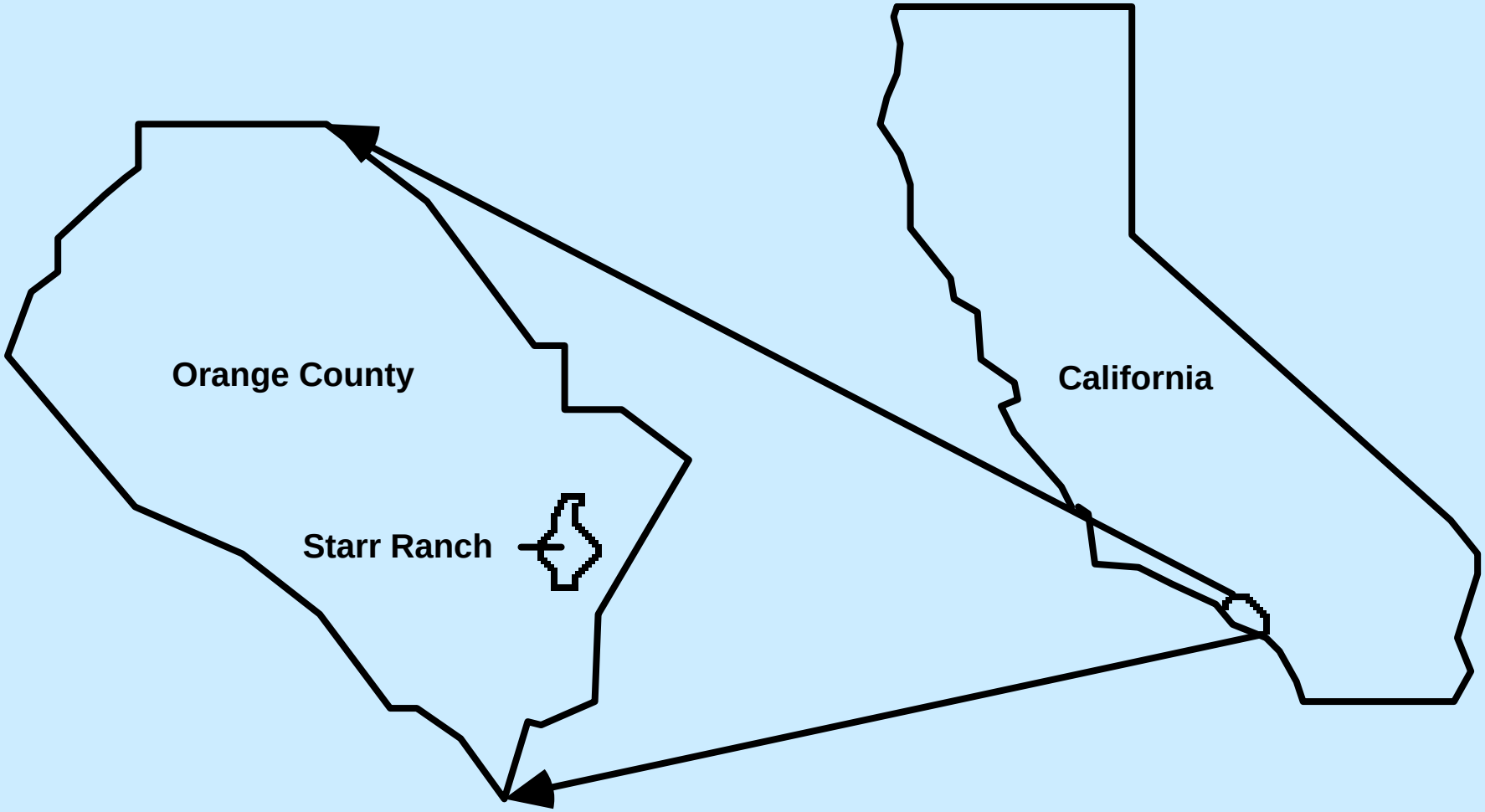
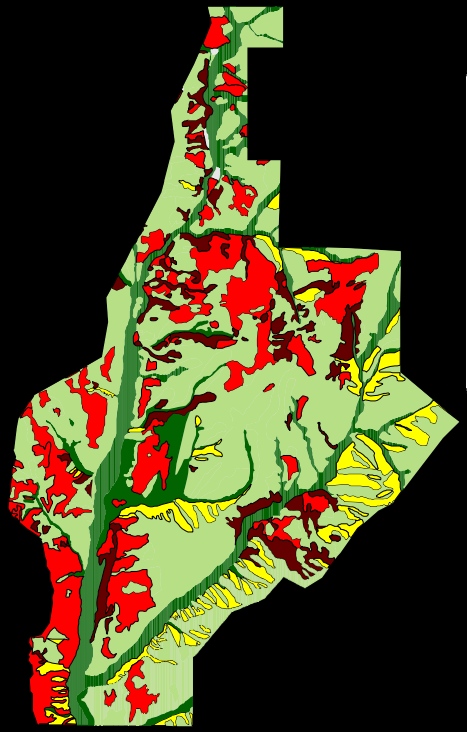
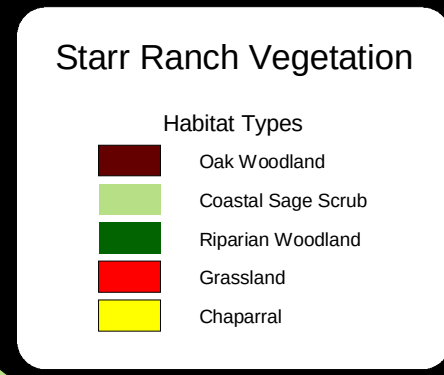
Exotic Control and Habitat Enhancement in Southern Californian Native Grasslands at an Audubon California Preserve

CALIFORNIA

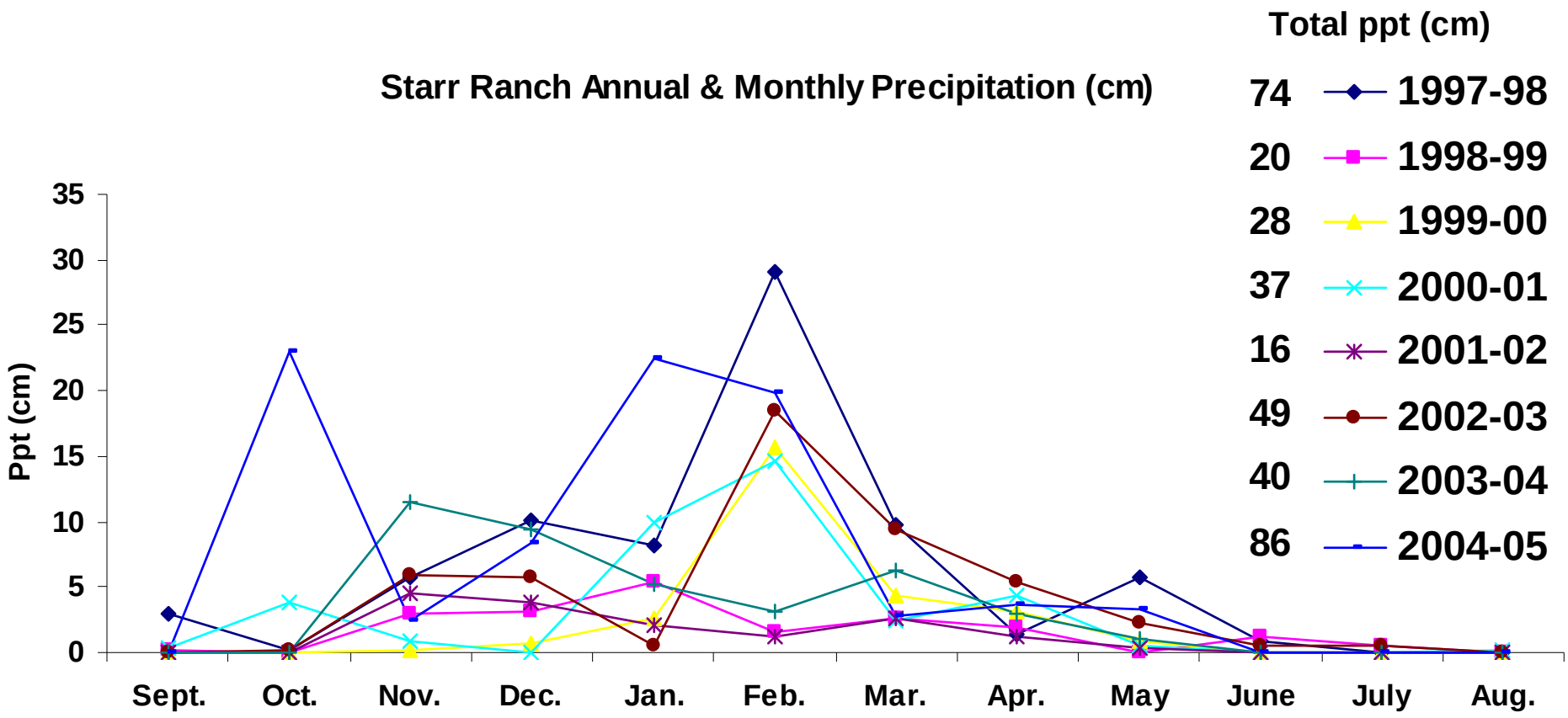

Orange County
Starr Ranch
California





CDFG Species of Special Concern

Cal-PIF Species of Special Concern


Starr Ranch Annual & Monthly Precipitation (cm)
Total ppt (cm)
74 1997-98
20 1998-99
28 1999-00
37 2000-01
16 2001-02
49 2002-03
40 2003-04
86 2004-05
Ppt (cm)
35
30
25
20
15
10
5
0
Sept.
Oct.
Nov.
Dec.
Jan.
Feb.
Mar.
Apr.
May
June
July
Aug.

