

**Invasive grasses can be your friends:
Use of songbirds and other observable wildlife as
metrics for selective acceptance of non-natives in
restoration**

Sandra A. DeSimone, Director of Research and Education

Matt Skarie, Field Supervisor

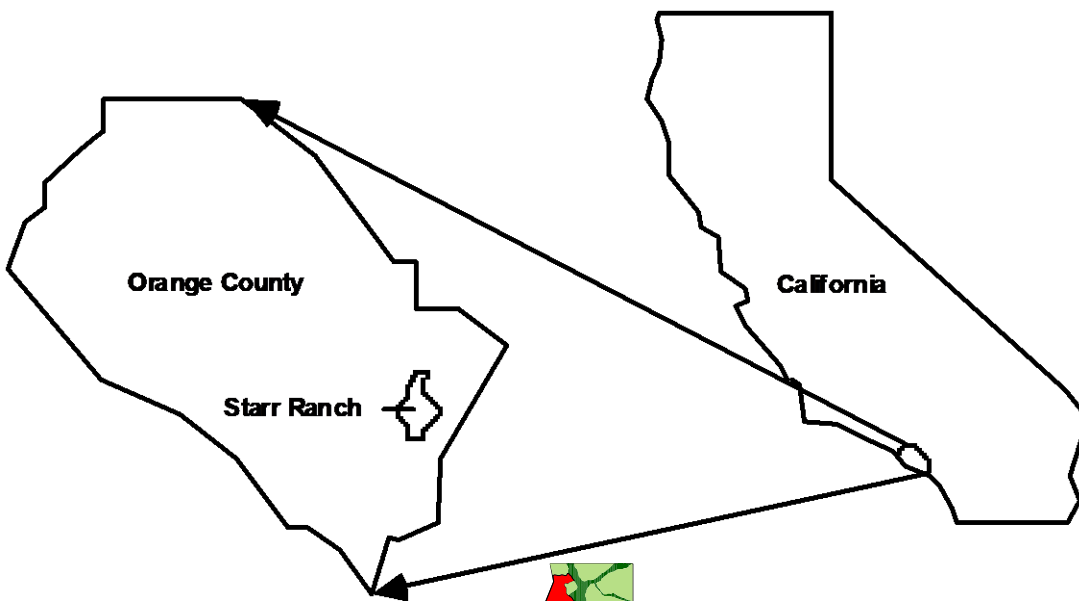
Mickie Tang, Research Assistant

Scott E. Gibson, Wildlife Ecologist








Audubon CALIFORNIA

STARR RANCH SANCTUARY



Starr Ranch Vegetation

-  Oak Woodland
-  Coastal Sage Scrub
-  Riparian Woodland
-  Grassland
-  Chaparral

Audubon Starr Ranch Land Manager Goal

Protect and restore native habitat for birds and other wildlife



Audubon Starr Ranch Land Manager Challenges

1. Restore and monitor rare native habitats

Coastal Sage Scrub

Needlegrass Grassland

Riparian Woodland

2. Monitor effects on birds and other wildlife

3. Non-native species control



Initial phases of a new non-native introduction

Go for it! (remove)

Early Detection

Shackelford et al. Biological Conservation 2013



Established non-native populations

Assess impacts

Impacts to biodiversity, ecosystem function, resilience

Shackelford et al. Biological Conservation 2013

BUT Managers need parameters we can measure:

- Ecosystem function (dynamic process): biotic-biotic interactions
e.g. Habitat provision for observable wildlife
- Does the established non-native have positive or neutral effects ?



Hybrid Ecosystem

Hybrid ecosystem: non-natives and natives

Retains historic system characteristics but composition or function lies outside historic range of variability

Novel ecosystem: non-natives

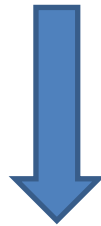
Composition or function completely transformed from historic system - human induced (disturbance, stress)

Hobbs et al. 2009

Starr Ranch: currently low anthropogenic disturbance & stress (grazing ended 1963, last fire in 1980, relatively low N deposition) = consider hybrid, not novel ecosystems

Established non-native populations

Does the established non-native have positive or neutral effects on observable wildlife: **songbirds and small mammals** ?



Hybrid Ecosystem

Hybrid Ecosystem Decision Making

Coastal Sage Scrub Restoration







Spring 2002



Spring 2009



Non-native annual grass control → dicot eruption



Develop New Strategy:

Fact: Control annual grasses = risk less manageable dicot invasive

(Cox and Allen 2008)

