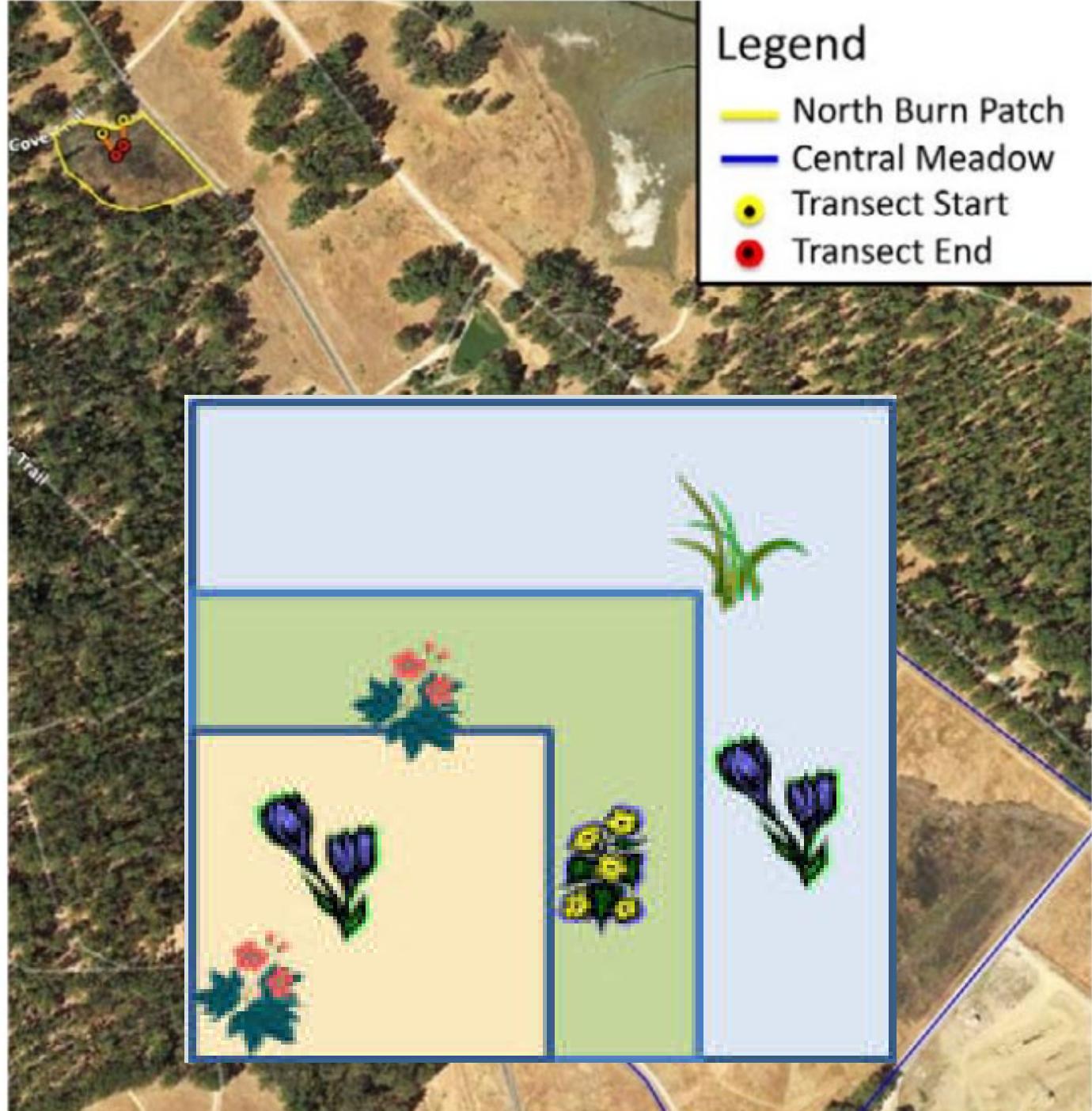


Study objectives

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

Study site

- Point Pinole Regional Park
- Nested quadrats **1-m², 1/4 m², and 1/16 m²** 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%