Starr Ranch ISC &R Research Team

Manager Pete DeSimone

Biologists Ernie Clarke, Curtis Kendall, Jeff Eickwort

Interns

Ernie Clarke

Laurie Clarke

Marissa Codey

Karen Laughlin

Megan Lulow

Natalie Reed

Andreas Reinhardt

Noelle St. Cyr

Research Assistants

Ernie Clarke

Dana Kamada

Bill Webb

Biologist, Helen de la Maza

Field Crew Leaders: Matt Lechmaier, Jenny McCabe, Brent Bachelder, John Dvorak

Field Assistants

Pam Archer

Leslie Boby

Jake Davidson

Patrick Duggan

Ross Hammersley

Ben Henshaw

Sara Kaiser

Sergey Khomenko

Sasha Keyel

Dave Kimble

Rich LaPaix

Scott Lillie

Erynn Maynard

Thad Miller

Jon O'Brien

Jeff Rau

Andy Reeder

Melissa Riedel-Lehrke

William Rodriguez

Lindsey Scholl

Jessica Schulte

Daniel Secundy

Stacy Smith

Kim Whorral

Erin Yost

Tom Baker and O'Connell Landscaping (field crew)

Dr. Margot Griswold, Earthworks Construction & Design

Volunteers who hoed thistle resprouts, collected, counted, and processed many, many seeds.

U.S. Fish & Wildlife Service for "Partners for Fish & Wildlife" and "Private Land Stewardship" funding

Jill Terp & Samantha Marcum, U.S. Fish & Wildlife Service

California Department of Corrections for mitigation funding from the Statewide Electrified Fence Project HCP (Bernd Beutenmuller)

Restoration Assistant, Debbie Gley

Research-Based Land Management

“Active & Passive Adaptive Management”

“decisions modified as we learn about the system we are managing”

Shea et al. 2002 Ecol. App. 12

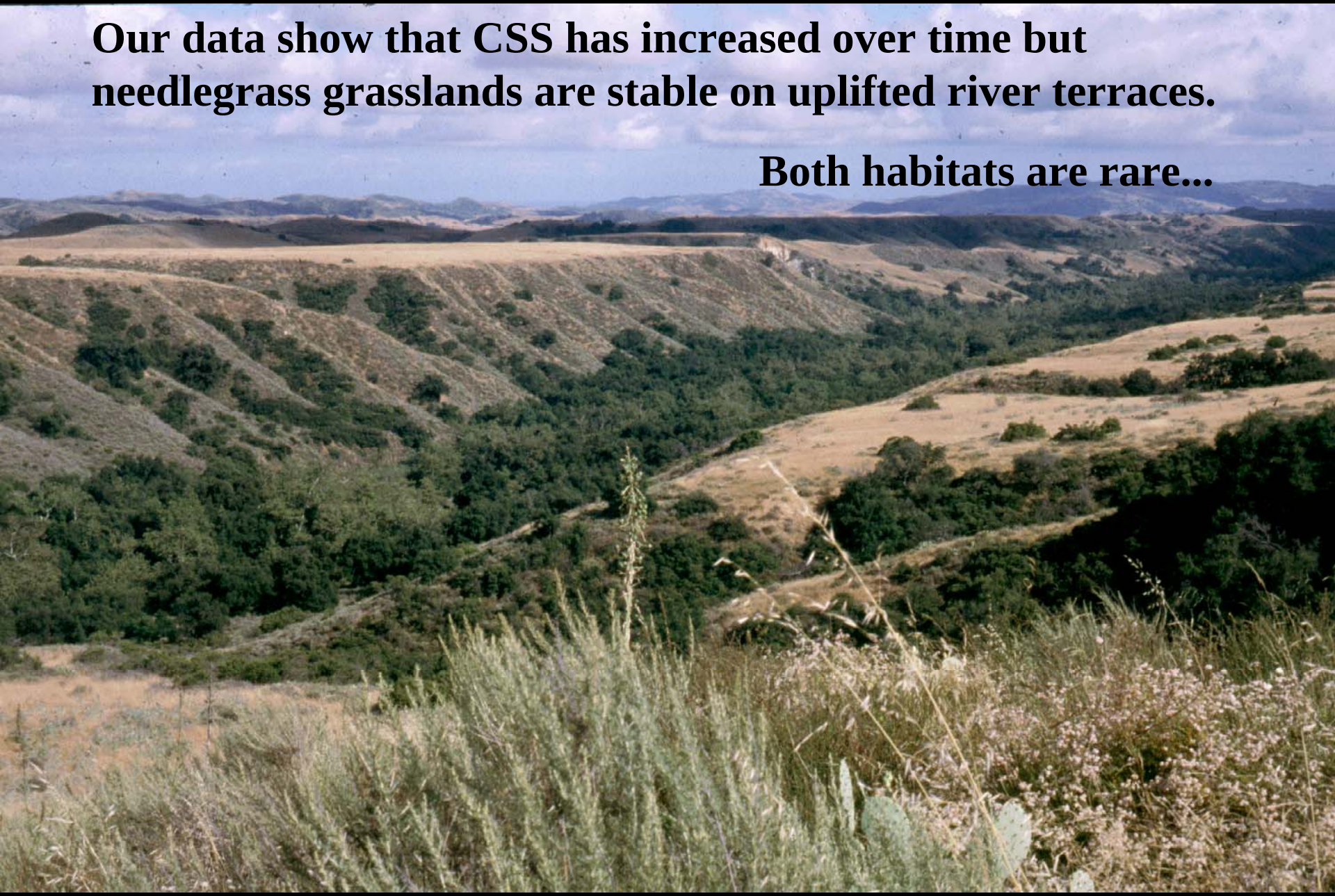
Cynara cardunculus

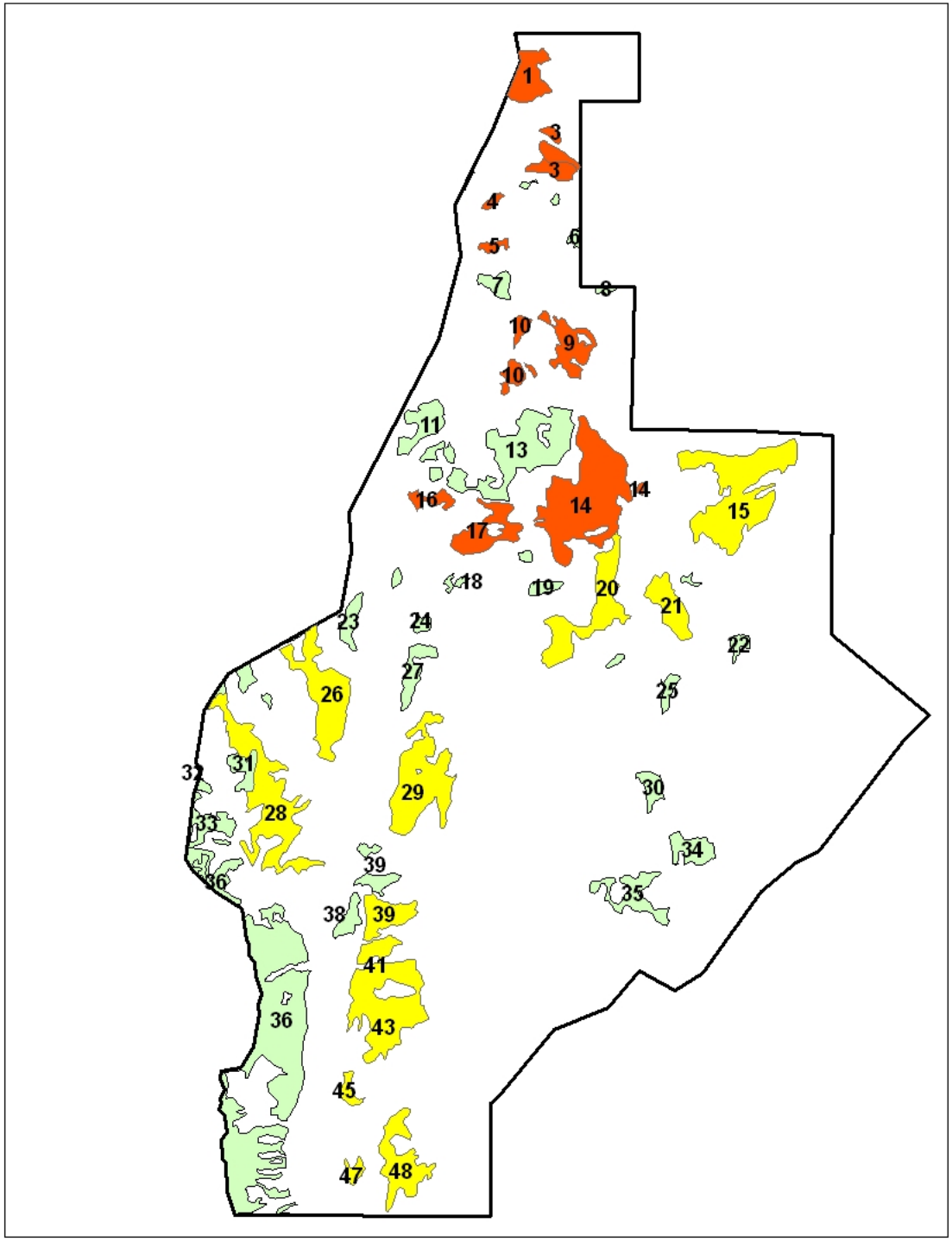
Artichoke Thistle

700 acres

283 ha


#28m
PP 1
03/29/01


Our data show that CSS has increased over time but needlegrass grasslands are stable on uplifted river terraces.
Both habitats are rare...