+

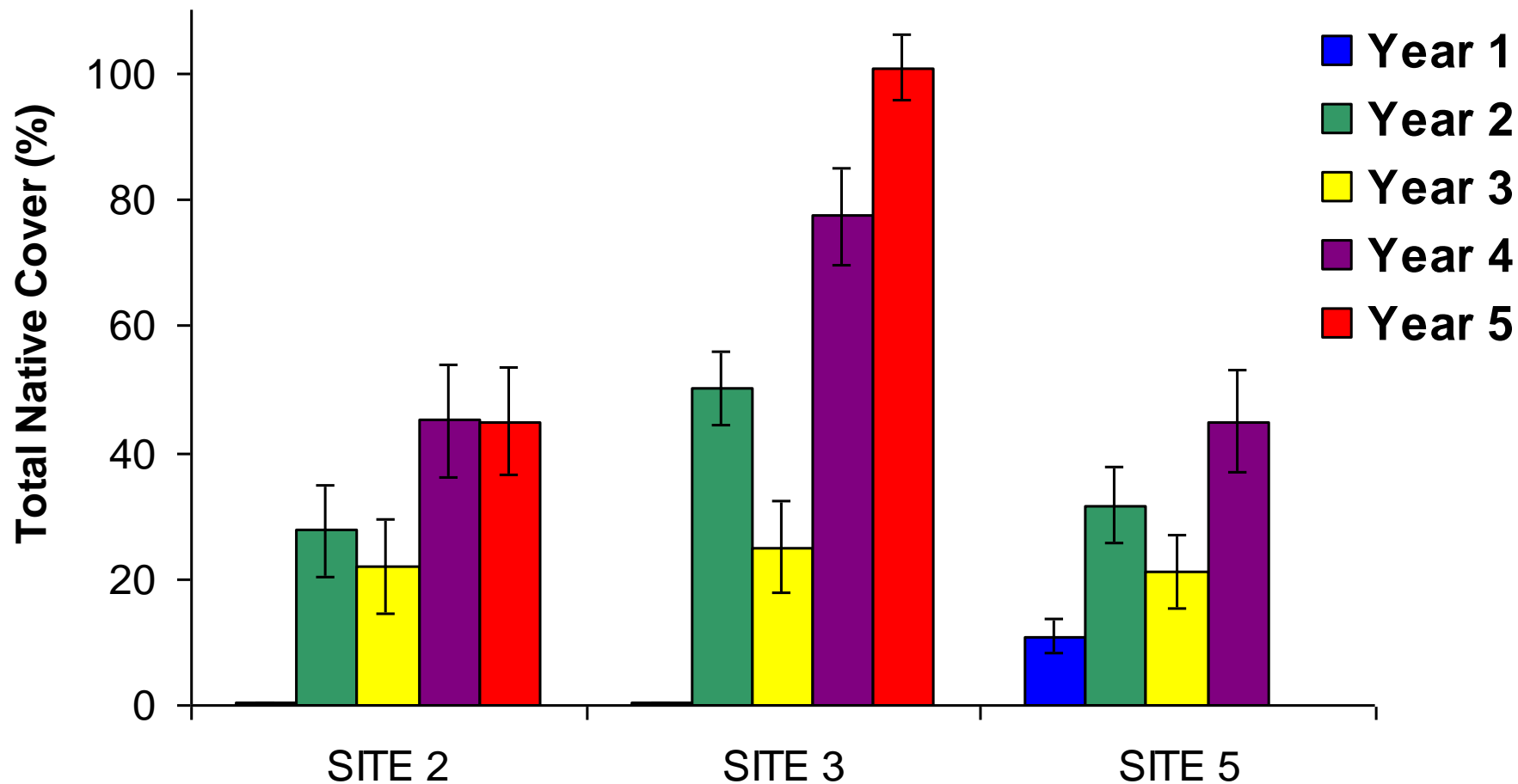
Fact: Native shrubs colonize annual grasslands *(DeSimone and Zedler 2001)*

=

Strategy: Target non-native dicot invasives,
Leave non-native annual grasses,
Monitor effects on native plants and wildlife

Total Native Cover in Buffers Between Strips

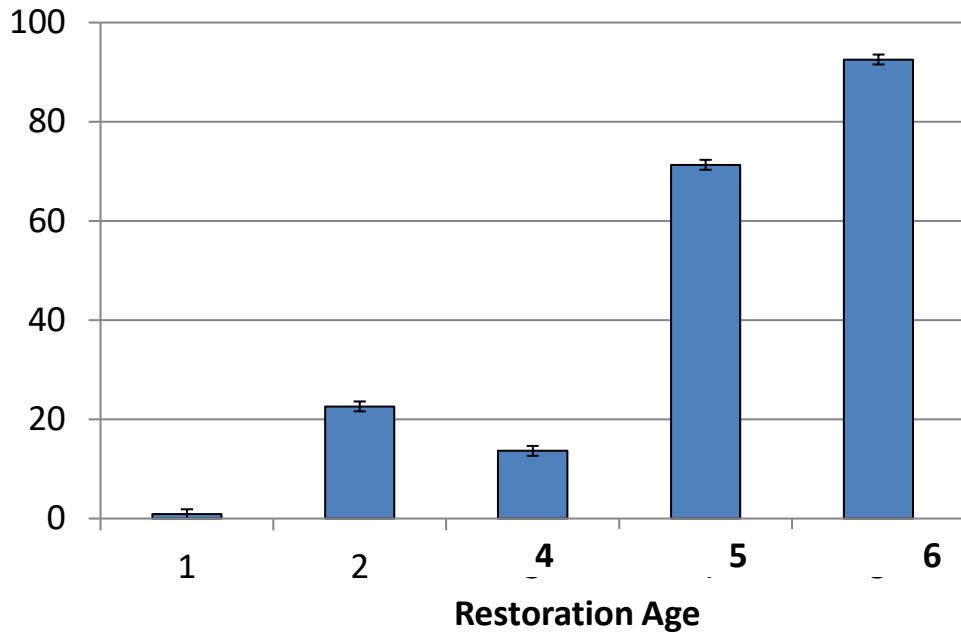
n = 20



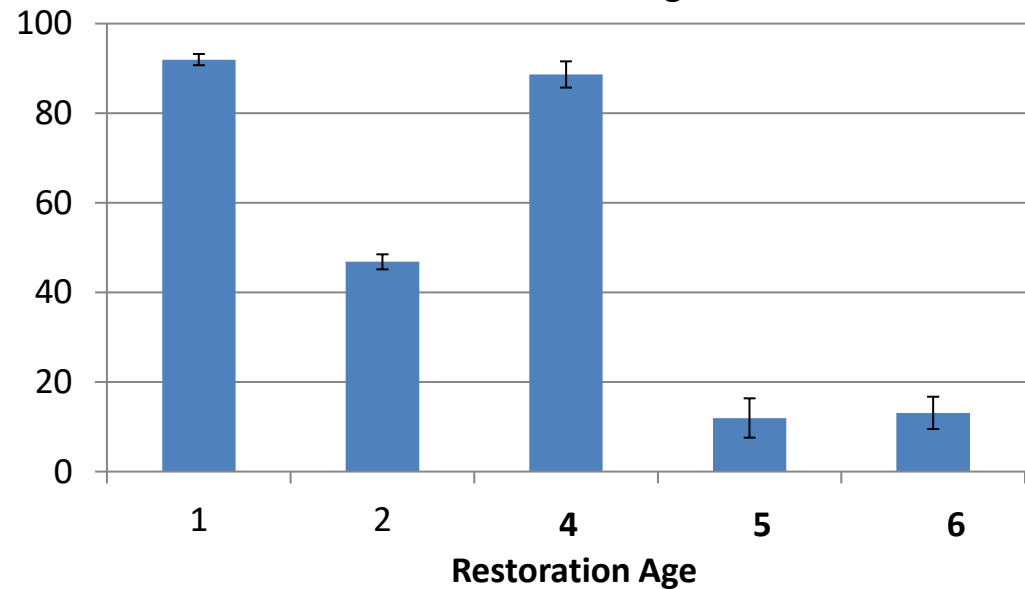
No non-native annual grass control

DeSimone Ecological Restoration 2011.

