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

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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
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

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³Overall change calculated from a base year of 2004.

- Data represents the percentage of students scoring proficient or above in science for each grade level over a span of years, from 2004 to 2015.
- The table shows the steady increase in proficiency rates from 2004 to 2015, with some fluctuations between years.
- The overall change in percentage is provided for each grade level, indicating improvement in educational outcomes over time.
Preventing Plant Blindness

Plant Blindness

- 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

Environmental Education

- Student Benefits
  - Knowledge & Skills
  - Environmental Stewardship
- Environmental Benefits
  - Research & Management
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
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
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
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

- Purple Needle Grass
- Annual Grasses

Treatment

Control

Mowed

Percent Cover

0 10 20 30 40 50 60 70 80 90 100

B A B A

- "B" indicates a significant difference from the control group.
- "A" indicates a significant difference from the mowed group.
8th Grade: Mowing Experiment

2015 Plant Cover

- **Purple Needle Grass**
- **Annual Grasses**

<table>
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<th>Treatment</th>
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### 2015 Plant Cover

- **Purple Needle Grass**
- **Annual Grasses**
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.”
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?