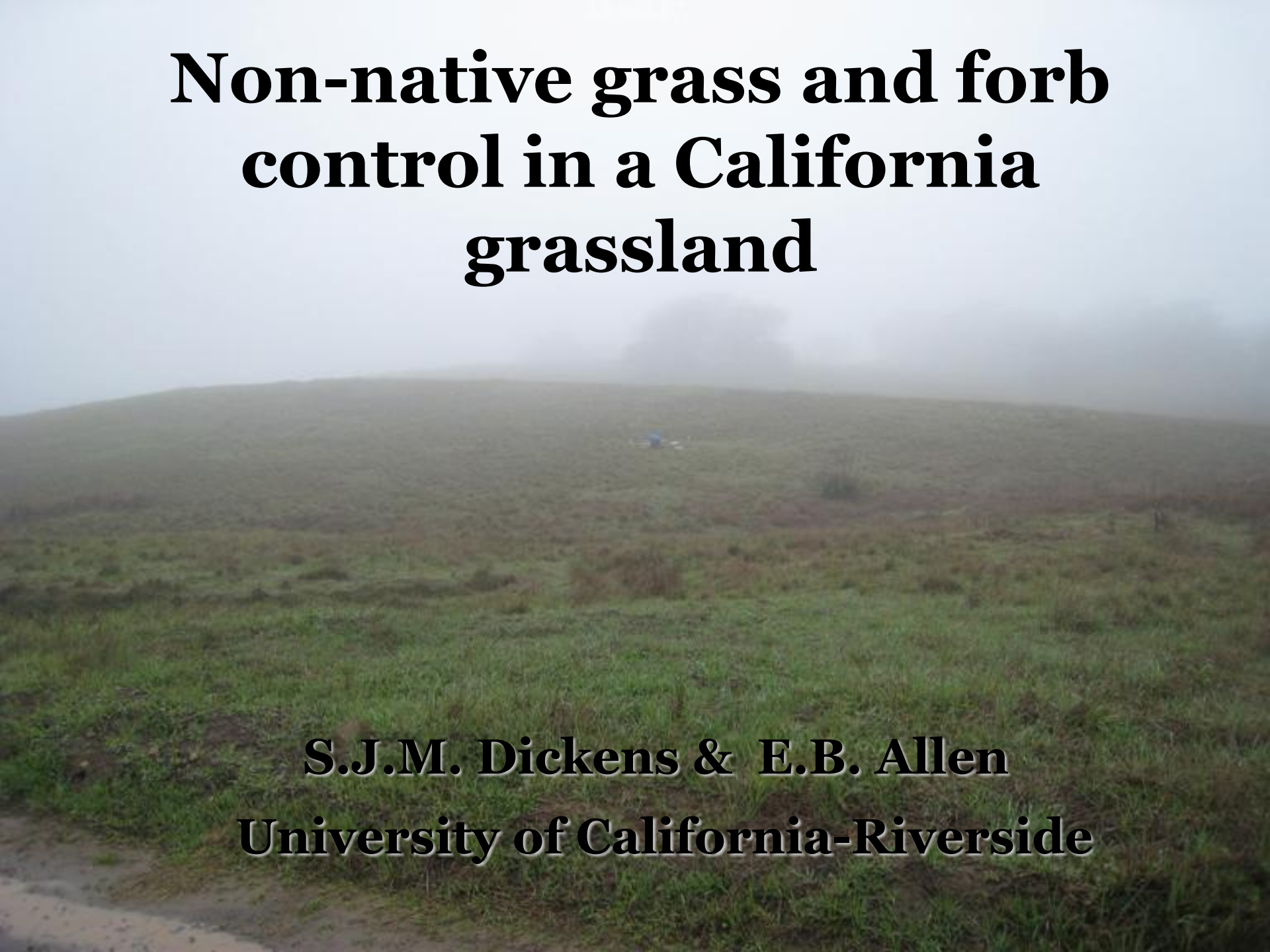
# Non-native grass and forb control in a California grassland