Total Native Cover Over Restoration Chronosequence



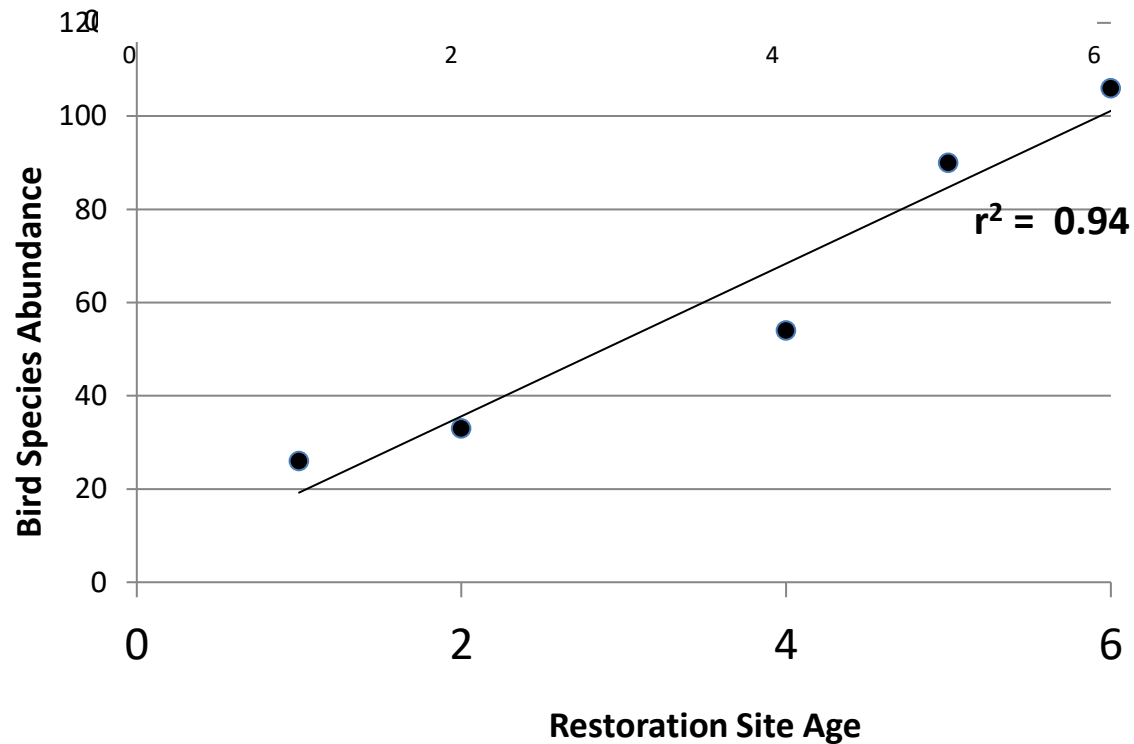
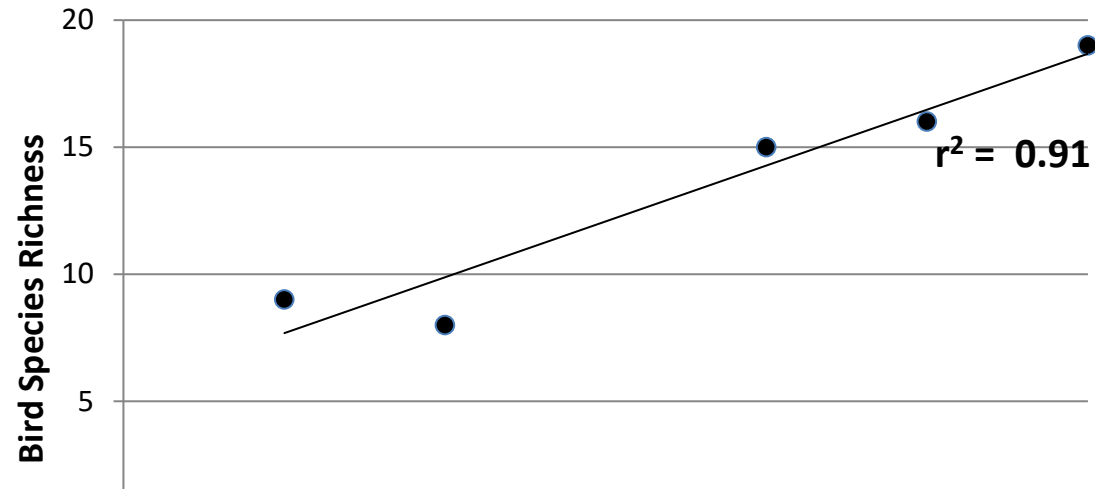
Annual Grass Cover Over Restoration Chronosequence