1
3
3
4
5
6
7
8
10
9
10
11
13
14
14
15
16
17
18
19
20
21
22
23
24
27
26
25
31
32
29
30
28
33
34
39
36
35
38
39
41
36
43
45
47
48

Needlegrass Grasslands Maintenance and Enhancement

Active Enhancement

Planting Natives

Plug Planting Trials in Nursery **(2002-03 & 2004-05)**

Winds = dry down

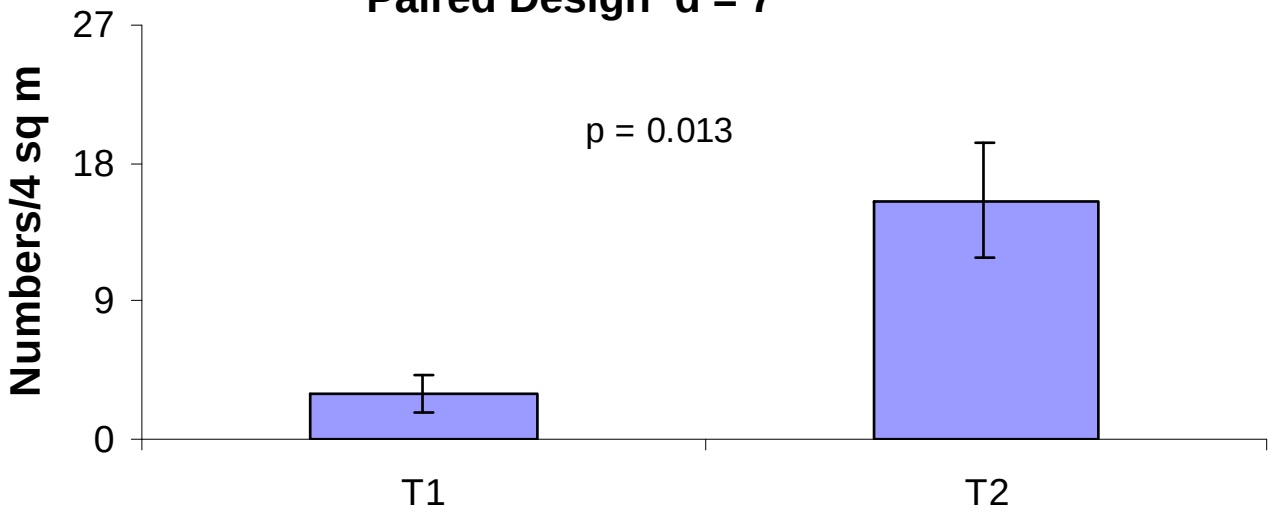
CSS seedlings survived

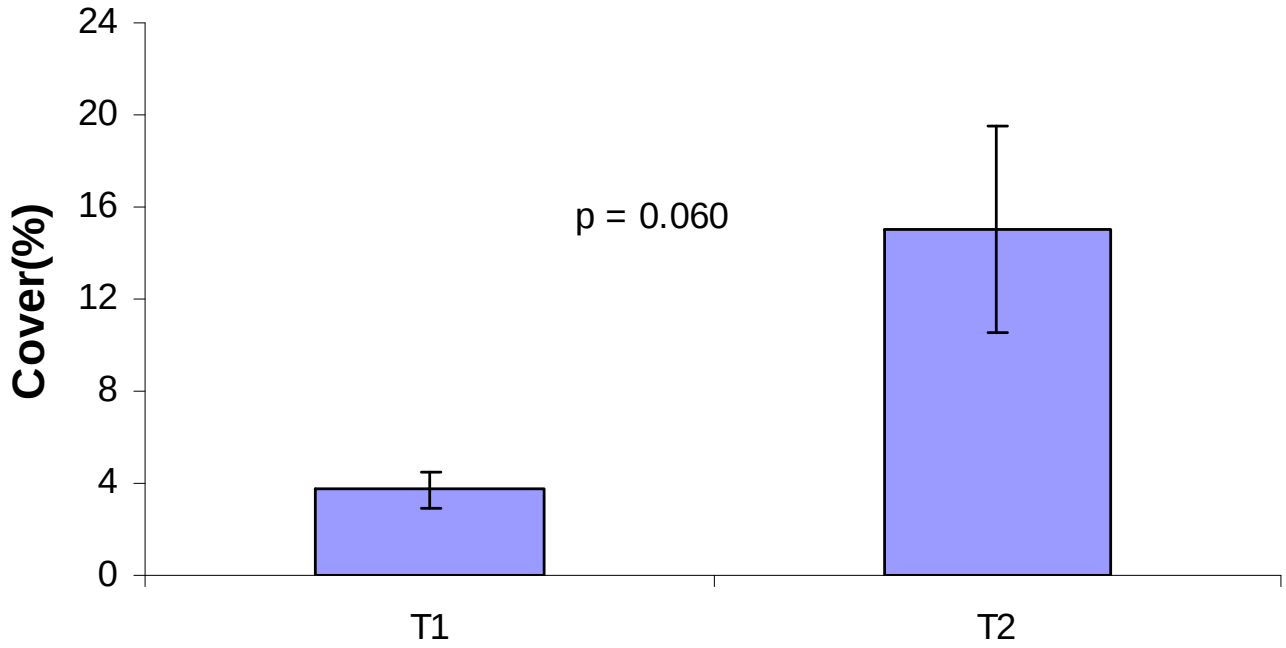
NASPUL seedlings wilted

Wind guards not effective

NASPUL Seed Rate Experiment **6/30/03**

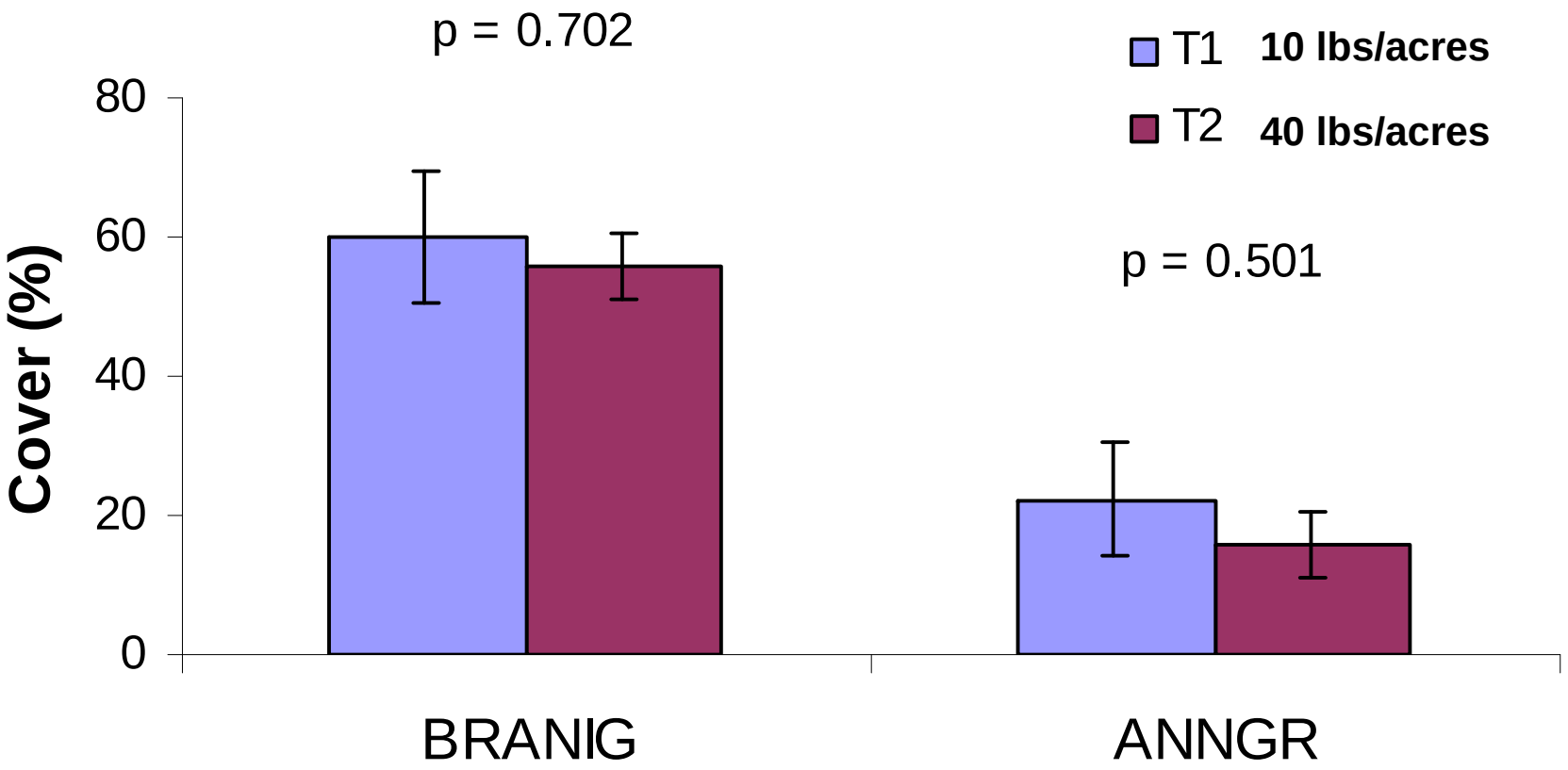
Paired Design d = 7





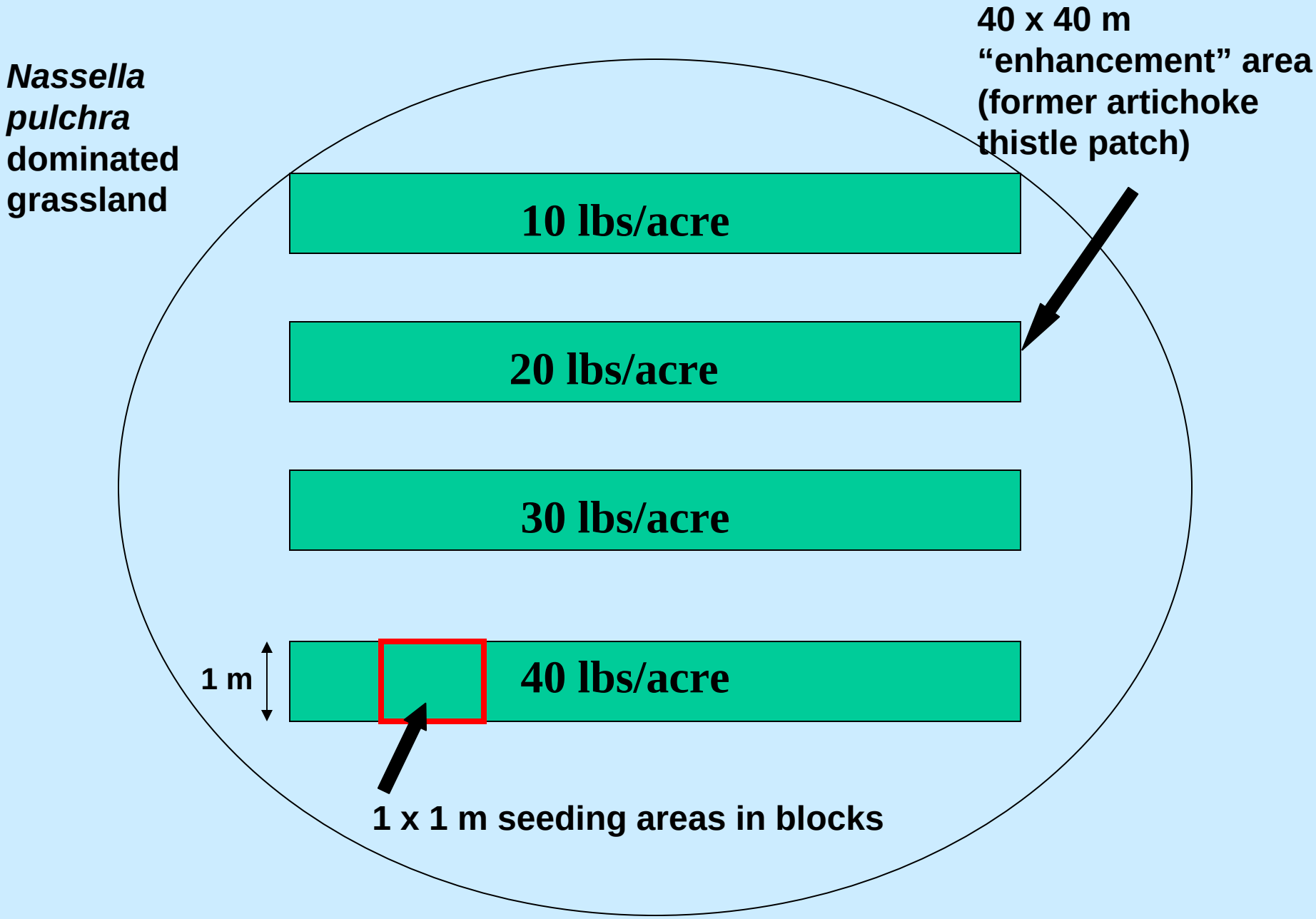