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# Outline

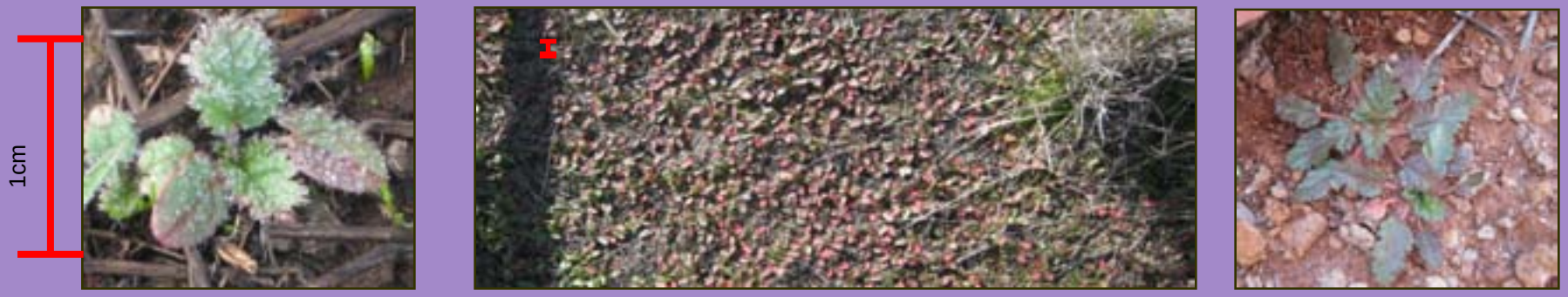
- Overview:
  - non-natives in grasslands
  - prescribed burns
- Santa Rosa Plateau Ecological Reserve
- Objectives and hypotheses
- Methods
- Results
- Conclusion, implications and future work

# Non-natives in California Grasslands

- Non-native grasses arrived about 250 years ago
- Pre-invasion plant community unknown
- Non-native grasses compete with and displace native plant species.
  - Water, Nutrients, Space, Light
- In the presence of non-native annual grasses, non-native forbs act as place holders for native forbs, without grasses they can become competitors (Gillespie & Allen 2004).

# Prescribed Fire

- Can reduce seed input by 96% (Moyes et al 2005)
- Prescribed fire may reduce non-native annual grass cover but may not increase native forb cover (Dickens & Allen 2009).
- Non-native forbs, specifically *Erodium spp*., often replace non-native grass after fire (Dickens & Allen 2009).



# Santa Rosa Plateau Ecological Reserve

- 8000 acres of land and 5 distinct habitats
- 48cm precipitation annually, most of which falls from November to April
- Historically grazed by cattle
- Home to many rare and endangered plants and animals

*Amsinckia menziesii*

*Calandrinia ciliata*

*Viola pedunculata*

*Sidalcea malvaeflora*

*Eschscholzia californica*

*Nassella pulchra*

# Prescribed Fire History

- 1988 Prescribed burning program began
  - Spring burns to capture seed on standing biomass
  - Burns reduce non-native grass seed input and thatch cover (Hervey 1949, Moyes et al 2005, White et al 2006)

**Objectives**: Assess effectiveness of fire and weeding of non-natives in releasing native species from competition.

**Hypothesis**:

- fire will reduce exotic grass cover and increase native cover.
- weeding of non-natives will further increase native cover and richness.