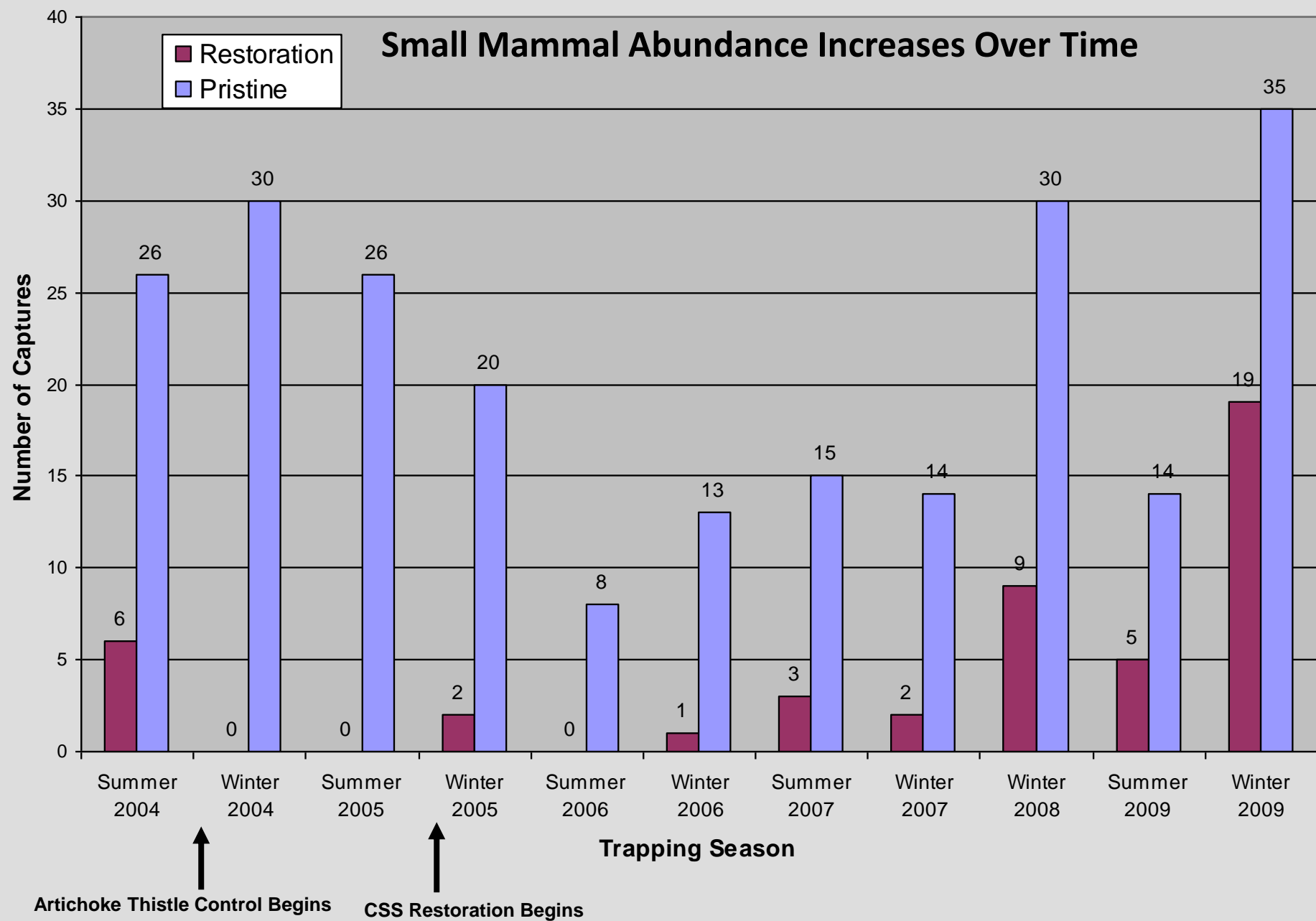


n = 40

No non-native annual grass control

Restoration Chronosequence: Spot Mapping



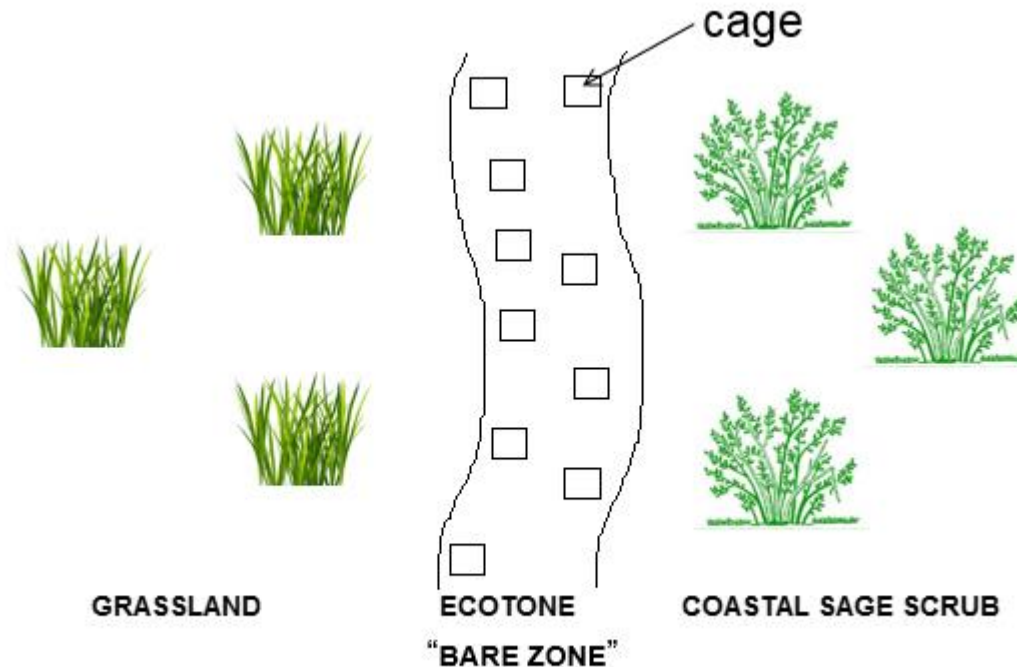


Natural Coastal Sage Scrub Patterns and Processes

What We Know

Aerial photo analysis 1945-1993: shrublands move into grasslands

Mechanism: small mammalian herbivory in the grassland – CSS ecotone



Herbaceous cover (%)

CAGE 44.4 ± 4.19 ***

NO CAGE 8.0 ± 1.22

*** $p < 0.001$

df = 16

DeSimone and Zedler 1999

Bare Areas Develop Adjacent to Strips

Do herbivores create bare areas later colonized by shrubs?

