

Santa Rosa Plateau Habitat Studies and Restoration Program: Integrating research and environmental education to restore native California grasslands



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California Invasive Plant Council 2015 Symposium
October 29th 2015

Thanks to Rob Hicks & Amanda Swanson



Santa Rosa Plateau Habitat Studies and Restoration Program: Integrating research and environmental education to restore native California grasslands

Outline of presentation

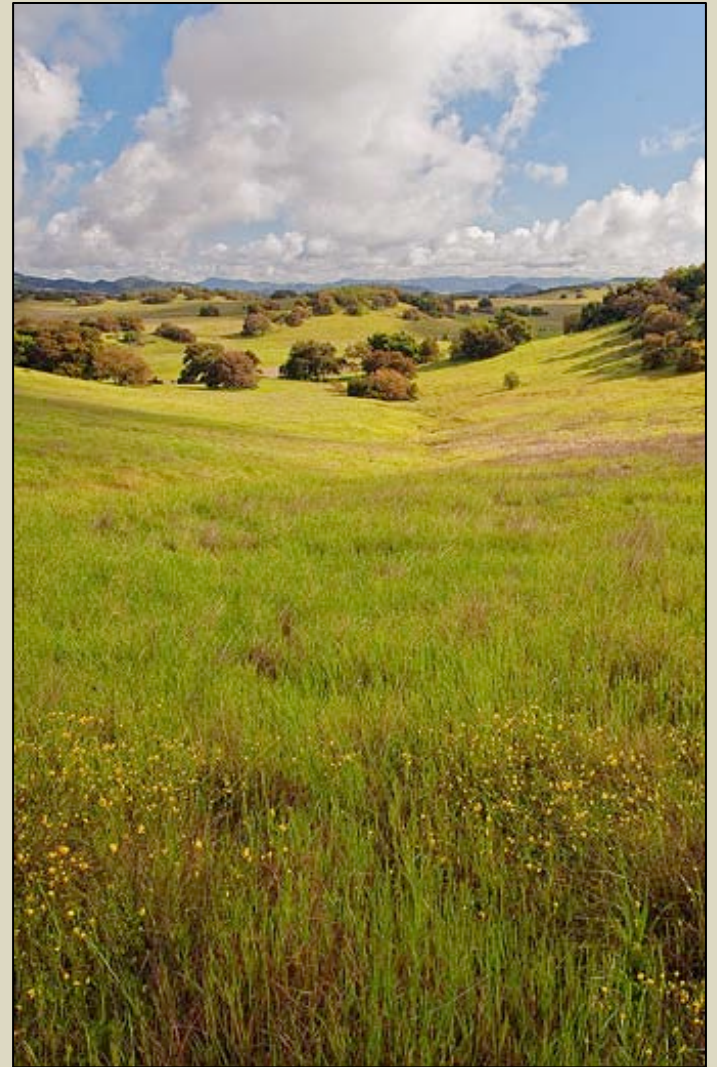
- Native California grasslands
- Restoration challenges
- Educational challenges
- Overview of program
- Mulching experiment
- Mowing experiment
- Seedbank experiment
- Outcomes and conclusions



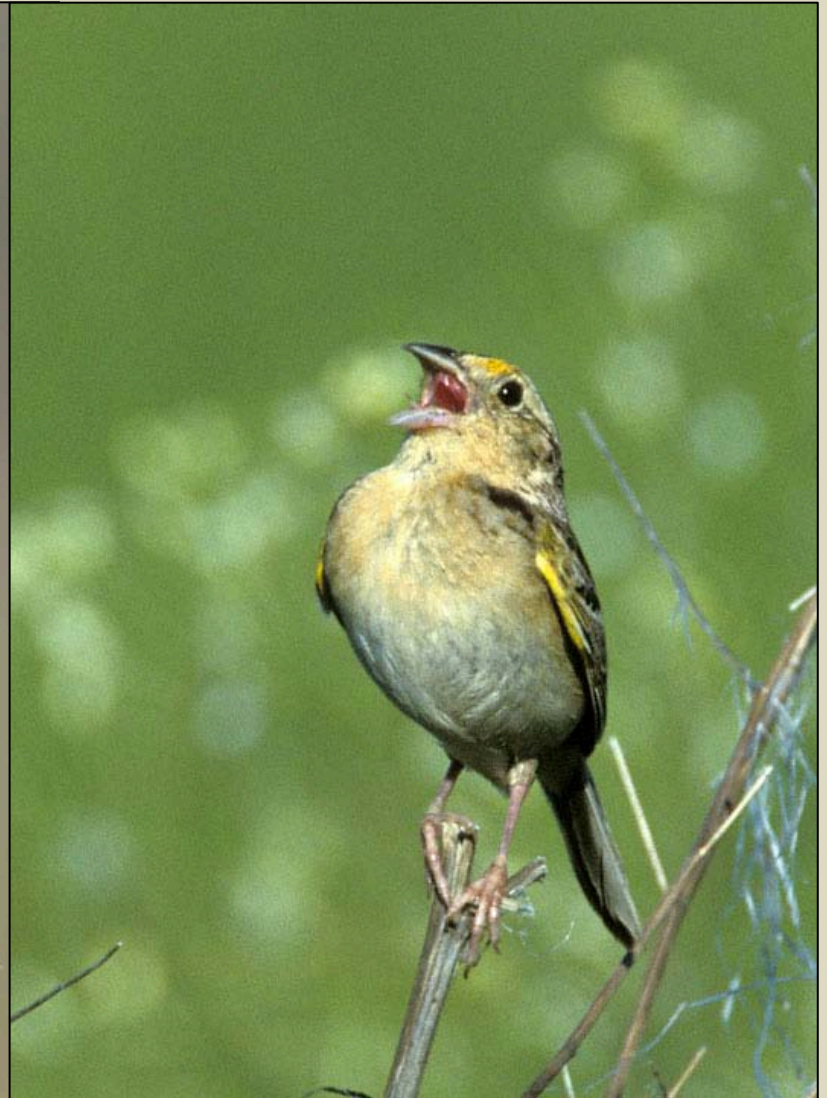
California Native Grasslands

- Consist of native perennial bunchgrasses and forbs
- Over 300 species of native grasses in California
- Biologically diverse
- 90% of rare and endangered species in California inhabit grasslands