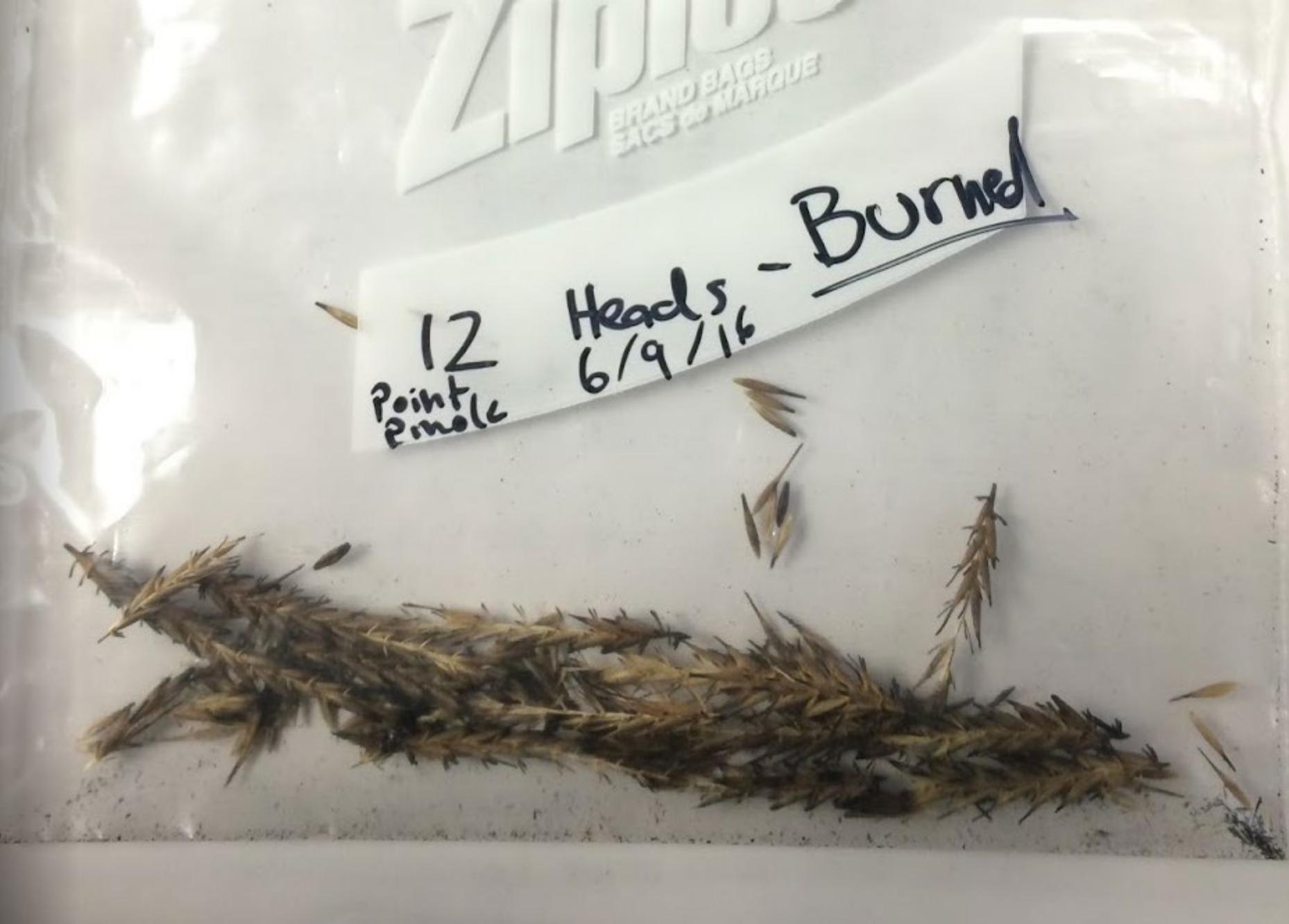
Decreases