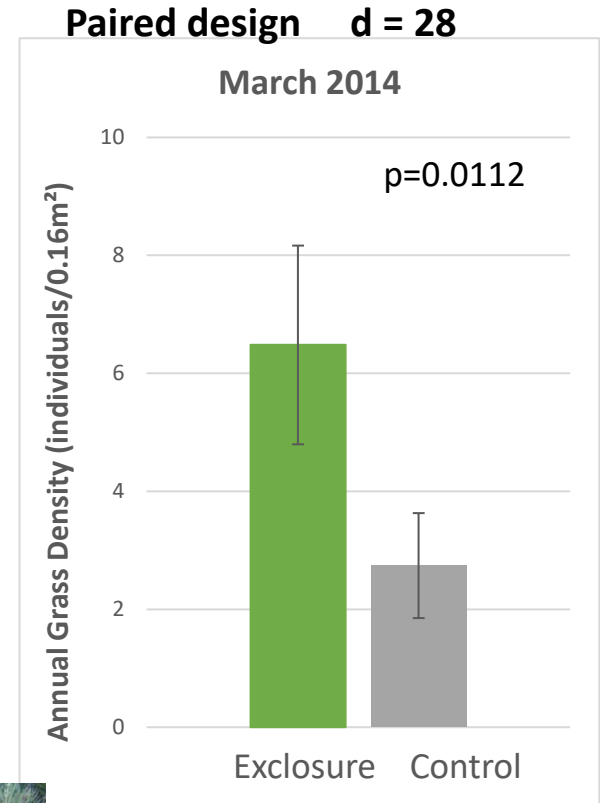
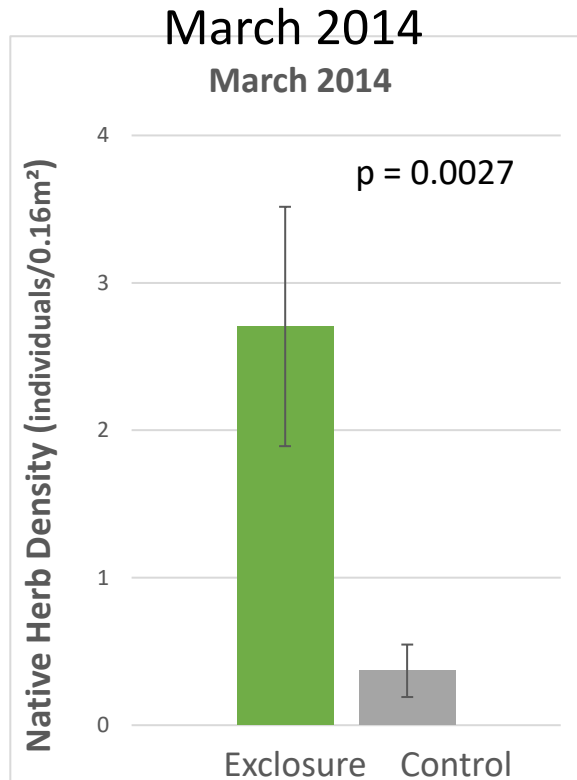
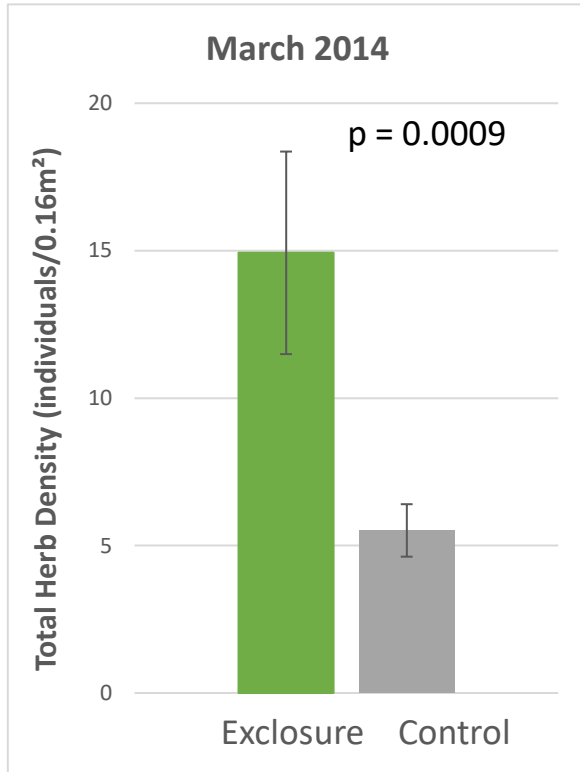


Exclosure Experiment

Is there an effect of herbivores on non-native species in buffers?



Exclosure Experiment: Results









Mature shrubs in planted strips provide shelter, predator avoidance

Rodents, rabbits, (and birds) consume non-native annual grass foliage and fruits in buffers between strips

Native shrubs colonize resulting bare ground in buffers



Conclusions (CSS Restoration):

- Neutral effects non-native annual grasses on wildlife = “accept”
- Hybrid ecosystem → native shrub-dominated
- **Mechanism: herbivory (rabbits, rodents, birds)**