# Methods

Picture: Don Baccus

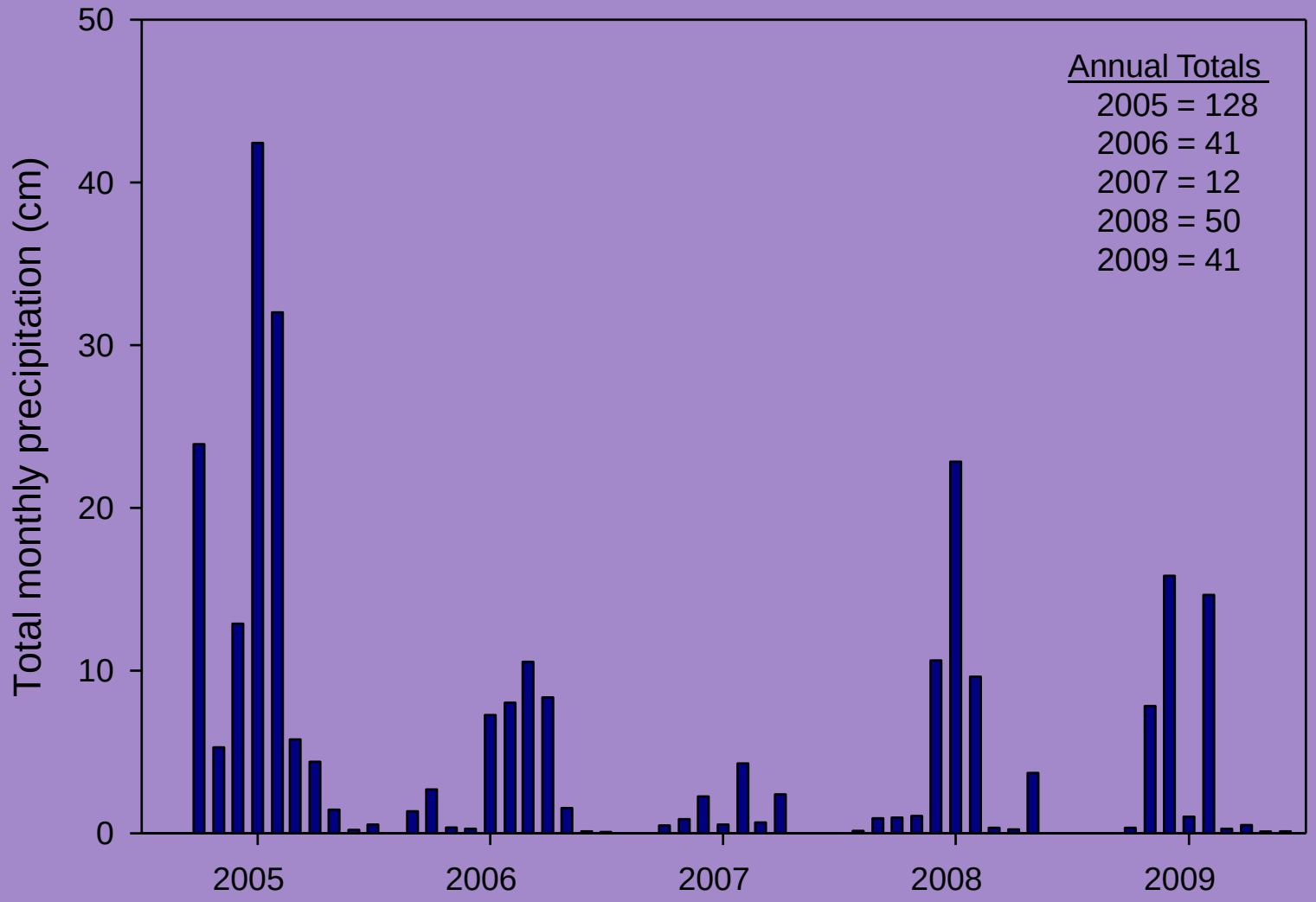
- Wildfire of 2006
- 27 1x1m plots were established in burned and unburned areas (unburned, burned, burn + weeded)
- Plots were weeded up to 3 weeks before data collection.
- Plant cover and richness recorded at peak of season