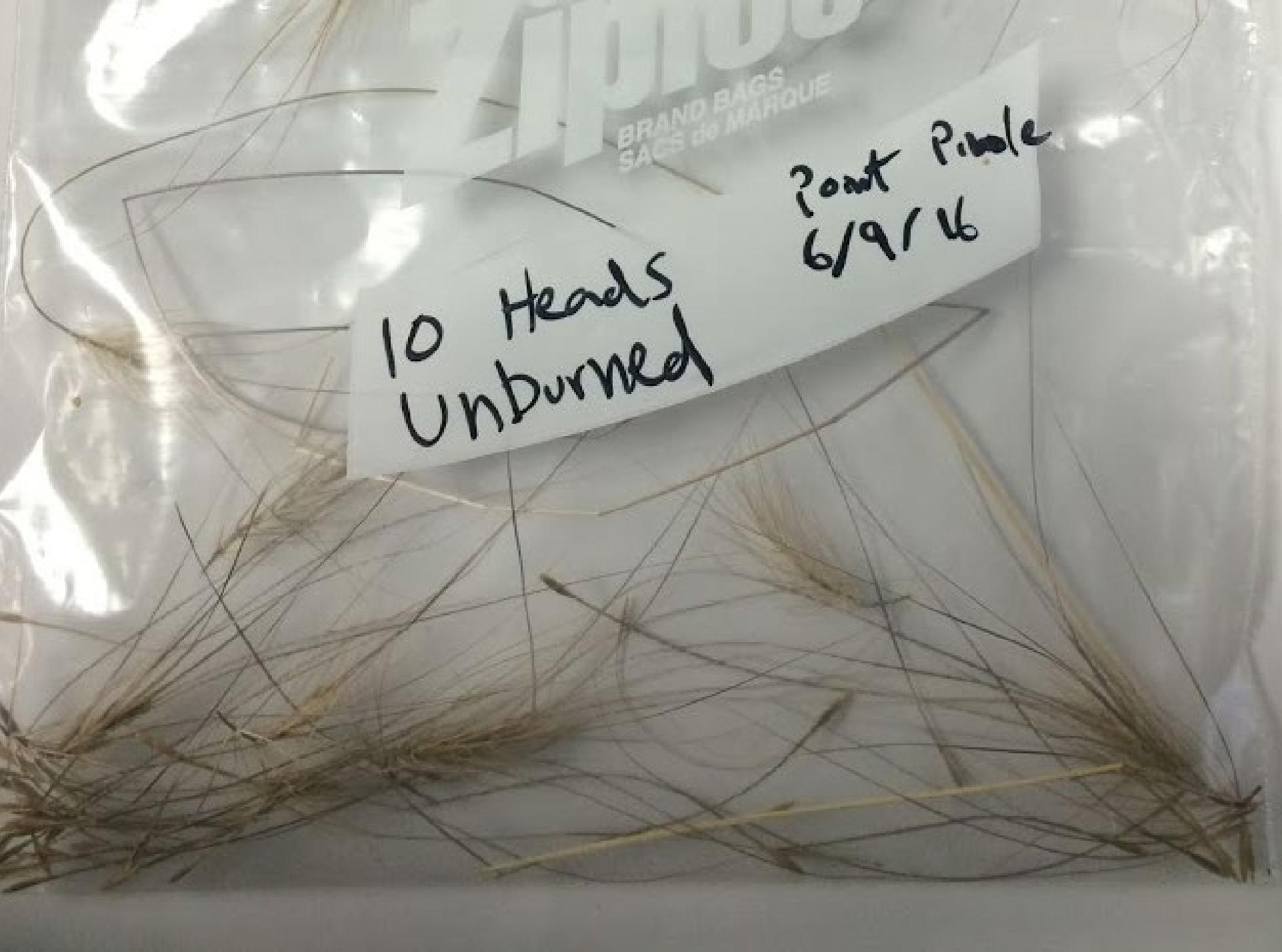
Medusahead, *Taeniatherum caput-medusae* -86%