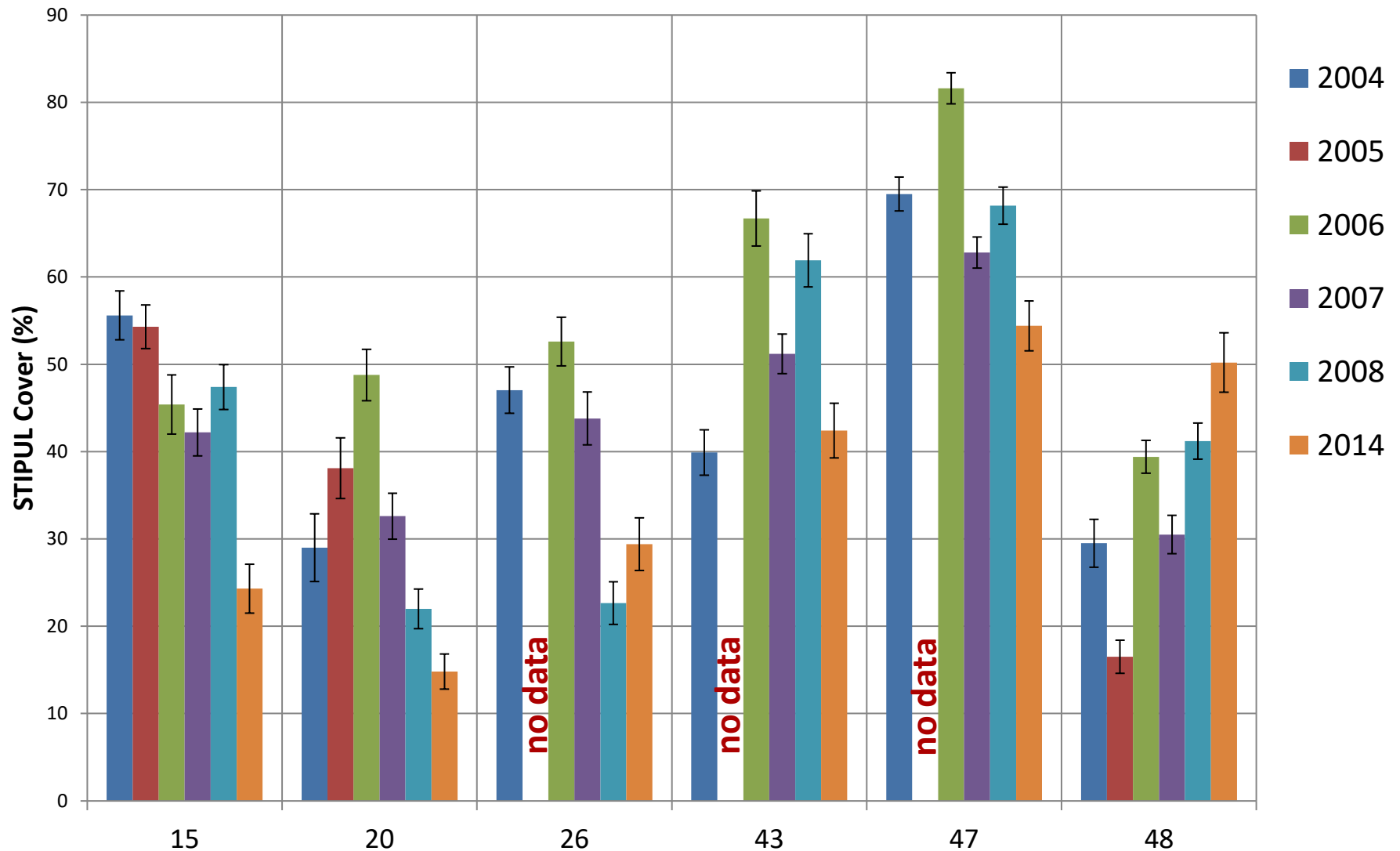


Hybrid Ecosystem Decision Making

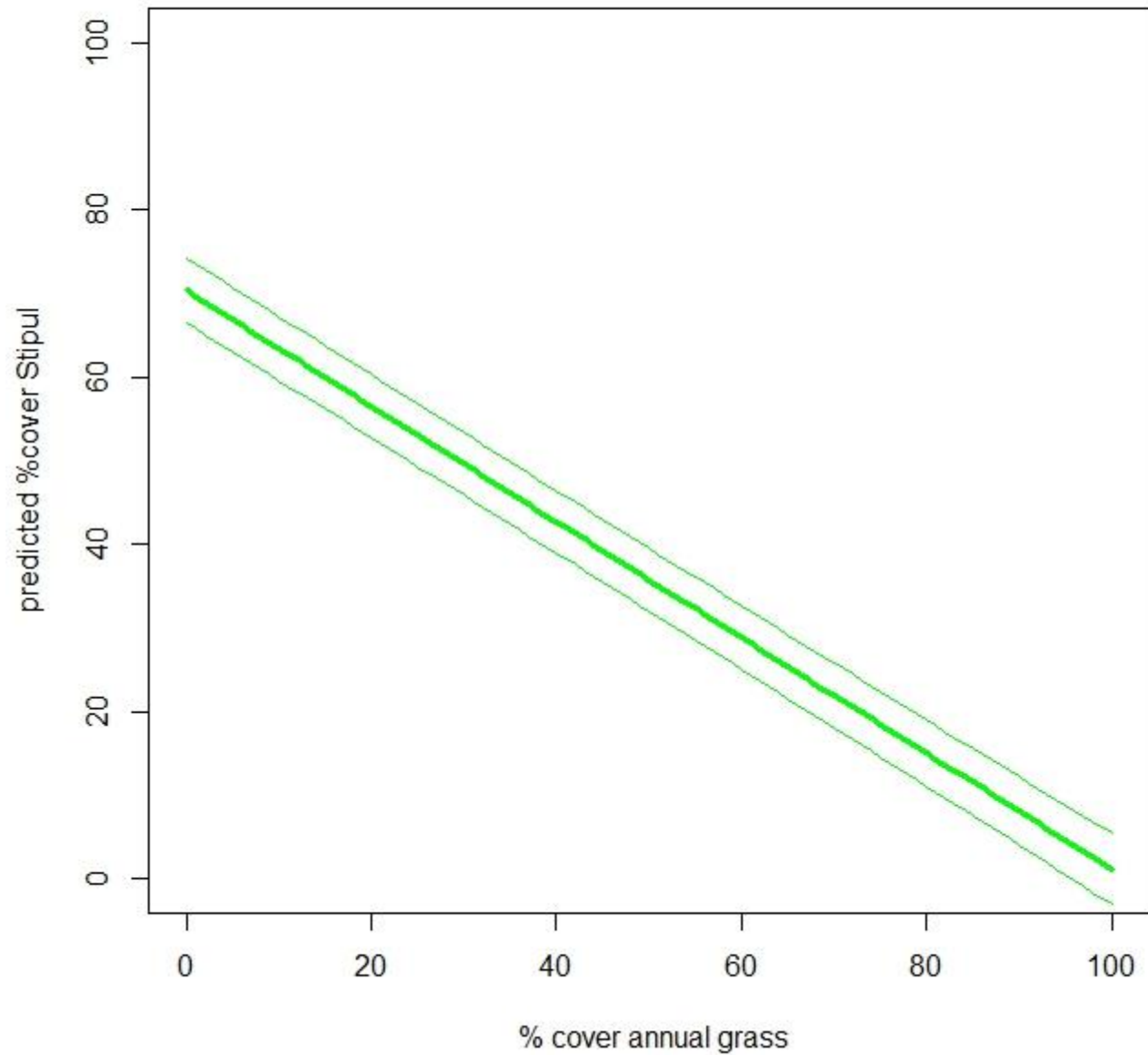
Natural Needlegrass Grassland Enhancement