10 lbs/acre **40 lbs/acre**

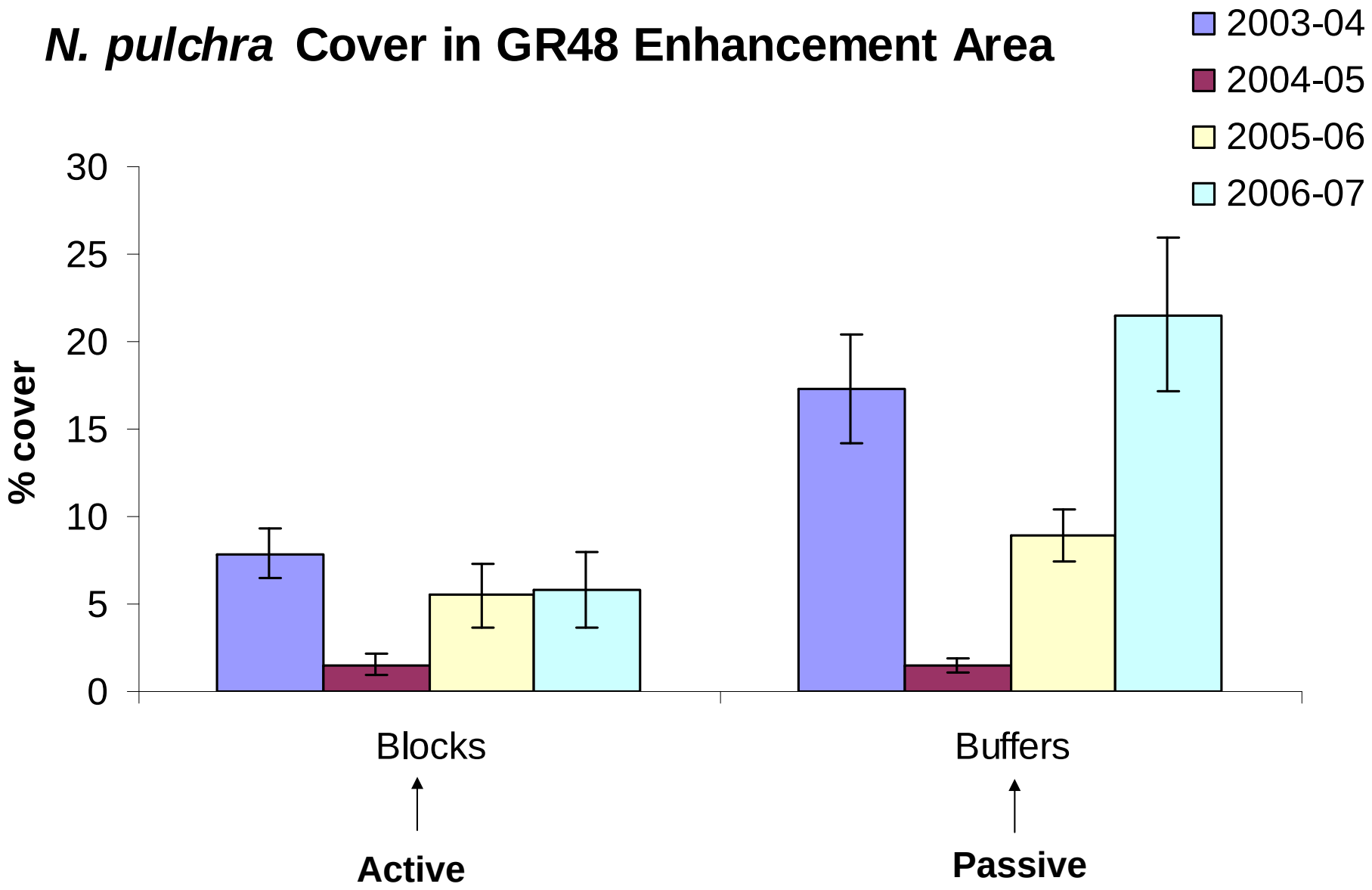
NASPUL Seed Rate Expmt 3/3/03




#48 4-23-02
Post T1

NASPUL Seeding Stand 48 2003 - 2004



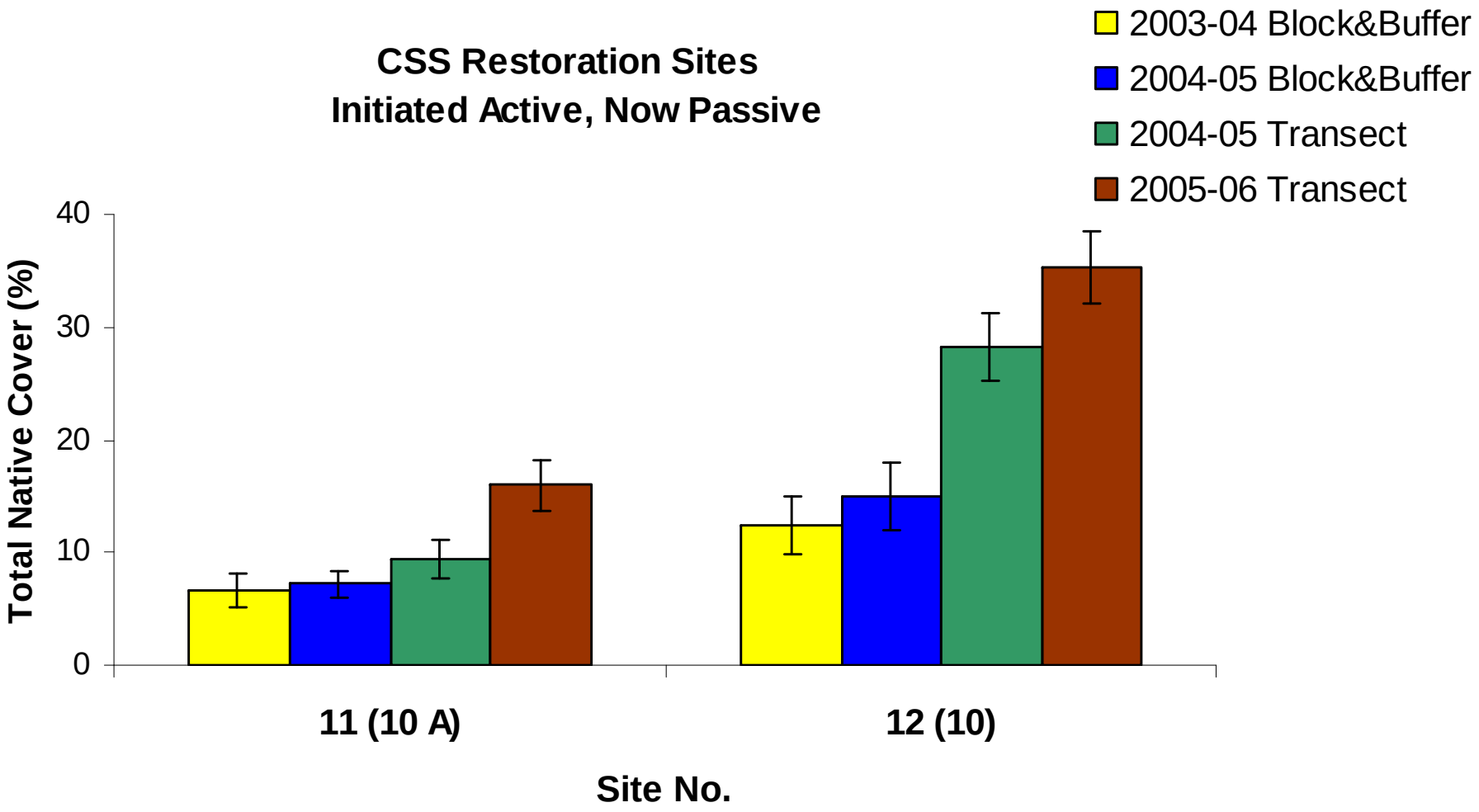

N. pulchra Cover in GR48 Enhancement Area
2003-04
2004-05
2005-06
2006-07
% cover
30
25
20
15
10
5
0
Blocks
Buffers
Active
Passive

“ One of the first tenets of ecological restoration is to consider the option of doing nothing. Rather than spending time and money on the introduction and establishment of species at a restoration site, it may be cost effective to allow natural recruitment processes to take place.”