Purple false brome, *Brachypodium distachyon* -62%

Blue-eyed Grass, *Sisyrinchium bellum**-37%







10 Heads
Undamaged

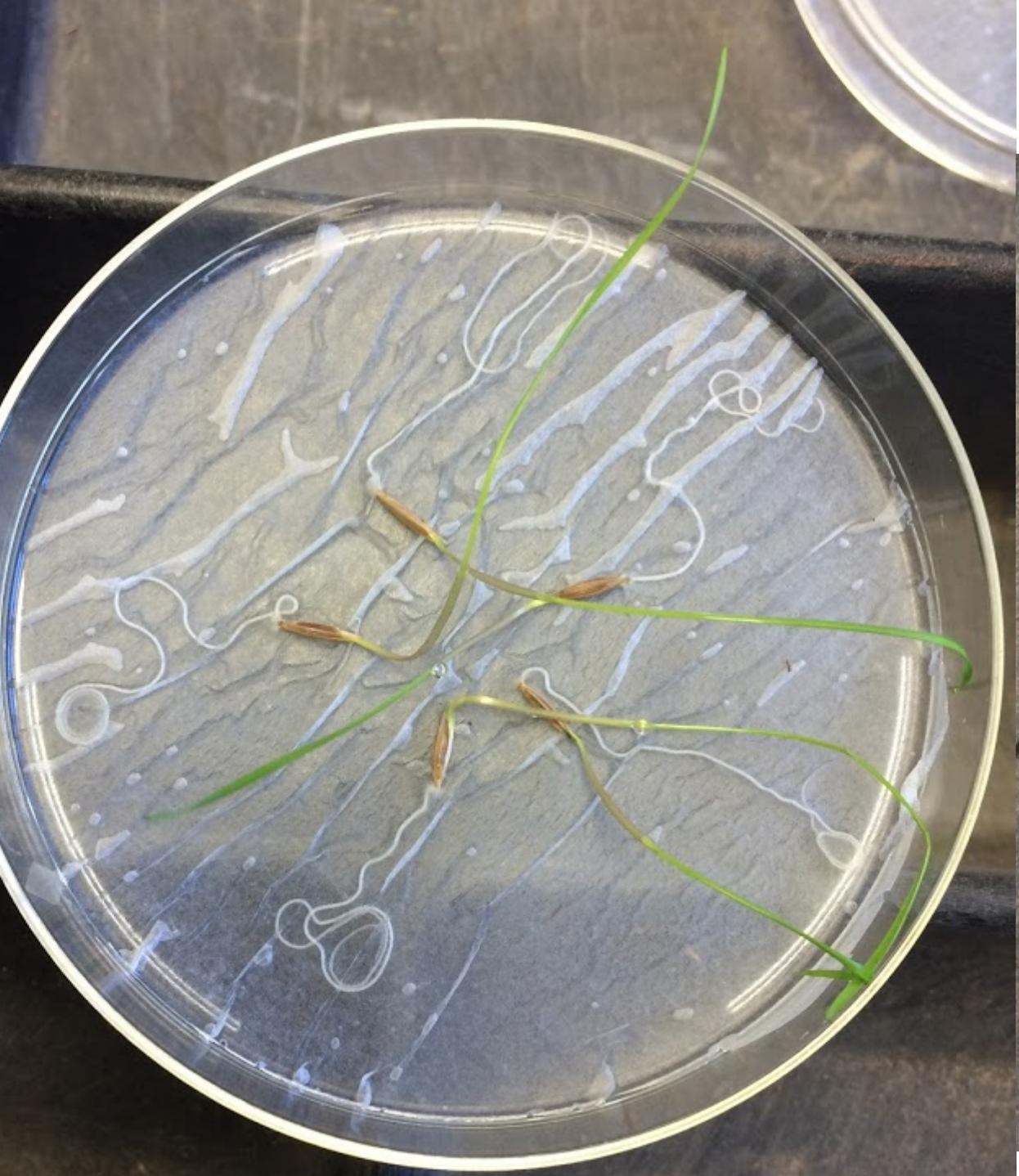
Point Pelee
6/9/16

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