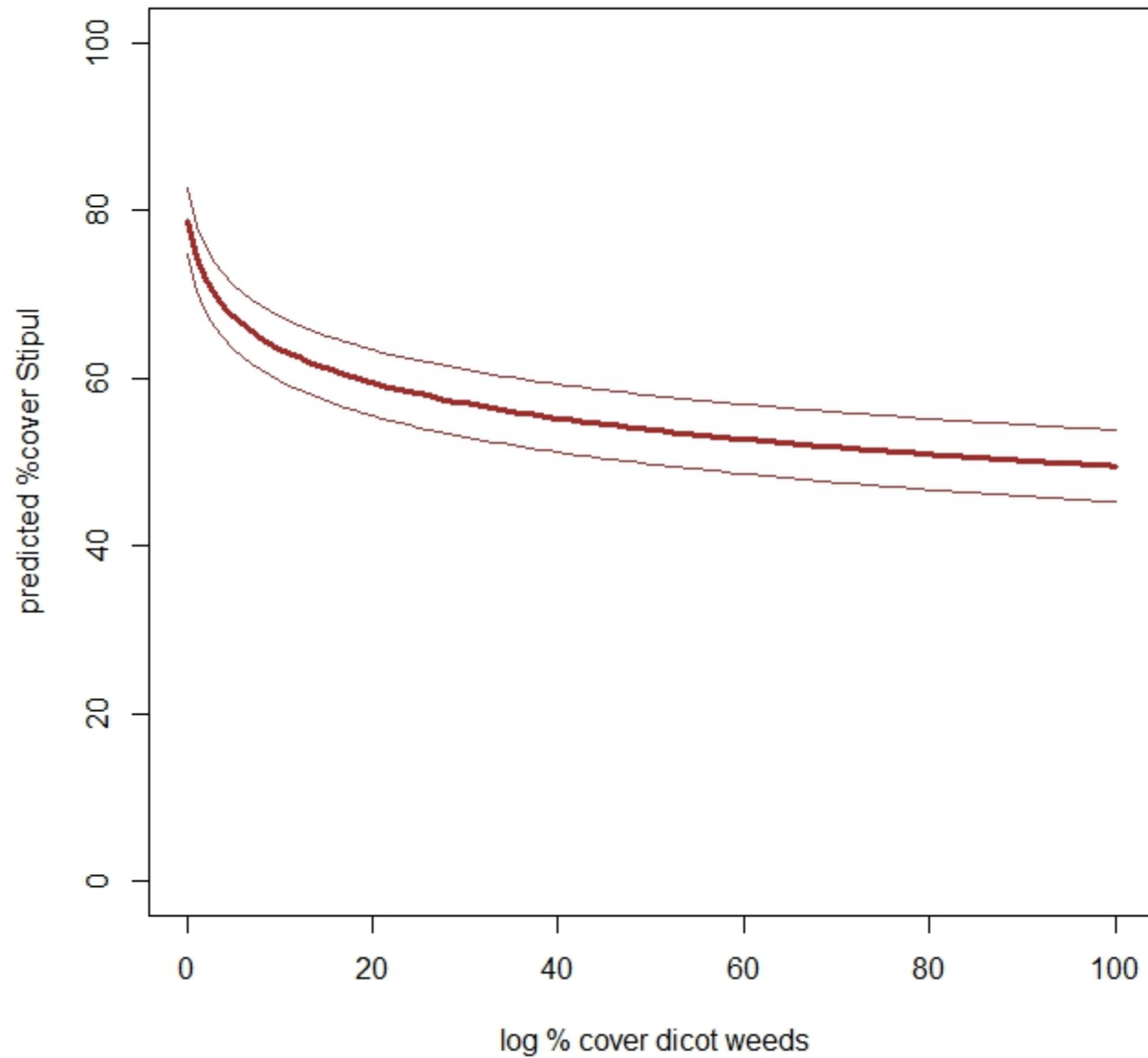
Native bunchgrass (*Stipa pulchra*) cover n = 50



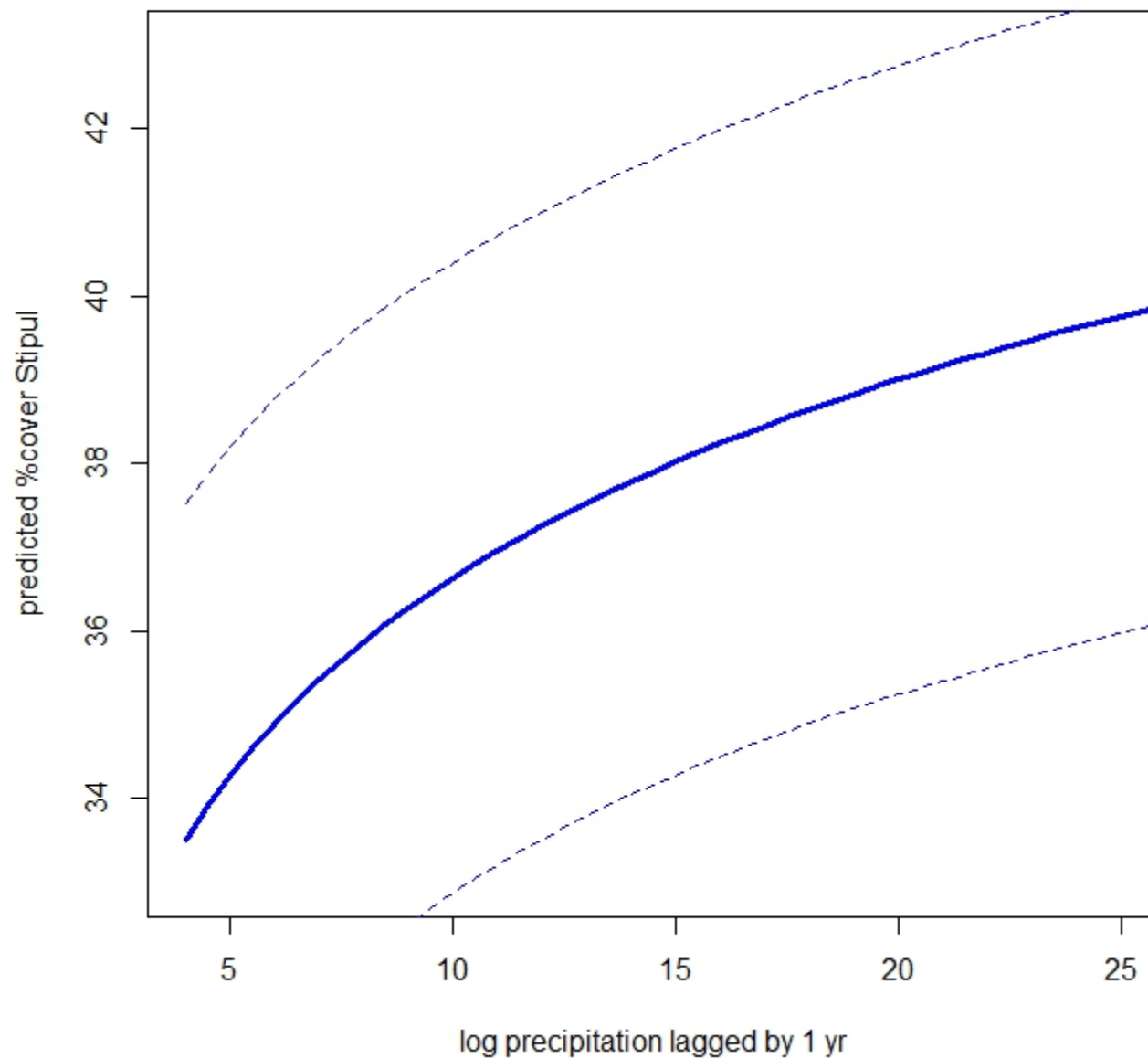
Non-native annual grass effects on native bunchgrass