K.J. Rice and and C. Emery. 2003. Frontiers in Ecology and the Environment

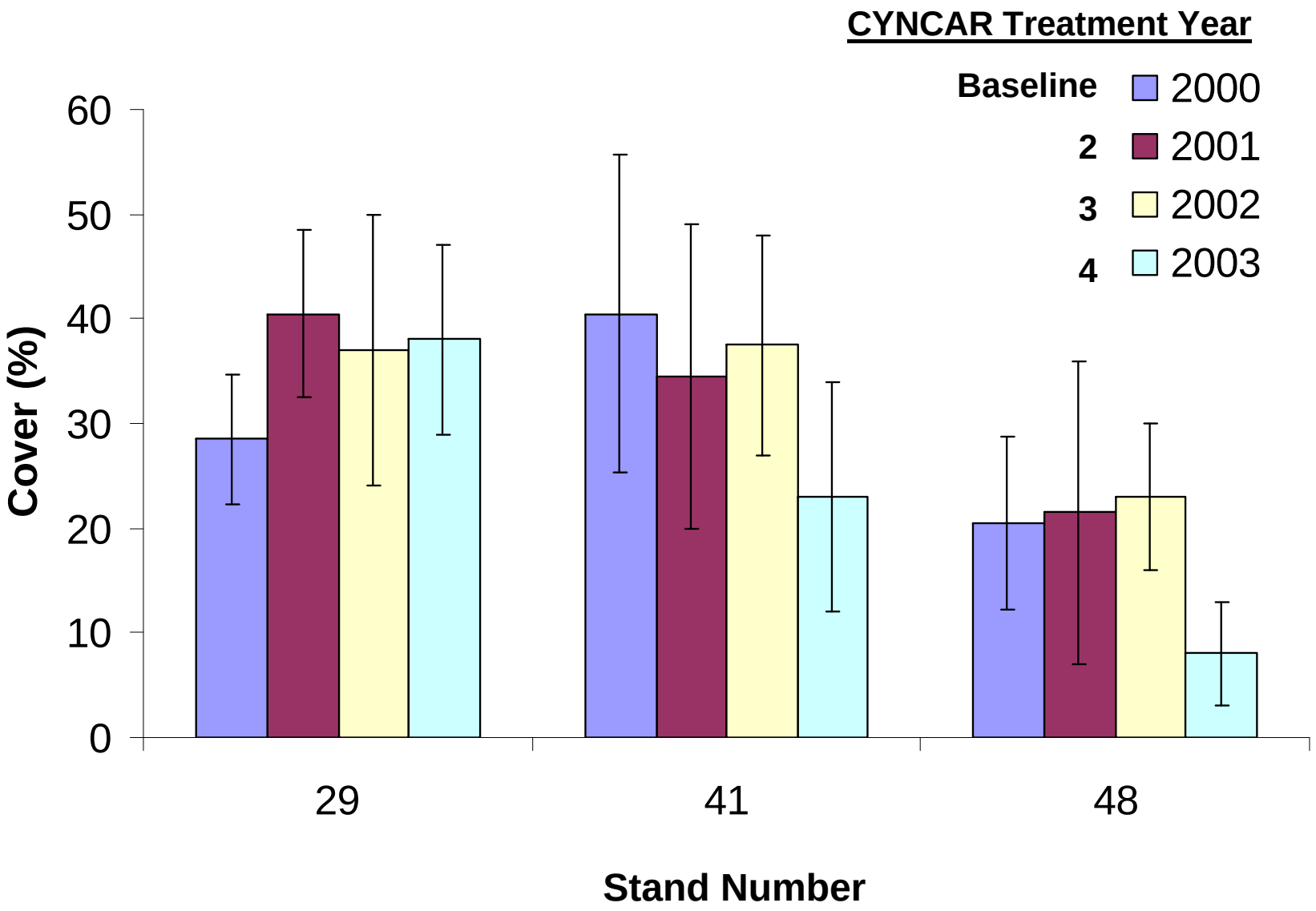
Passive Enhancement

Colonization by Natives


CSS Restoration Sites
Initiated Active, Now Passive
2003-04 Block&Buffer
2004-05 Block&Buffer
2004-05 Transect
2005-06 Transect
Total Native Cover (%)
40
30
20
10
0
11 (10 A)
12 (10)
Site No.

NASPUL Cover in Former CYNCAR Patches

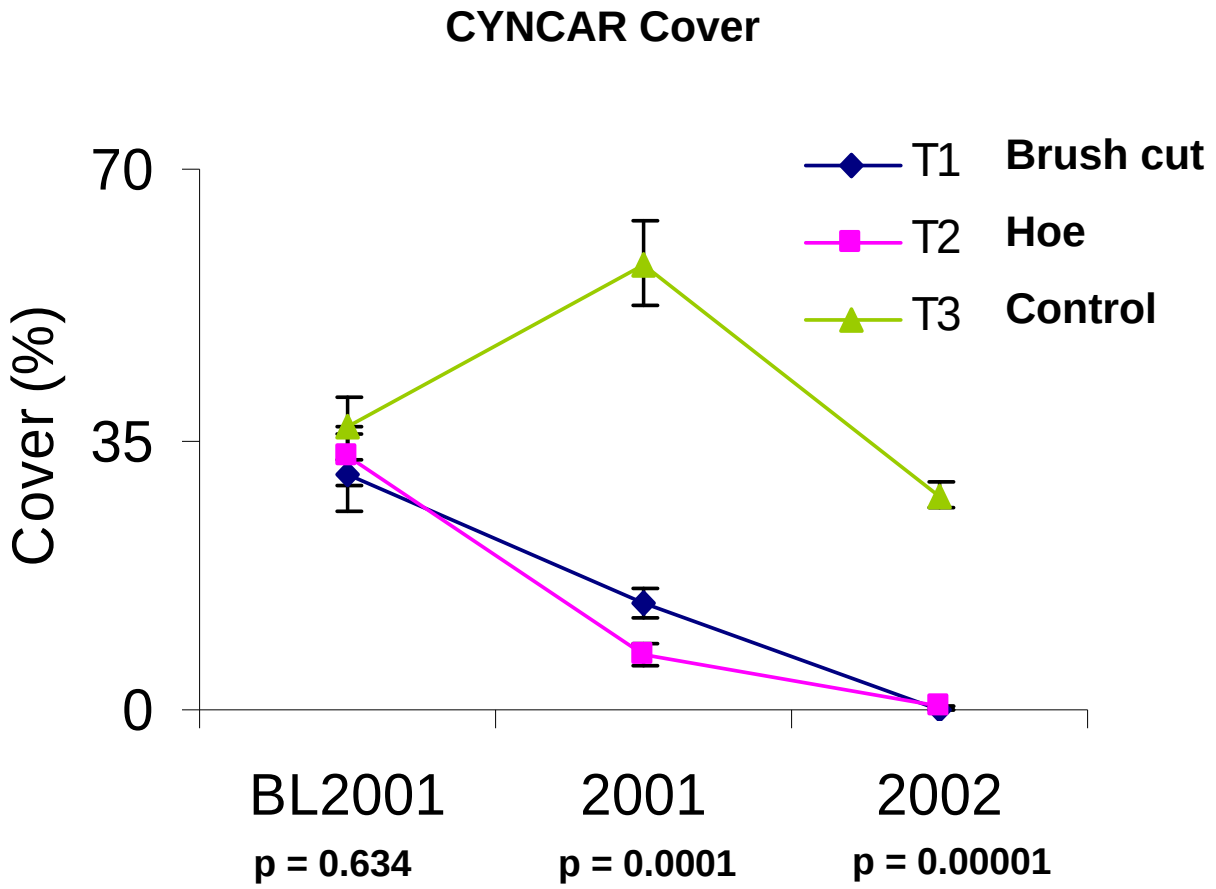
n = 2 (50 m point intercept transects)