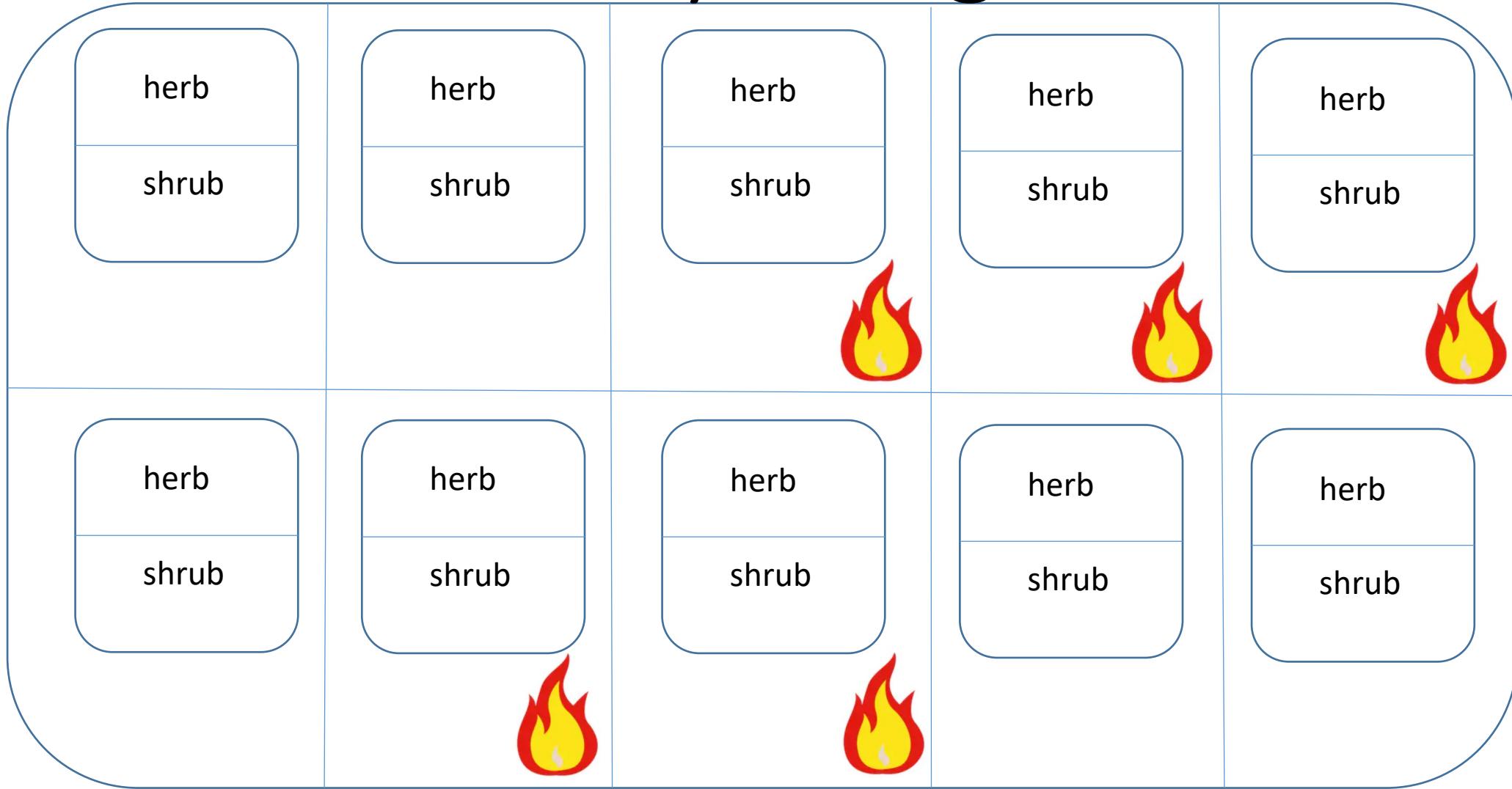
- 1) Will two consecutive prescribed burns increase shrub mortality?
- 2) Are there any other benefits or negative impacts to the herbaceous community in the face of consecutive fires.