*California Native Grassland Association



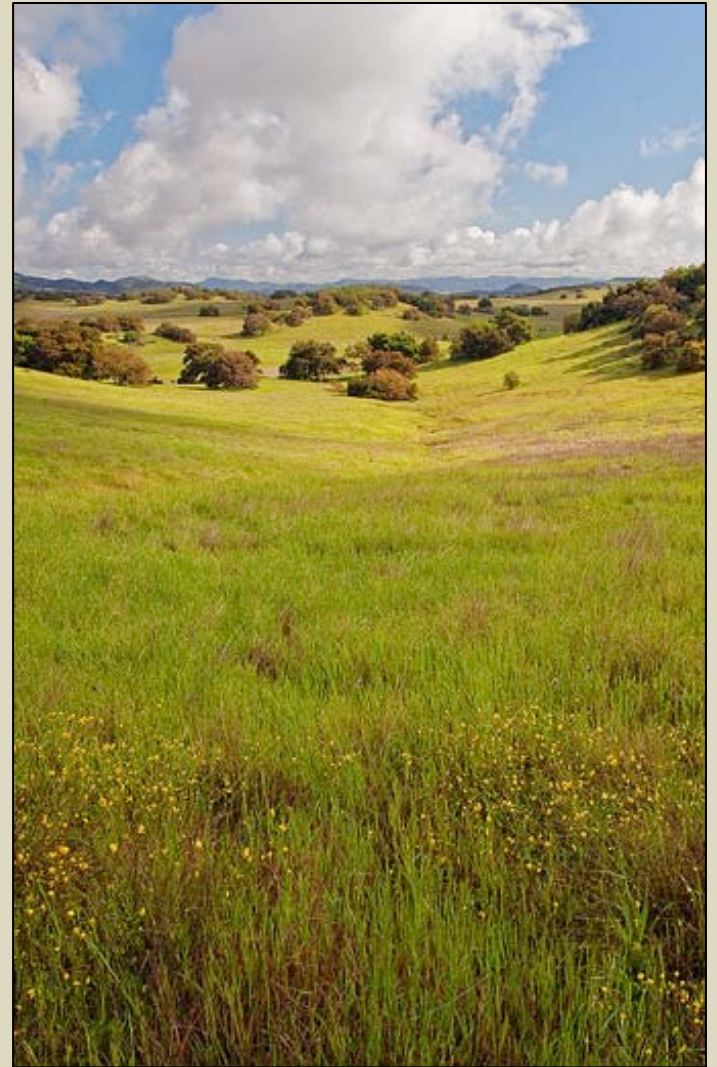
California Native Grasslands



Restoration Challenges

Native grasslands have been reduced to 1% of historic range due to:

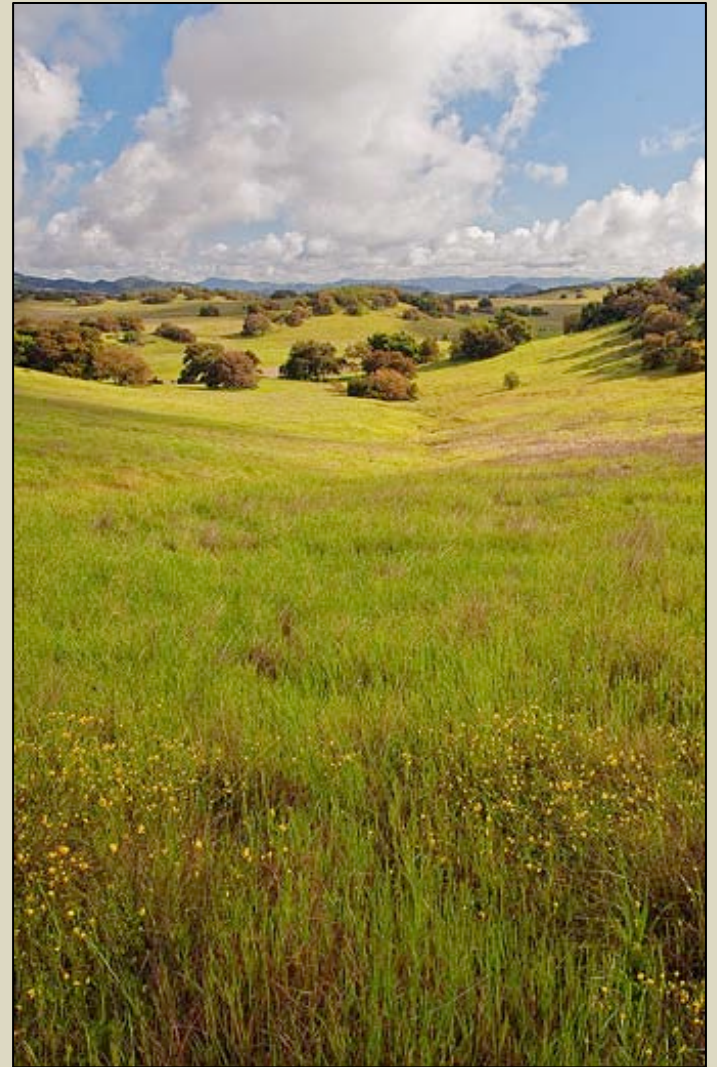
- Cultivation
- Grazing
- Urbanization
- Fire suppression
- Invasive grasses and forbs



Restoration Challenges

Limits to restoration:

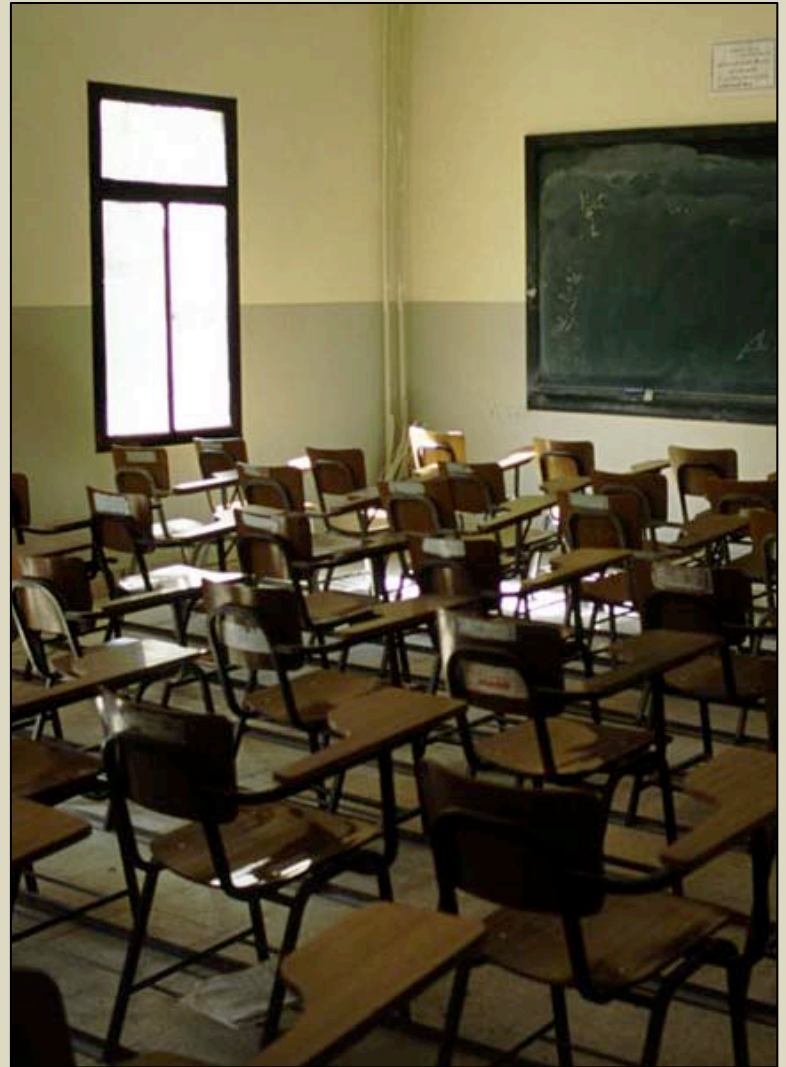
- Widespread invasion
- Loss of native species in the seedbank
- Global change factors (e.g. drought)
- Funding
- Resource and time constraints



Education Challenges

Problems and Challenges:

- California's education system ranks near the bottom of all states
- Educational quality and equality
- Lack of resources and funding
- Cuts to extracurricular and other programs
- California's students perform poorly in STEM
- Lack of opportunities for outdoor or environmental education



Education Challenges

Percent of California Students Scoring Proficient or Above in Science

Grade	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Change in Percentage 2015-2014	Change in Percentage Overall ³
Grade 5	24	28	32	37	46	49	55	58	60	57	60	55	-5	31
Grade 8	--	--	38	42	52	56	59	63	66	67	66	64	-2	26
Grade 10	--	--	35	35	40	44	46	50	53	54	56	53	-3	18
State Total 5, 8, and 10	--	--	35	38	46	50	53	57	60	59	61	57	-4	22