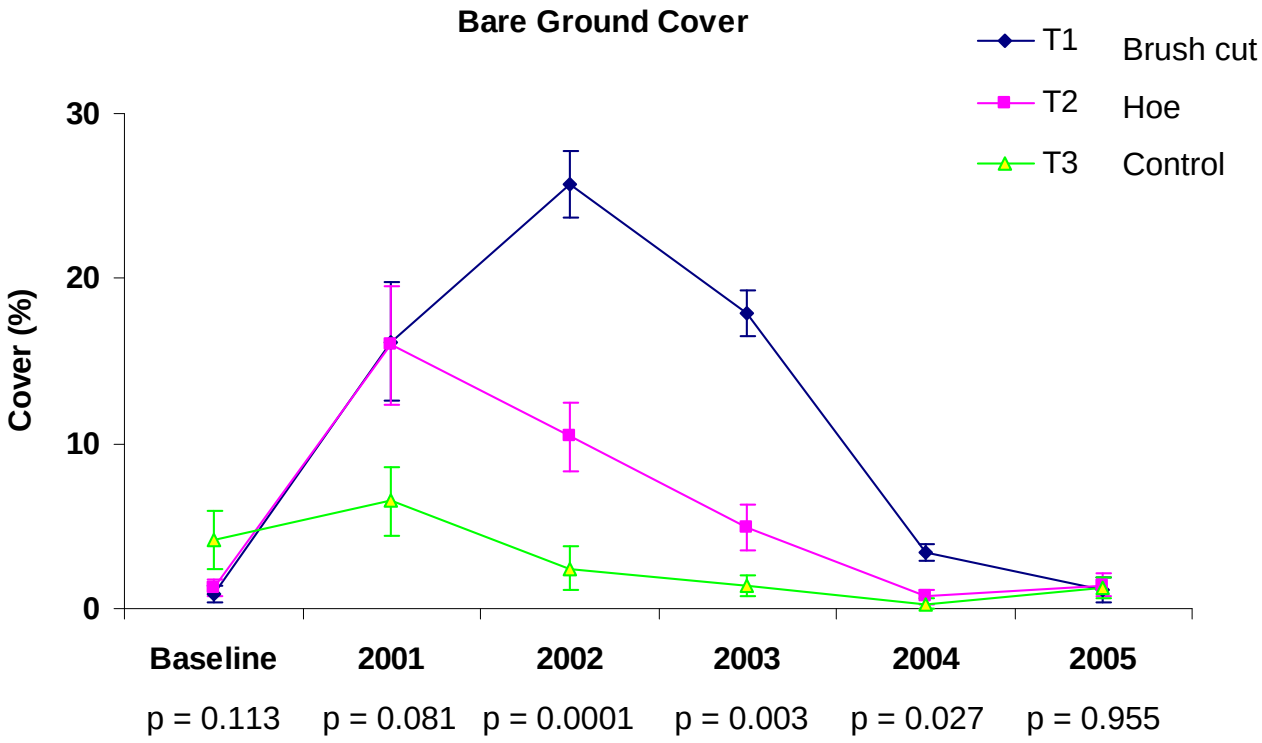


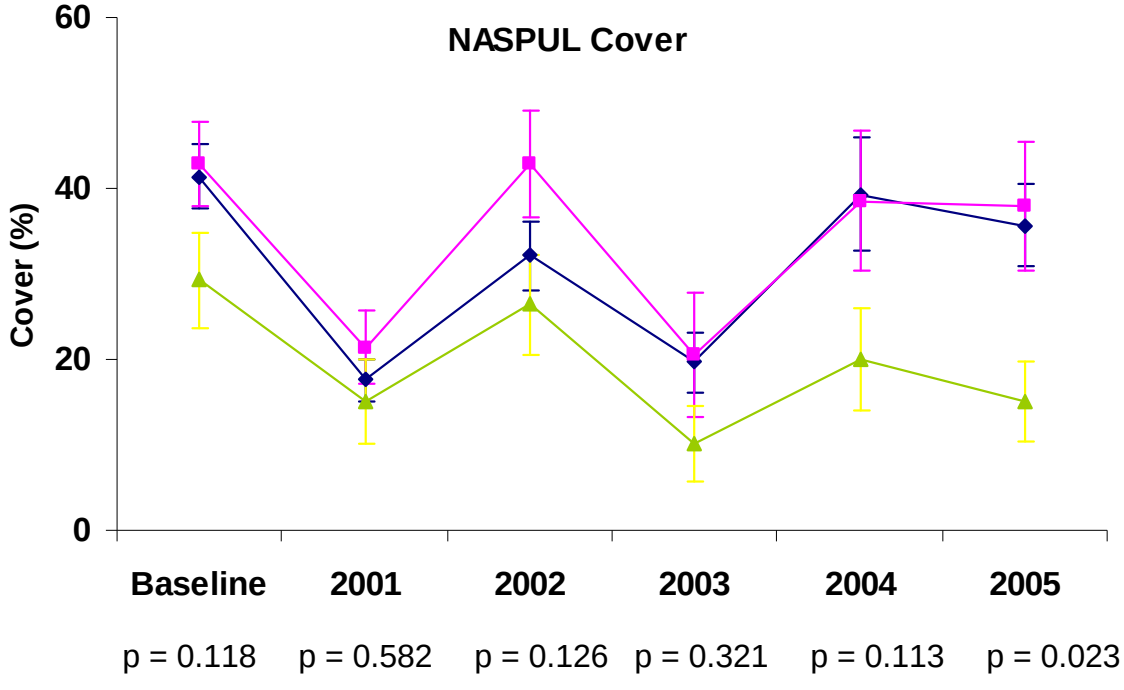
Effects of CYNCAR Removal in a Native Needlegrass Grassland

Completely Randomized Design **2 x 2 m plots** **n = 7 df = 18**

<u>Dependent variables:</u> Cov, dens CYNCAR, other exotic spp, NASPUL cov, dens species richness



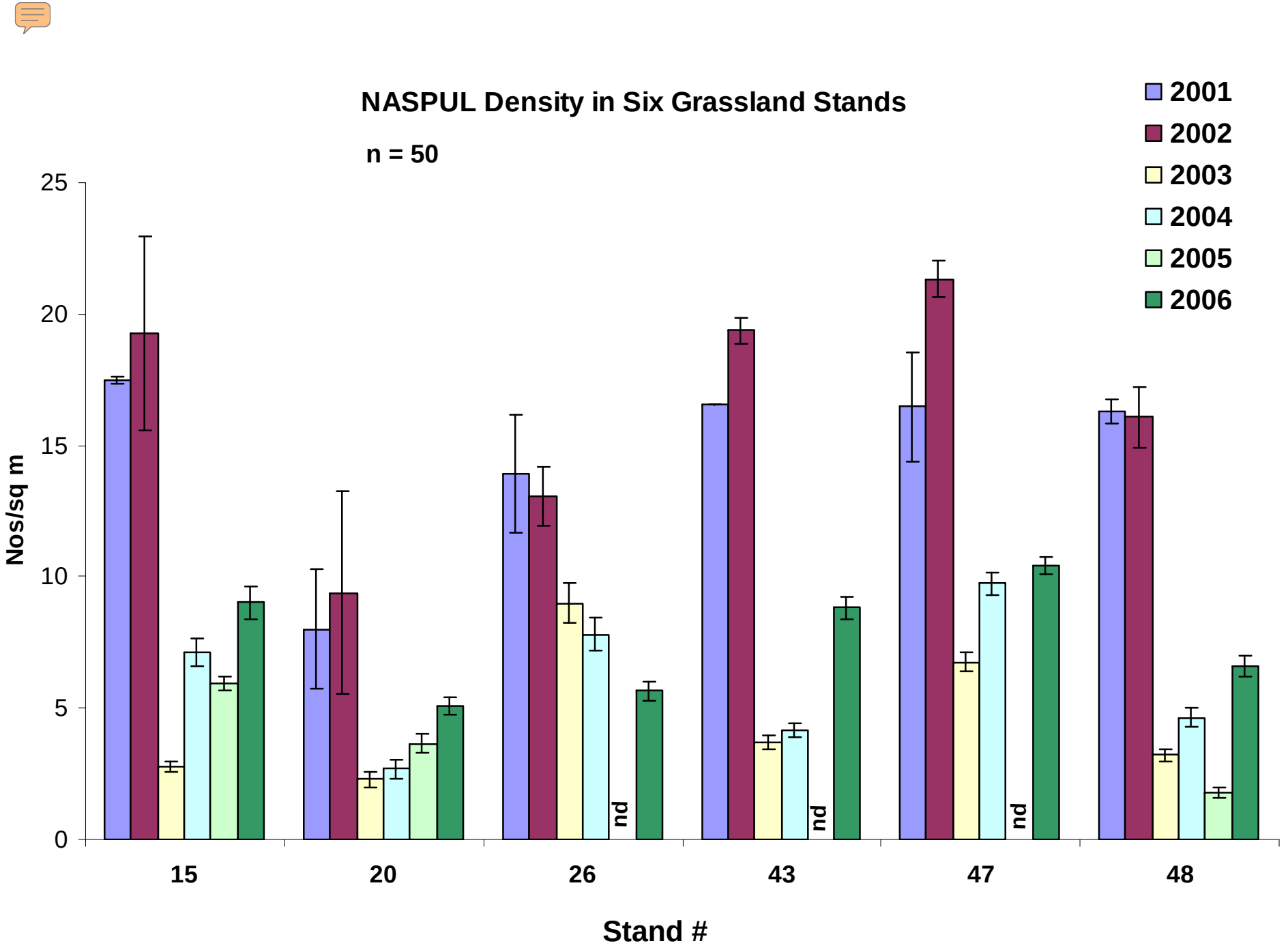

Bare Ground Cover
T1
Brush cut
T2
Hoe
T3
Control
Cover (%)
30
20
10
0
Baseline
2001
2002
2003
2004
2005
p = 0.113
p = 0.081
p = 0.0001
p = 0.003
p = 0.027
p = 0.955


NASPUL Cover
Cover (%)
60
40
20
0
Baseline
2001
2002
2003
2004
2005
p = 0.118
p = 0.582
p = 0.126
p = 0.321
p = 0.113
p = 0.023

"*Nassella* stands in areas that have not been disturbed by cultivation do not appear to require management for maintenance." **Hamilton, J.G., J.R. Griffin, and M.R. Stromberg. 2002. Madroño**

1999-00 to 2003-04

Monitoring without active management


NASPUL Density in Six Grassland Stands
n = 50
2001
2002
2003
2004
2005
2006
Nos/sq m
25
20
15
10
5
0
nd
nd
nd
15
20
26
43
47
48
Stand #

Large Scale Management – Burning and Mowing

“Grassland communities are increasingly recognized as disturbance-dependent ecosystems

…yet…few replicated, multi-site studies documenting vegetation responses to varying frequencies and types of grassland disturbance…

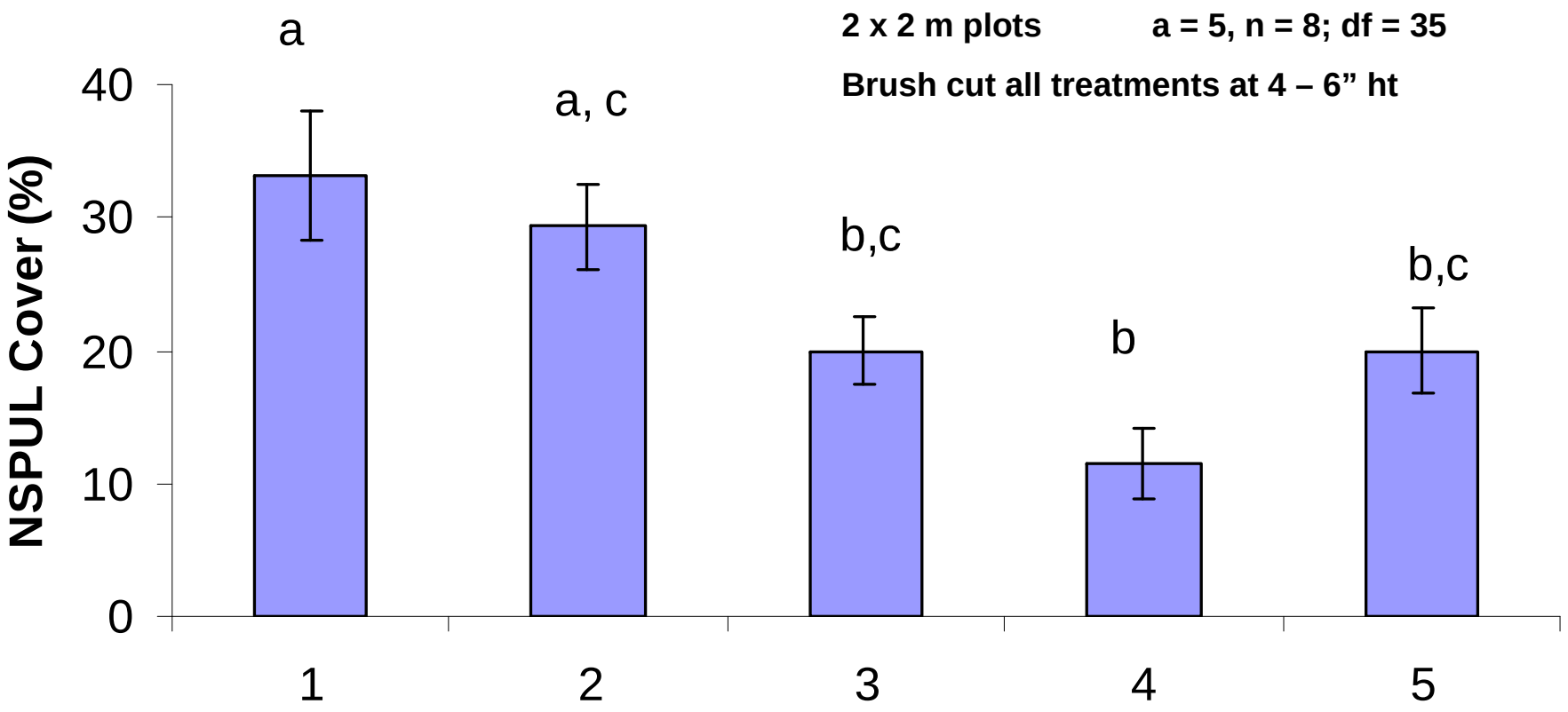
…grasslands were widely impacted by Native American burning for at least 10 000 years

and then by cattle grazing for nearly 250 years…

…land managers are mowing… grasslands to maintain a disturbance regime, although mowing may have different effects than grazing.”