Study site

- Point Pinole Regional Park



Study design

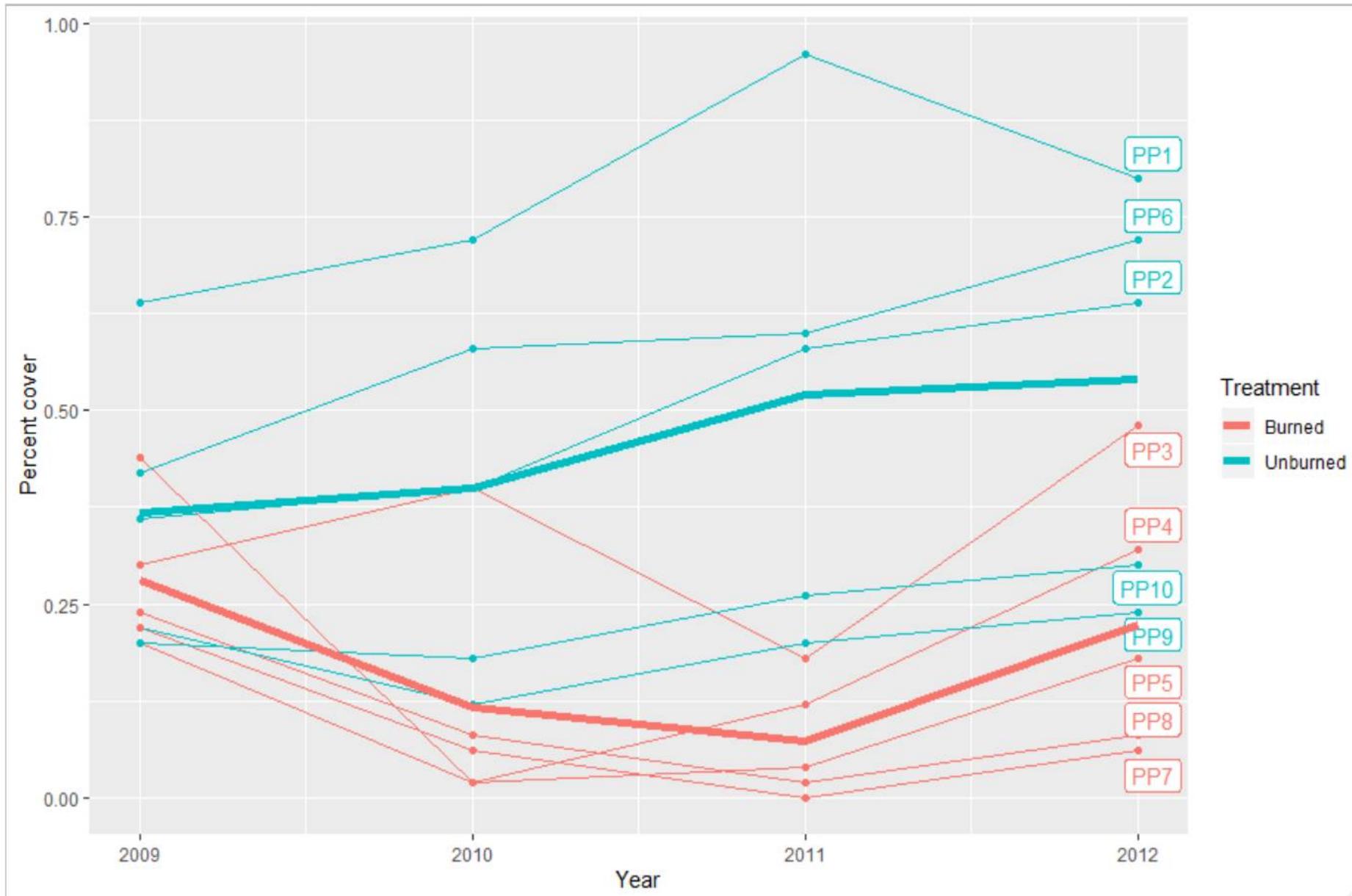


Methods