Preventing Plant Blindness

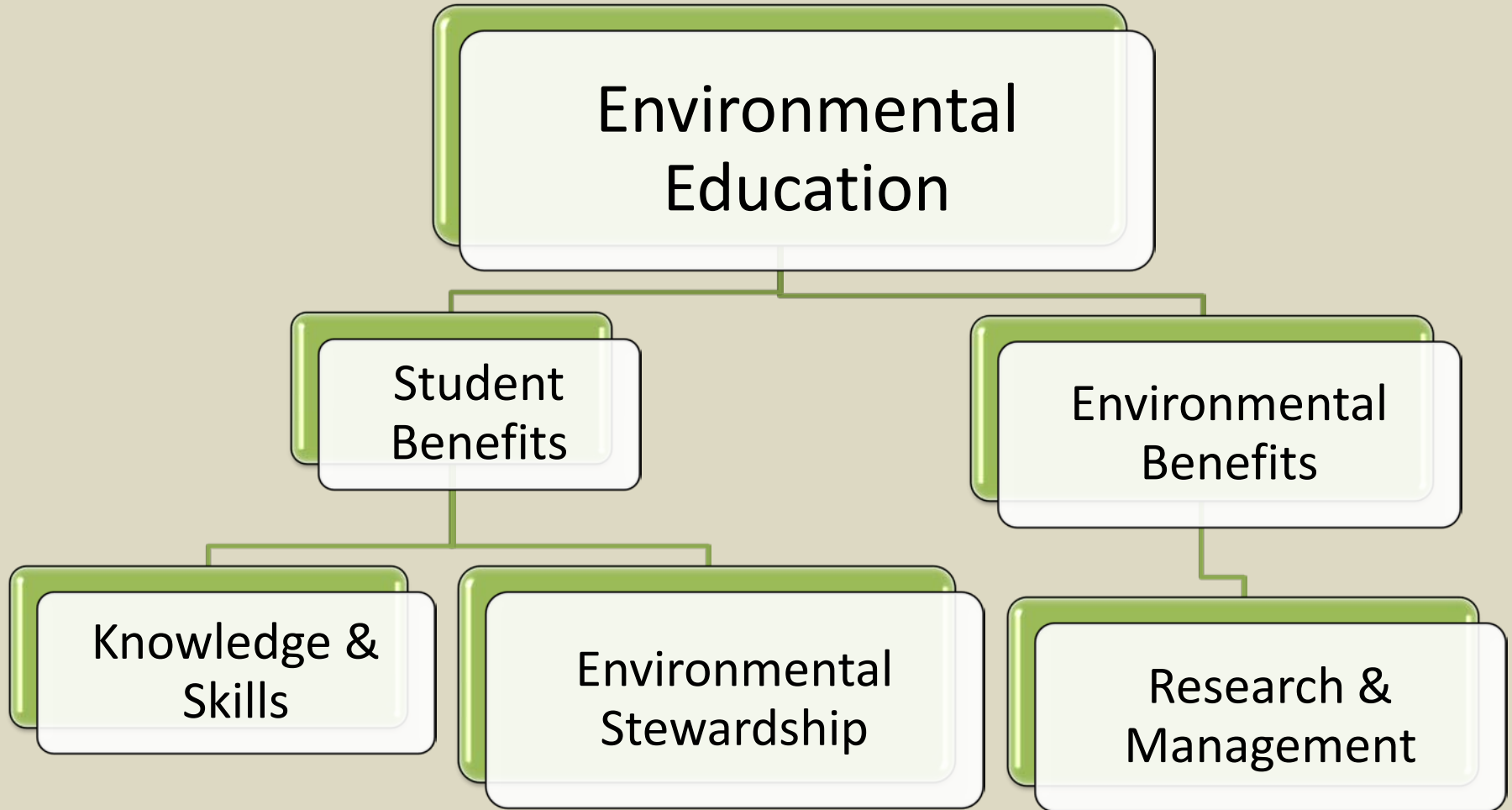
Plant Blindness

- Wandersee & Schussler The American Biology Teacher (1999)
- Plants go relatively unnoticed and unappreciated compared to animals
- People prefer to view objects between 0 and 15 degrees below eye-level
- Selective information processing
- Students have little understanding of botany or the importance of plants
- Only 7% of students surveyed expressed scientific interest in plants (2/3 of were female)



Program Overview

Habitat Studies & Restoration Program



Program Overview

“No child left inside”

Habitat Studies & Restoration Program

- **Mission:** to educate and empower youth to appreciate, protect and preserve nature
- Funded by the Santa Rosa Plateau Foundation
- Collaborators:
 - Santa Rosa Plateau Ecological Reserve
 - Murrieta School District
 - California Fish & Wildlife
 - Riverside County Regional Parks
 - University of California, Riverside
 - Cal-IPC Student Chapter

Santa Rosa Plateau Foundation



**Habitat
Studies
and
Restoration**

An Environmental Education Pathway

Santa Rosa Plateau



High School: Mulching Experiment

Does mulching benefit native grassland species?

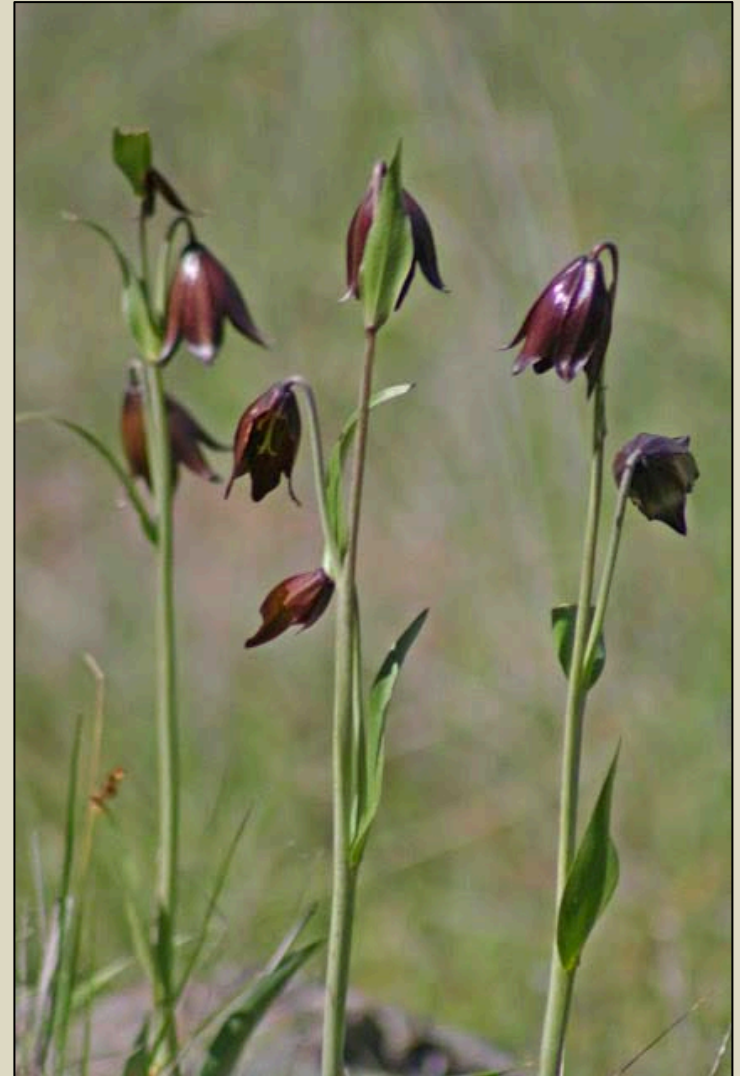
- Students hypothesized increased moisture due to mulching would benefit natives
- Installed 1 m² plots (control and mulched)
- Mulch added in early fall
- Plots monitored throughout the year