Unburned

Burned

Burned + Weed

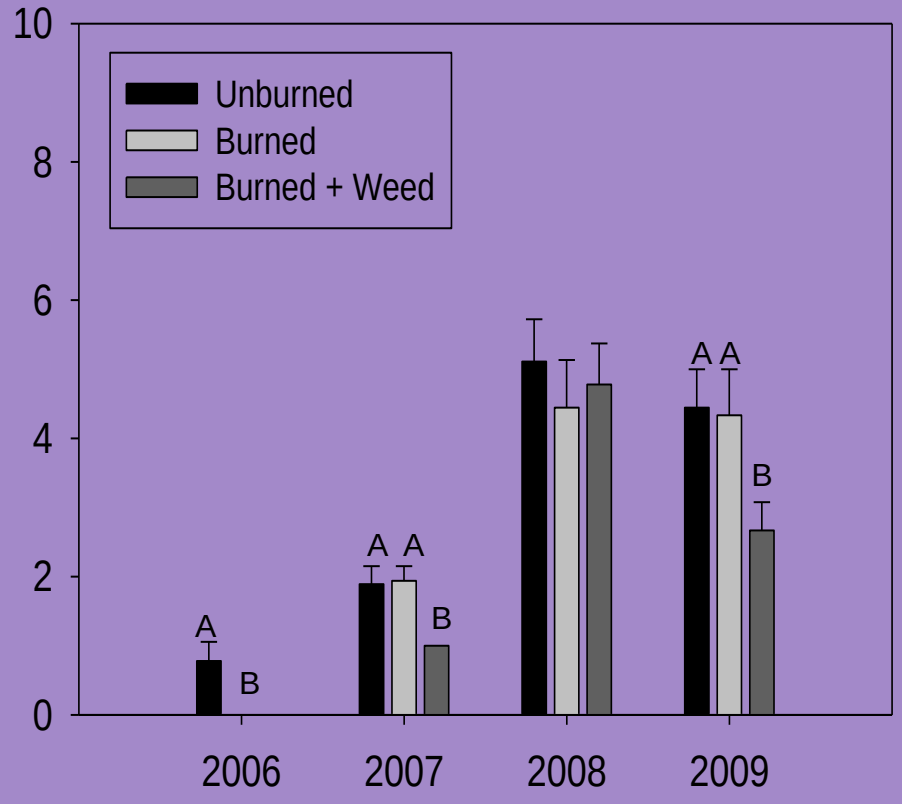
# Total Monthly Precipitation



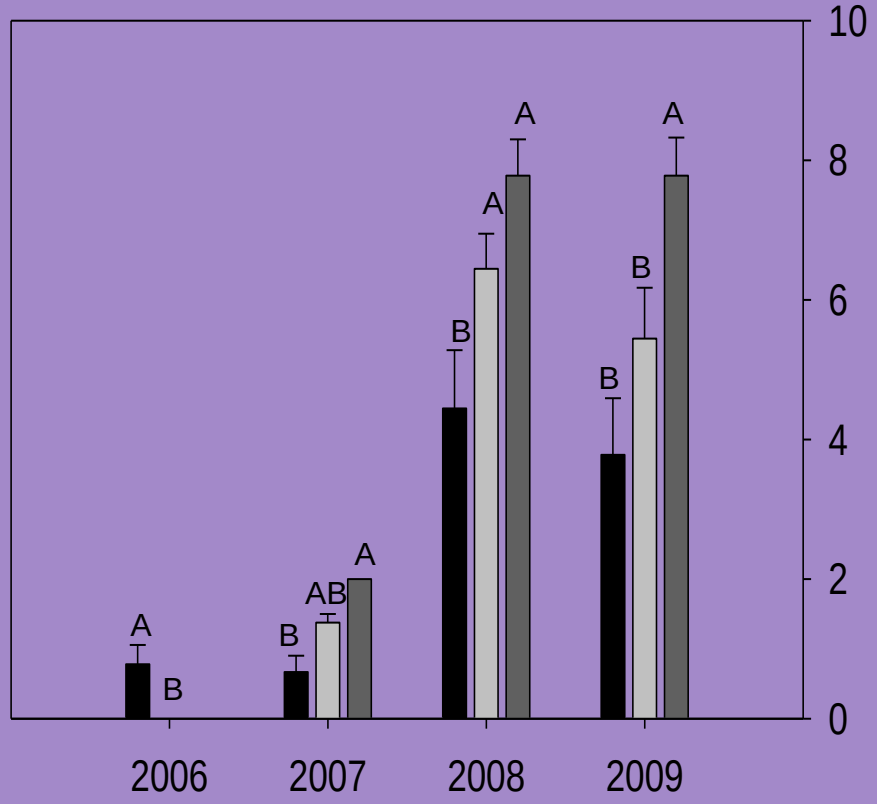

Data supplied by Riverside County Flood Control and Water Conservation District