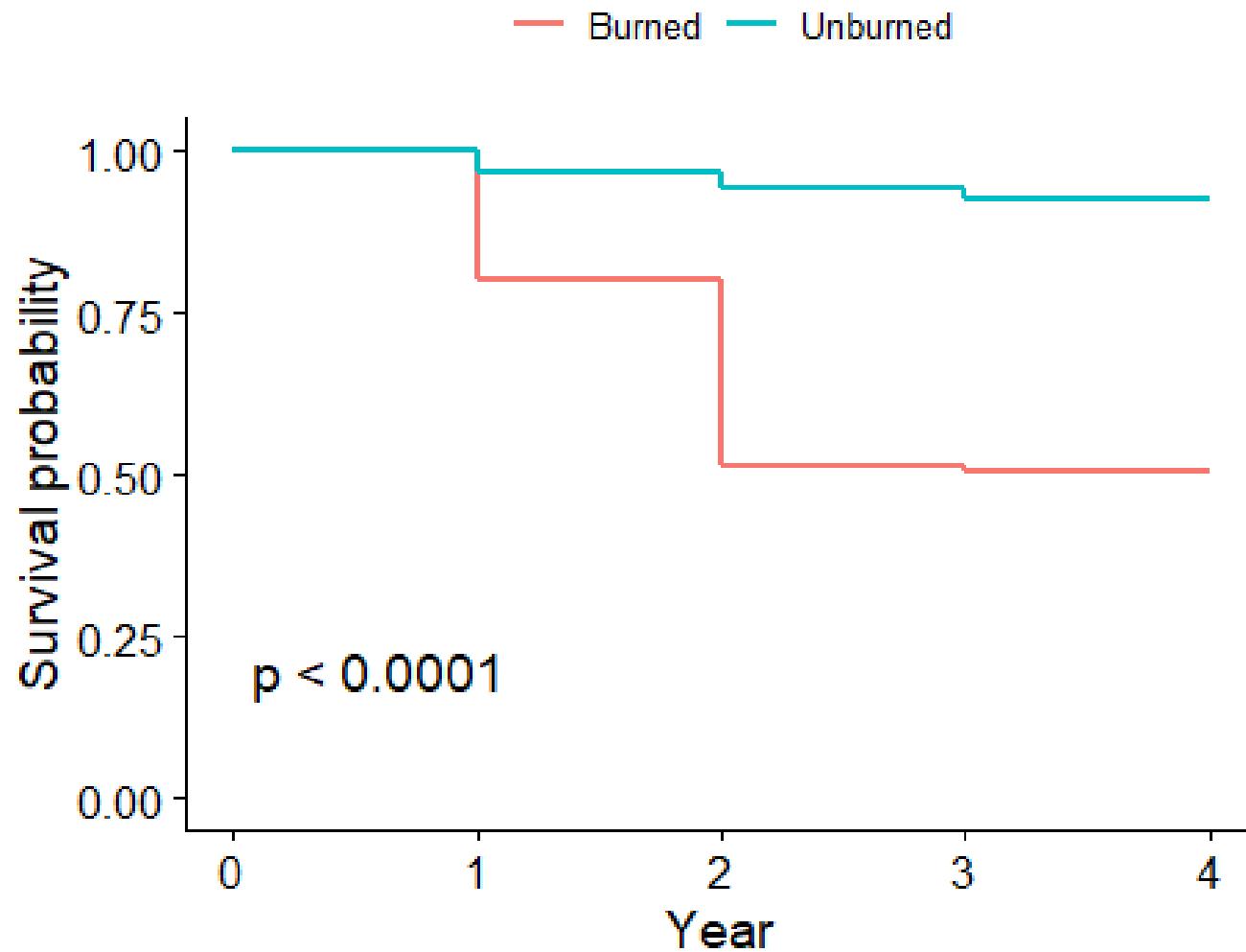
- 20m Point line transects in each plot, every .2 m = 100 points
- 250 individual shrubs tagged