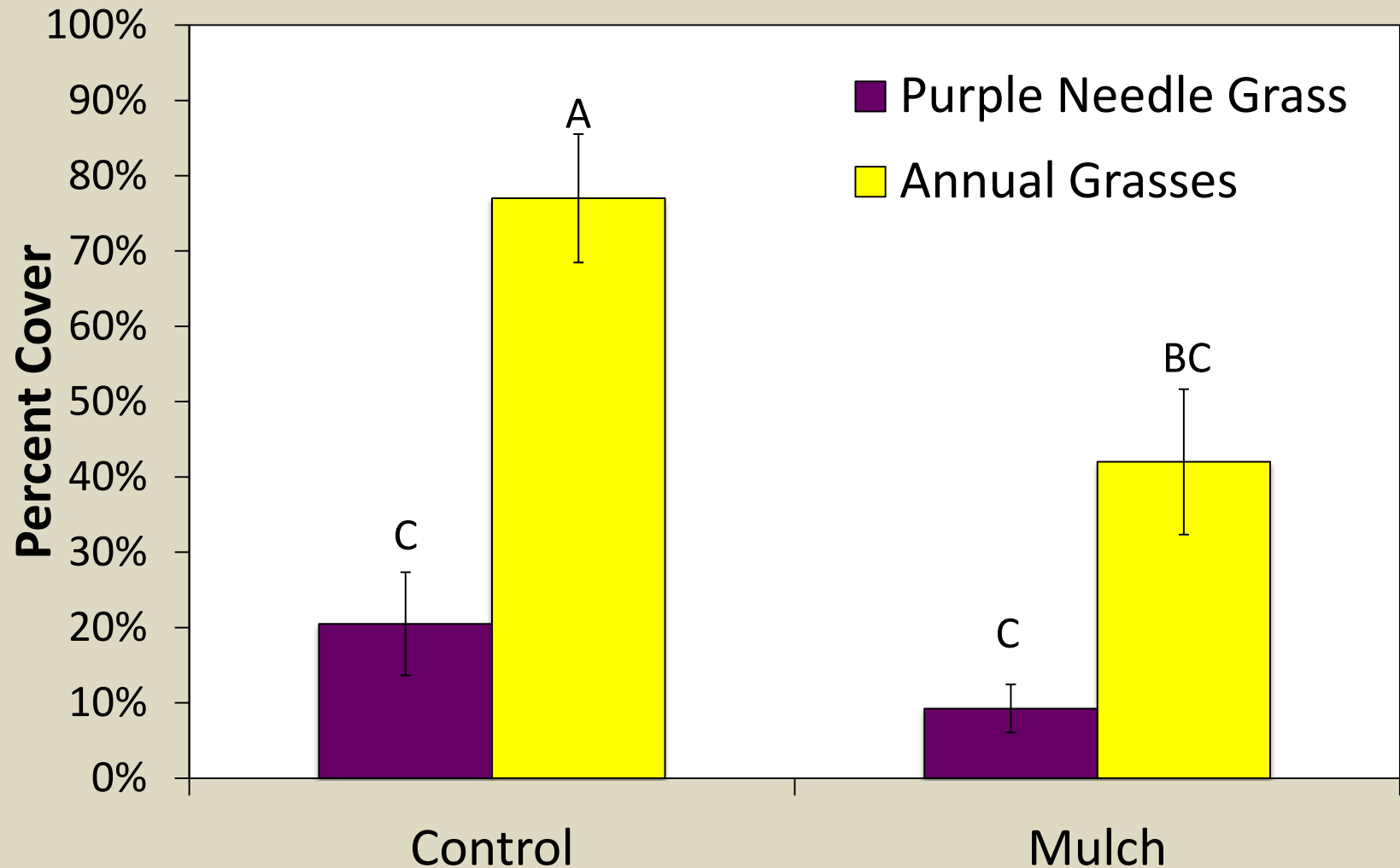
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High School: Mulching Experiment



Mulching may reduce native grass cover, but does not benefit native bunchgrass (may actually harm).

8th Grade: Mowing Experiment

Does mowing benefit native grassland species?

- We hypothesized mowing would reduce nonnative grass seed inputs
- Reduced nonnative grasses and increased light would benefit native bunchgrasses