Hayes, G.F. and K.D. Holl. 2003. Applied Vegetation Science.

May, 2005 Census: Brush Cut Experiment Site 48



2 x 2 m plots **a = 5, n = 8; df = 35**

Brush cut all treatments at 4 – 6" ht

ANOVA
p = .00062

LSD post hoc

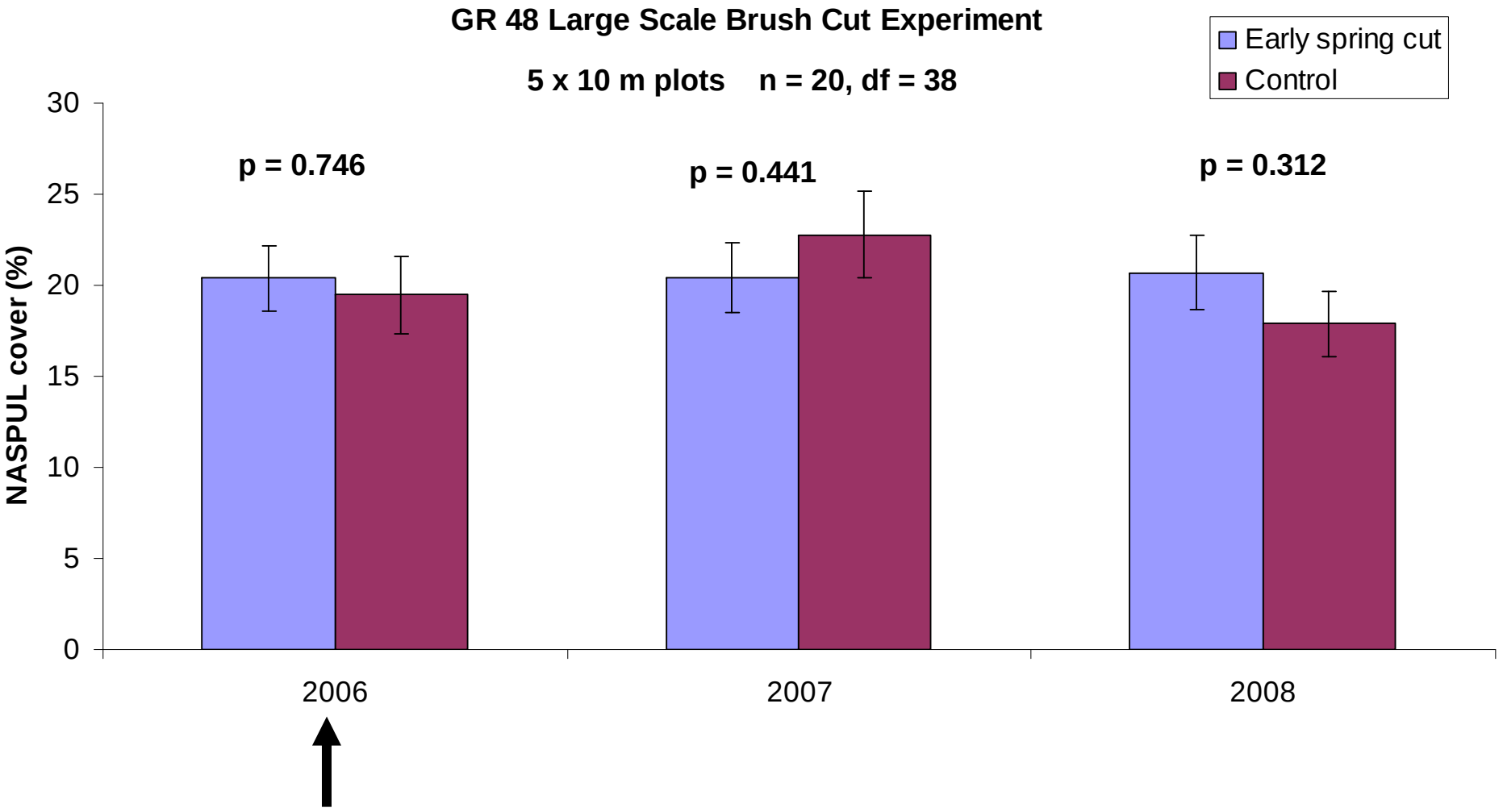
1 = Brush cut 1x in Feb.

2 = As in #1 + rake

3 = Brush cut 2x in Feb., Mar.

4 = As in #3 + rake

5 = Control

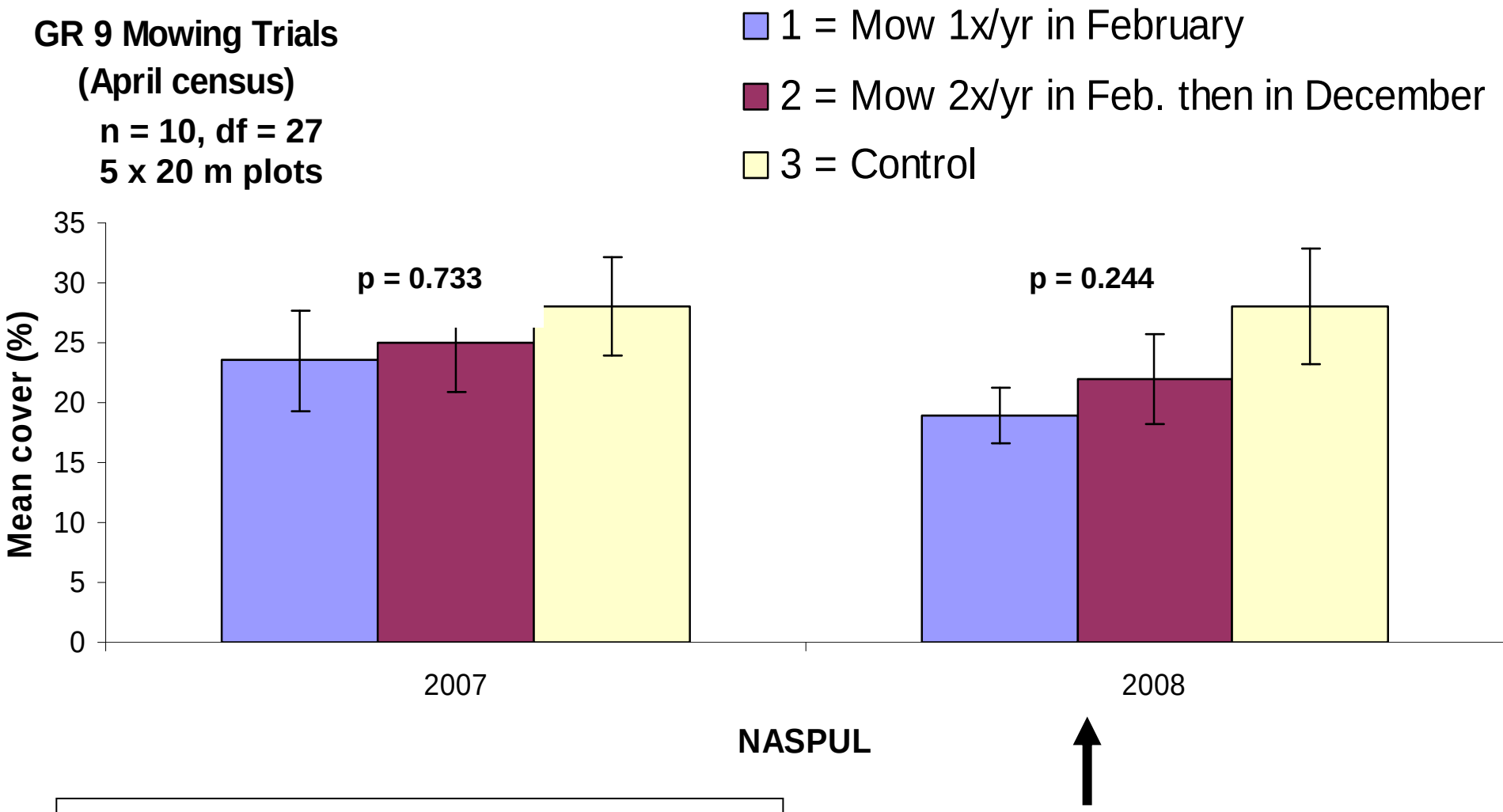


Power (GPOWER)

Cohen's standardized effect size = 0.80 (large)

alpha = 0.10 power = 0.80

GR 9 Mowing Trials
(April census)
n = 10, df = 27
5 x 20 m plots



Brush cut at 4-6” ht.