# Species Richness

## Non-native

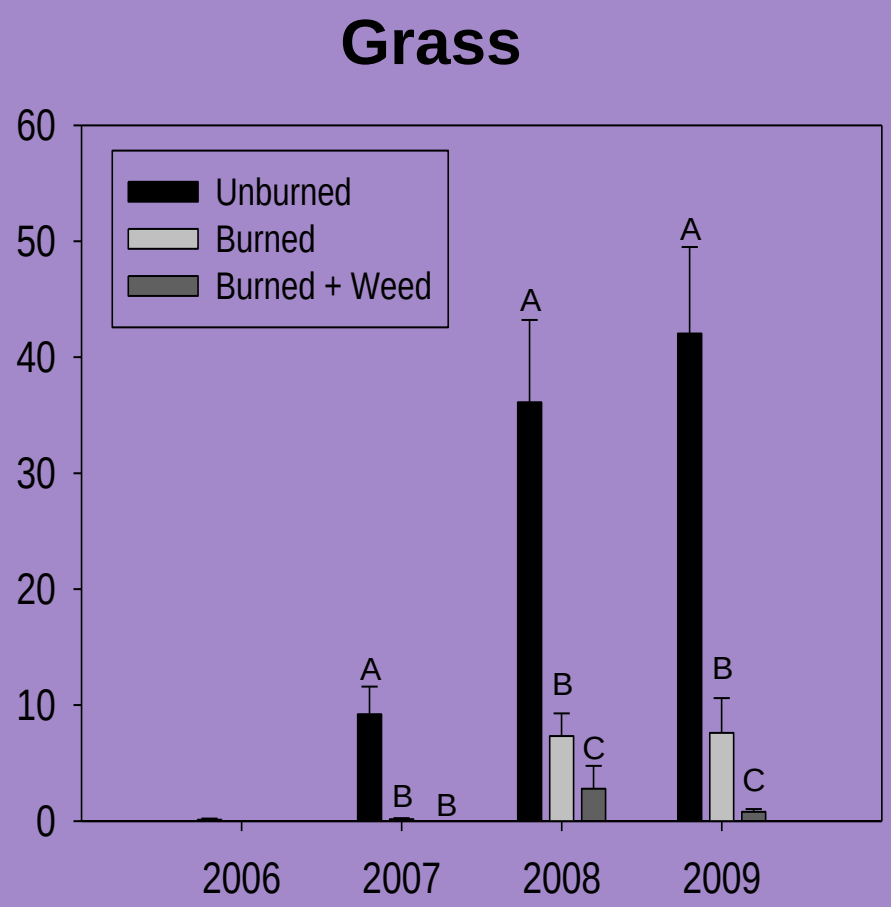


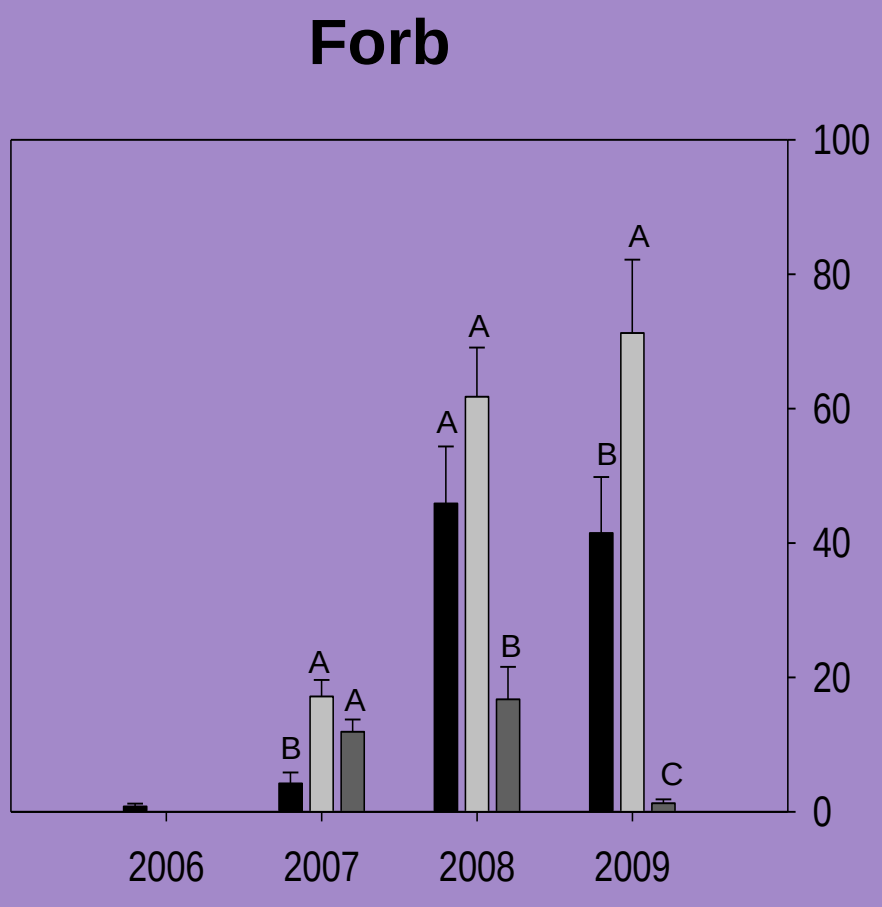

## Native




Total species richness per 0.5m$^2$.
ANOVA's from individual years.