8th Grade: Mowing Experiment

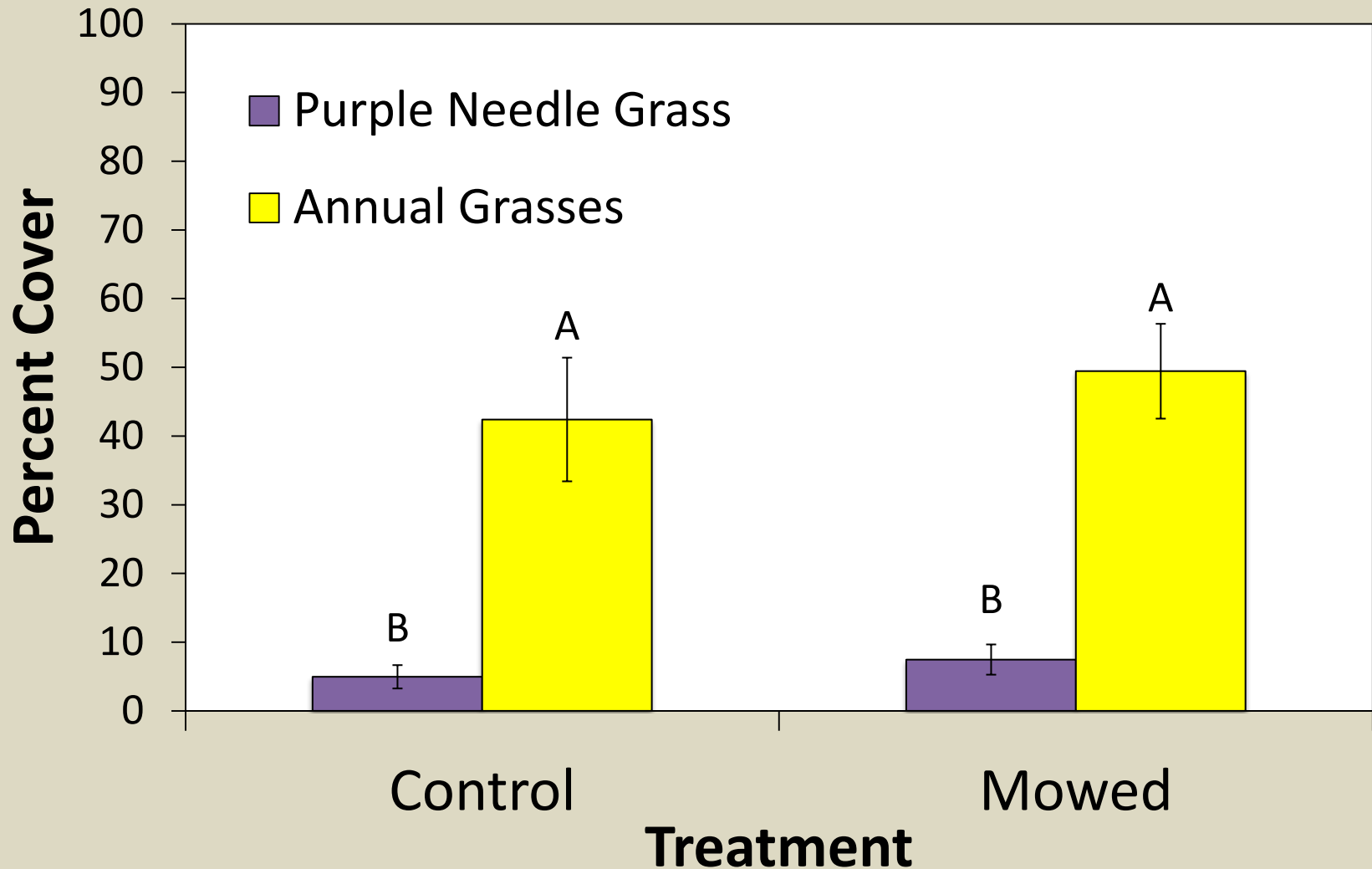
Experimental Design

- Initiated in 2011
- Block design: 2 mowed, 2 control
- 6 transects per treatment
- 5 plots per transect
- 30 replicates per treatment
- Blocks are mowed each spring before exotic annual grasses set seed
- Monitored throughout the growing season