Results: Coyote brush cover



Coyote brush survival

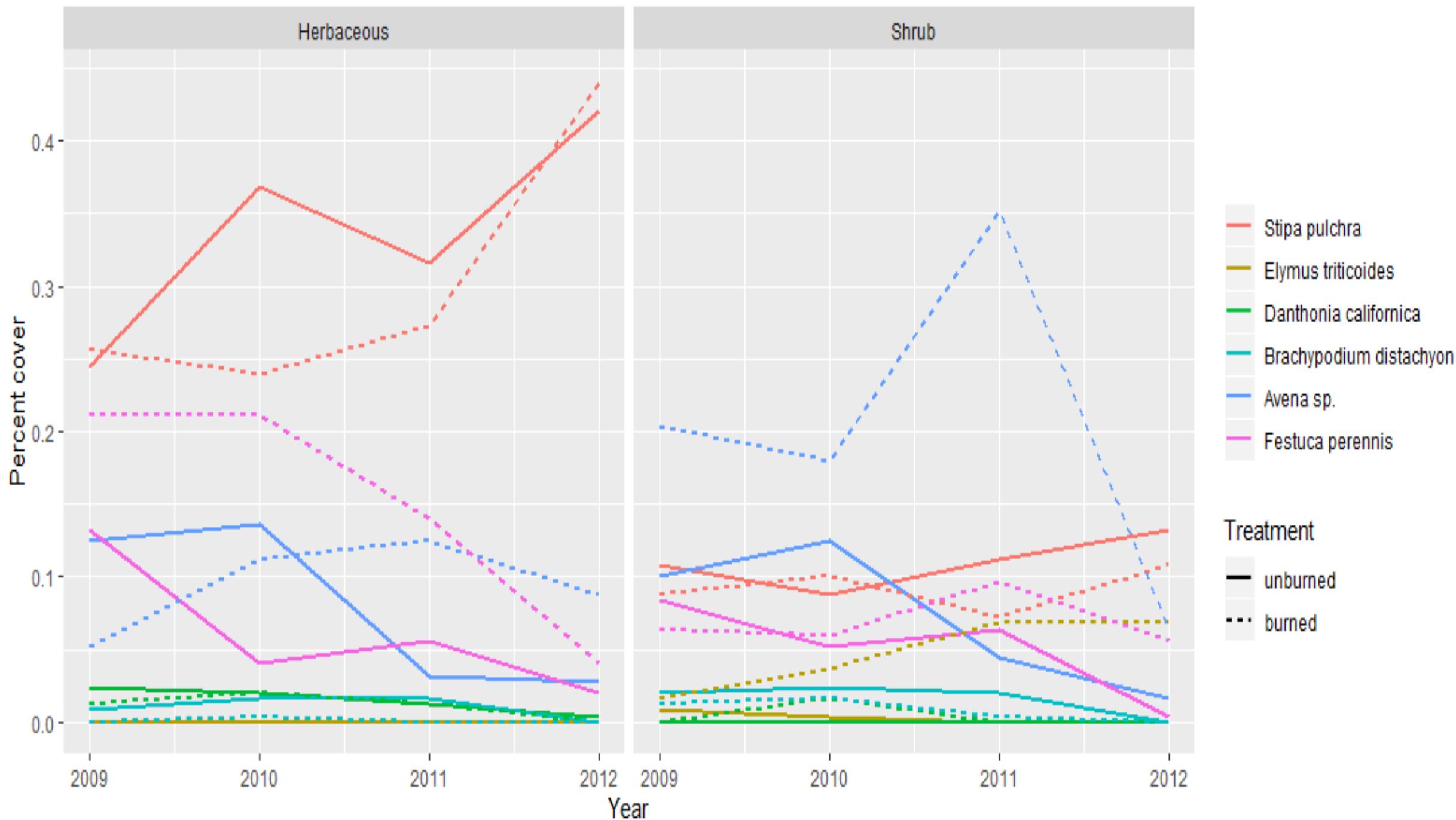


Herbaceous results

Herbaceous results

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

	Dependent variable:		
	Danthonia californica	Brachypodium distachyon	Festuca perennnis
	(1)	(2)	(3)
2010	0.49	0.42	-0.41**
	(0.45)	(0.42)	(0.16)
2011	-0.43	0	-0.44***
	(0.54)	(0.45)	(0.16)
2012	-2.27**	-19.32	-1.72***
	(1.06)	(70.33)	(0.22)
Burned	0	-1.46	1.2
	(4.06)	(1.34)	(1.05)
Shrub Plots	-1.96***	0.8**	-0.74***
	(0.54)	(0.37)	(0.13)
Constant	-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



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Questions

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Prescribed Burn Association Meeting, January 15-16, 2020



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%