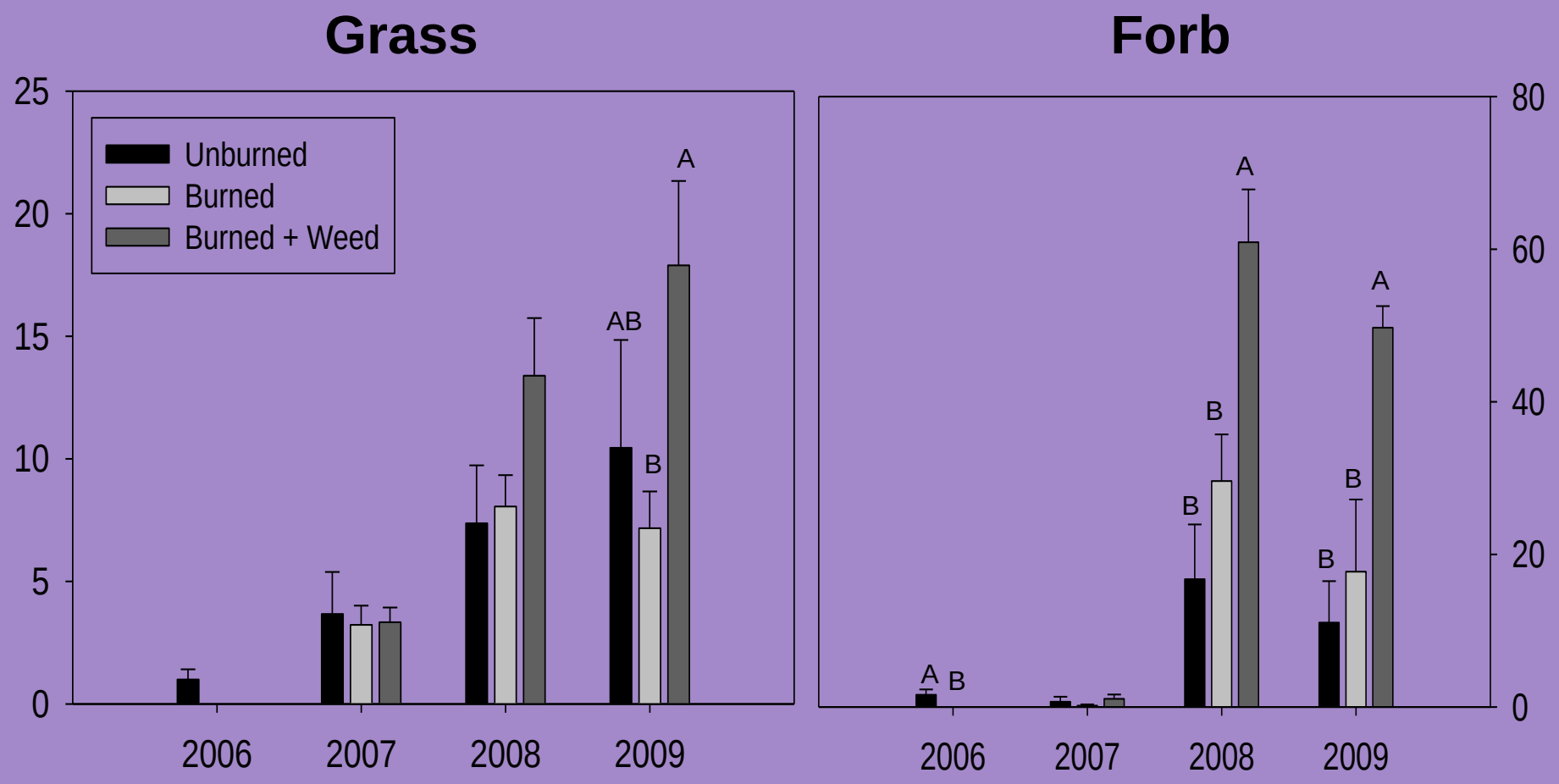
# Non-native Species Percent Cover




Non-native species percent cover per 0.5m$^2$.
ANOVA's from individual years.

# Native Species Percent Cover




Native species percent cover per 0.5m$^2$.
ANOVA's from individual years.

# Conclusions

- Fire decreased non-native grass cover for the length of the study.
- Native species richness was initially increased with both fire treatments.
- The increase in native diversity is mainly in fire following species.
- Non-native forb cover increased with burning
- Native forb cover increased in burn + weeding treatments.
- Erodium spp are competing with *Nassella pulchra* slowing recovery.

# Management Implications

- Weeding is not logistically realistic for large areas. Further research using herbicide following fire is necessary.
- Management practices may take multiple years of application.
- Precipitation in the season of and following management will be important but unpredictable.


# Future work

- Following the plant community recovery one more year.
- Testing herbicide methods for non-native forb control after fire.
  - Roundup and Fusilade following *Erodium spp* germination.
  - seeding treatments to test seed-bank limitations.

Student Chapter
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