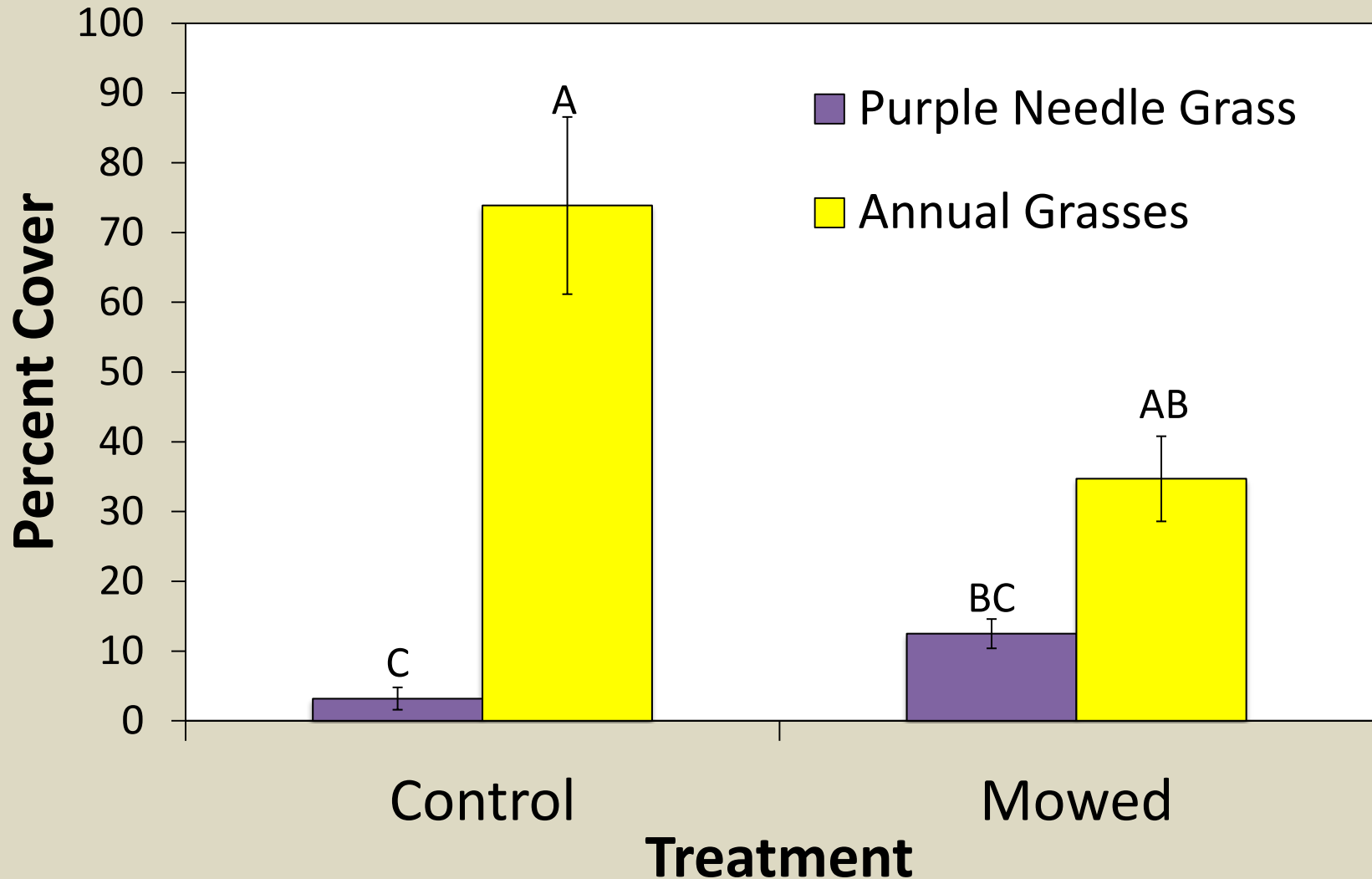
8th Grade: Mowing Experiment

2014 Plant Cover

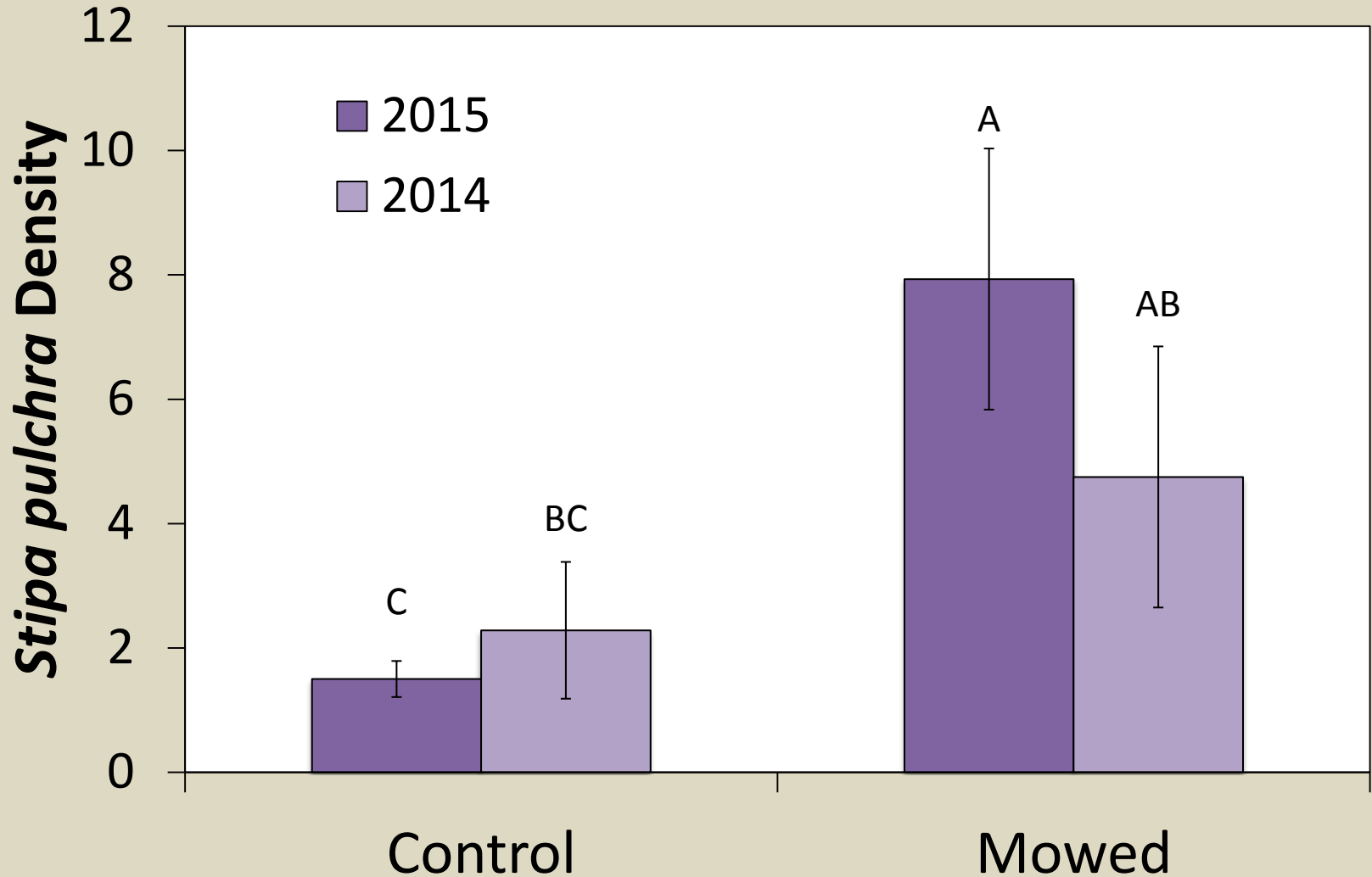


8th Grade: Mowing Experiment

2015 Plant Cover



8th Grade: Mowing Experiment



8th Grade: Mowing Experiment

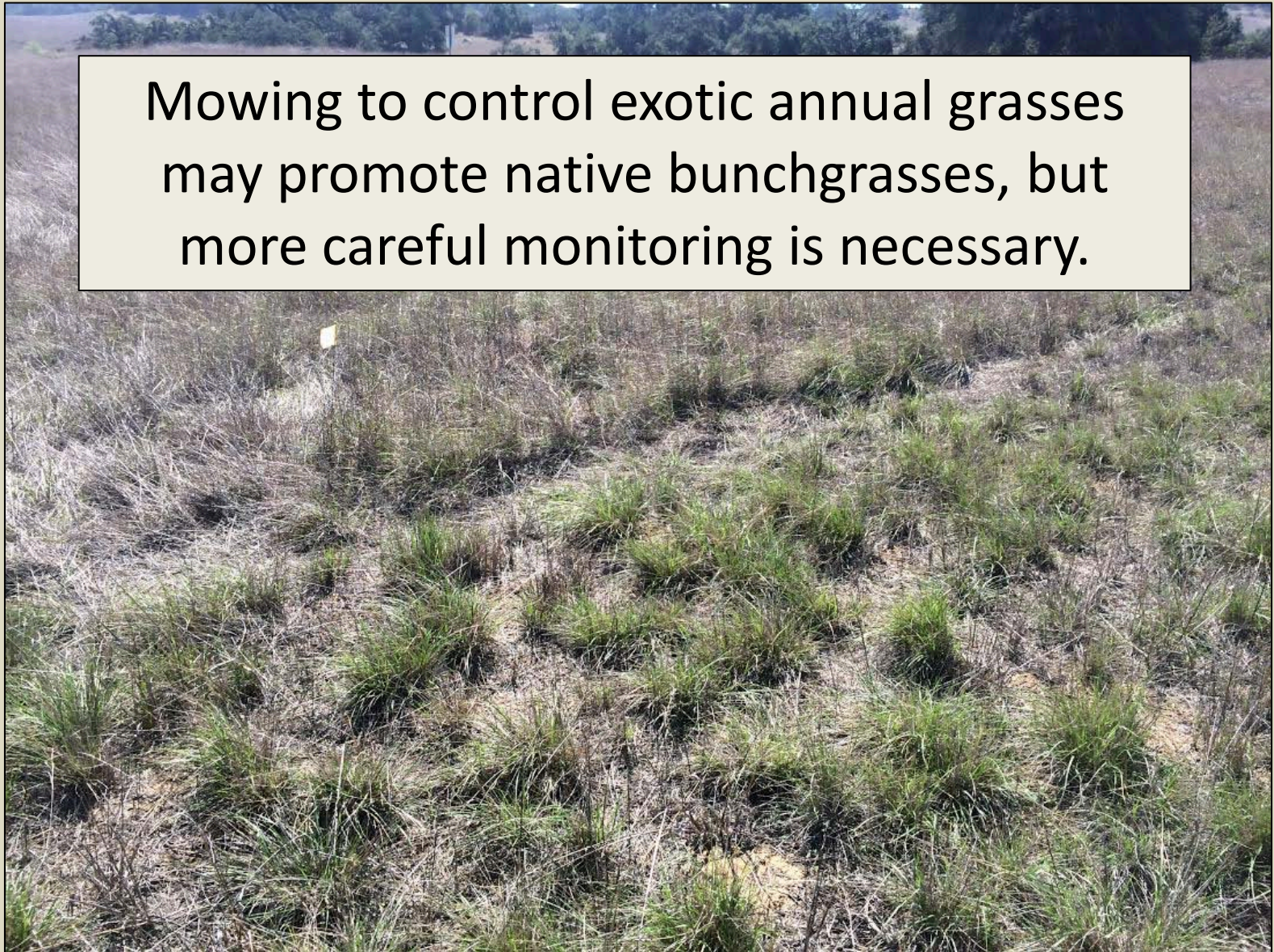


8th Grade: Mowing Experiment



8th Grade: Mowing Experiment

Mowing to control exotic annual grasses may promote native bunchgrasses, but more careful monitoring is necessary.



8th Grade: Mowing Experiment

What about nonnative dicot weeds?



8th Grade: Mowing Experiment

What about native summer annuals?



8th Grade: Mowing Experiment

“Being able to go outside and perform real science is exciting and fun to experience.”

“I thought it was cool to make a real difference instead of just learning from a textbook.”

“I liked taking scientific data and in the end getting to see how our work was important. Thank you Justin and Bridget!”