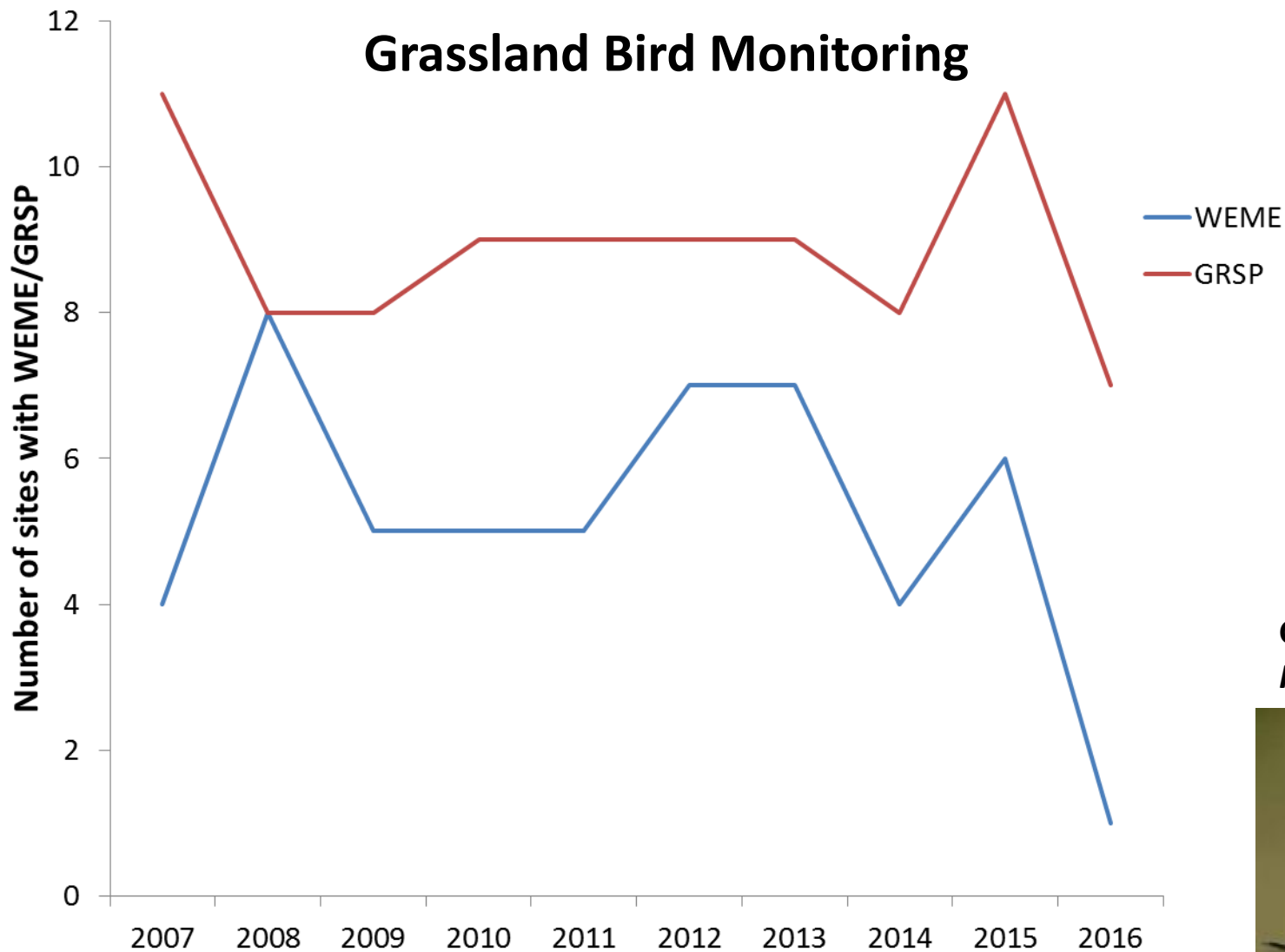
Non-native dicot effects on native bunchgrass



Lagged precipitation effects on native bunchgrass



Grassland Bird Monitoring



11 sites

WEME
 $\beta = -0.35$
 $p = 0.32$

GRSP
 $\beta = 0.21$
 $p = 0.53$

Gpower = 0.119
Possible declines



Conclusions (natural grasslands):

- Neutral effects non-native annual grasses on songbirds = “accept”
- Low power of tests and *possible* songbird decline after five seasons of drought = continue monitoring to understand if decline real & drought related
- Negative effects annual grasses on native bunchgrass = monitor and test management options (mowing)



Conclusions

1. With persistence and diligence, a non-chemical approach to invasive species control can be efficient and effective.

2. Monitoring is ongoing

Hybrid ecosystem concepts have

stimulated us to view non-native species through a new lens

reduce workload while also

accomplishing goal – habitat for birds and other wildlife.



But

2017 ON

Extreme events in SoCal:

Extreme cold and heat

Intense and extended rainfall

Extended drought

Repeated and extensive fires



Sandy



Matt



Land management in a changing climate requires



But we've always thought OUT OF THE BOX

Strategy 2017 on

1. Continue

Research and monitoring

Non-chemical, targeted invasive control

Accepting selected non-natives

2. Stay positive – how I stay positive

Interesting research on extreme events

Walk in the coastal sage scrub

Rain = wildflowers 2019 and 2020!



Acknowledgements

Seasonal Staff

Megan Garfinkel
Justin Wright
Amanda Nee
Matt Lechmaier
Jenny McCabe
John Dvorak
Justin Valliere
Matt Skarie
Field Assistants (200)

Pete DeSimone, Manager

U.S. Fish and Wildlife Service
Natural Resources Conservation Service
Orange County Transportation Authority

Volunteers

Stacee Lockard
Debbie Gley
Barbara Bruce
Dave Skinner
Leila Haghi
Fred Rozzo
Maria Alonso
Veronica Kratman
Rachel Raddatz