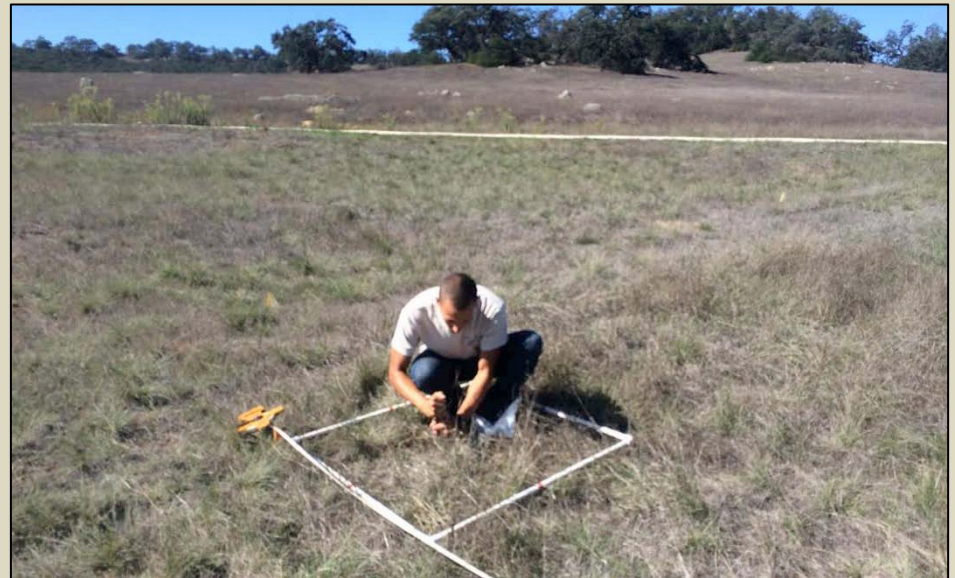
“I’d never really considered a field like this for my career, and now I’m starting to.”

“I liked being treated like I was mature enough to do something about the world, and that’s a great feeling.”

5th Grade: Seedbank Study

How does mowing influence native and nonnative species in the seedbank?

- Students visit Plateau in September to collect soil samples
- Grow out samples in the classroom
- Identify native and nonnative seedlings
- UCR undergraduate Daniel Sanchez conducting parallel study (2015)



Conclusions

- Mulching may reduce annuals grasses, but does not benefit native bunchgrasses
- Mowing appears to favor native bunchgrasses and reduce annual grasses
- Seedbank study results pending, but annuals appear reduced
- SRPHSR Program helps meet both environmental and educational challenges in California



Questions?