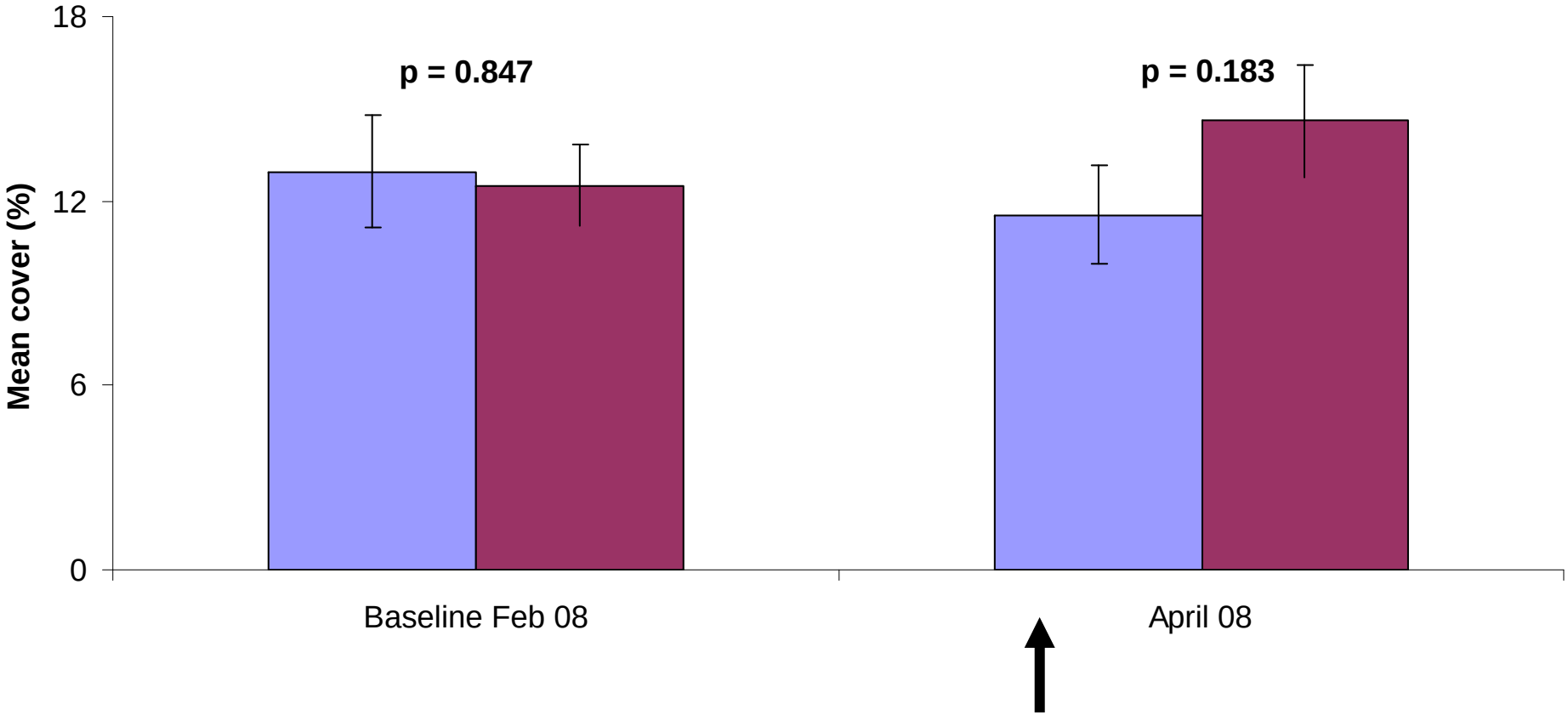
Power (GPOWER)

Cohen's standardized effect size = 0.25 (medium)

alpha = 0.10 power = 0.30

GR 20S NASPUL Brushcut Expt 2008

5 x 5 m plots **n = 20, df = 38**



Brush cut at 4-6” ht.

Power (GPOWER)

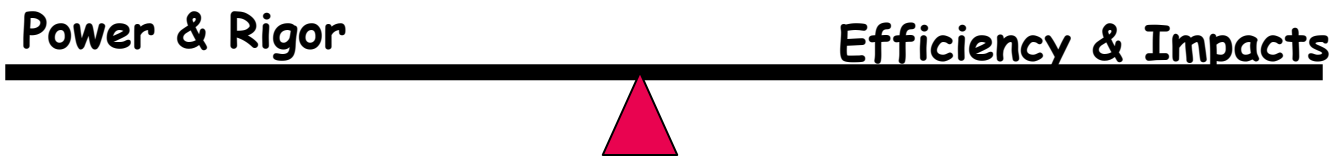
Cohen's standardized effect size = 0.50 (medium)

alpha = 0.10 power = 0.46

Value of "quick and dirty" data for land managers currently under debate and discussion

(Cabin 2007 *Restoration Ecology*, Giardina et al. 2007 *Restoration Ecology*, **Klein 2007 *Cal-IPC News)***

Adaptive management dilemma – pluralistic approach – how to balance…



Experiments and Trials on Enhancement Techniques:

1. **What works in one site in one ppt year may not predict what will work in a different site in a different ppt year**
2. **Experiments on techniques do have value but:**

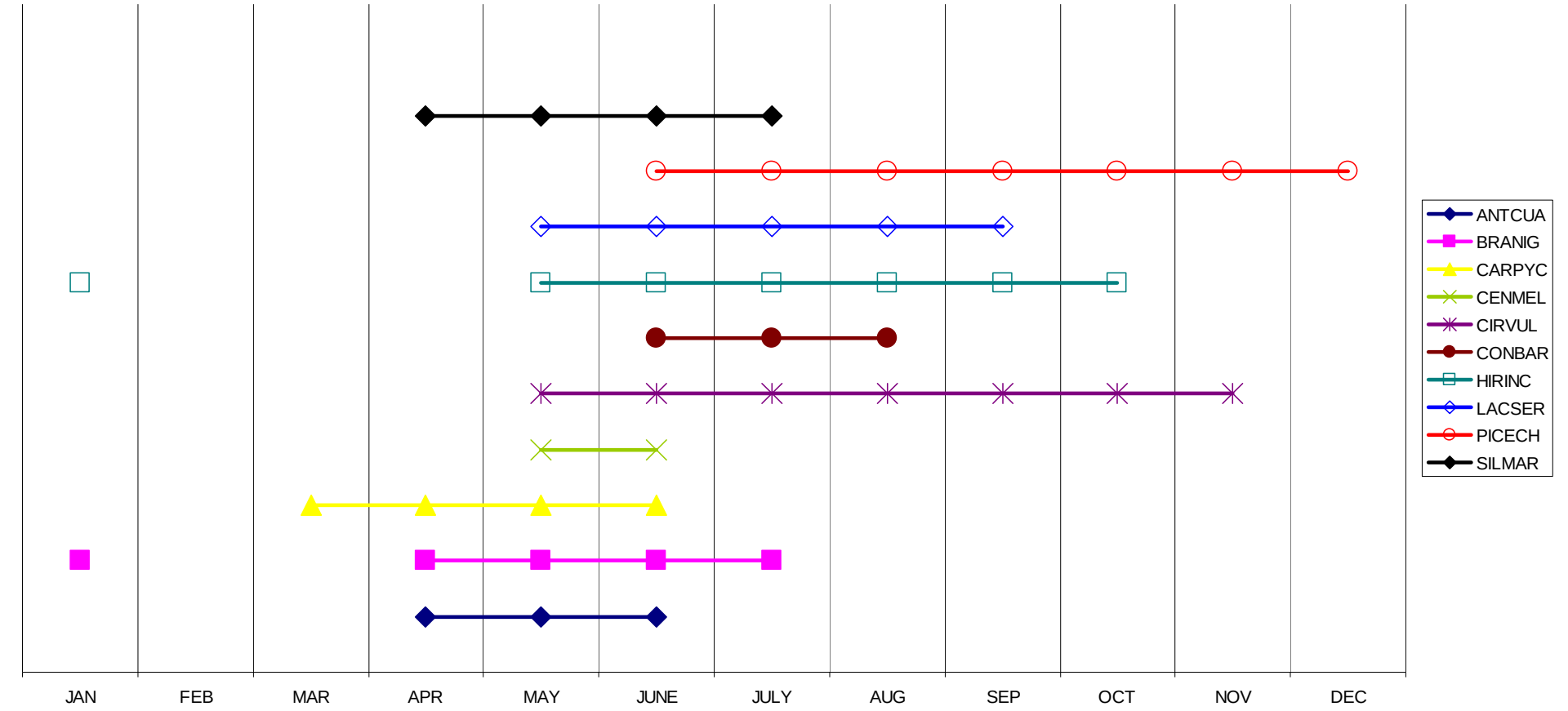
- **must either run the experiment over several years or**
- **repeat the experiment over different years and in different sites**
- **supplement experiments with long-term observational studies**

Non-chemical Exotic Species Control

- **Ongoing control and mapping (GPS, GoogleEarth or GIS)**
- **Exotic Species WatchList**
- **Literature Reviews**
- **Control methods unclear = experimental test or trial of techniques**
- **Regional Partnerships (adjacent land stewards)**


9 MAY 2007
3:02pm
10 MAY 2007
3:08am
N
© 2008 Tele Atlas
Image © 2008 DigitalGlobe
Google
Pointer 33°36'16.63" N 117°33'24.19" W elev 1133 ft Streaming 100%
Eye alt 12127 ft

Flowering Phenology of Common Exotic Annuals and Biennials



Pointers for Treating Sites & Exotic Species WatchLists

Jenny McCabe, Field Crew Leader 2004-05. Updated by Sandy and subsequent field crews

* Sandy has drawings or aerials for a lot of the sites; it helps to take those out with you the first time. **Carry red 21" flags strapped on hoes (tie on wire flags) for PLALAN, blue flags for natives in blocks (January – March).** Additionally, **GPS PLALAN locations in large grassland sites only.** *Remove PLALAN entirely (i.e. roots and runners) from entrances & parking areas of all sites.* Check for PLALAN in this list and in the Public exotic locations file before visit each site then check at site and remove. **Take pink flagging for any hard to find CYNCAR.** Other exotics to GPS: *Cortaderia jubata* (pampas grass), hard to find CIRVUL. At each visit check parking spots for exotics and remove (to avoid seed transfer into sites).

For working in shrubs, take a hand tool for weed removal without shrub damage.

Watch for fence lines (wooden or metal fence posts) – barbed wire might still be present.

NOTE: CIRVUL (bull thistle) should be removed at rosette stage. If flowering stalk with closed heads is present, remove from site and bring back to burn. Seeds can ripen even on cut stalks.

1 - New in 2005-06 (1L). 1 E added in 2006-07; 1 W in 2007-08.

Exotic Species	Notes	Exotic Species	Notes
HIRINC			
CIRVUL	1E near cactus		
BRANIG			
Lactuca			

2 - Sandy does the blocks/ buffers in this site mostly.

Exotic Species	Notes	Exotic Species	Notes
CARPYC		LACSER	
BRANIG			
BRADIS			
Sonchus spp			

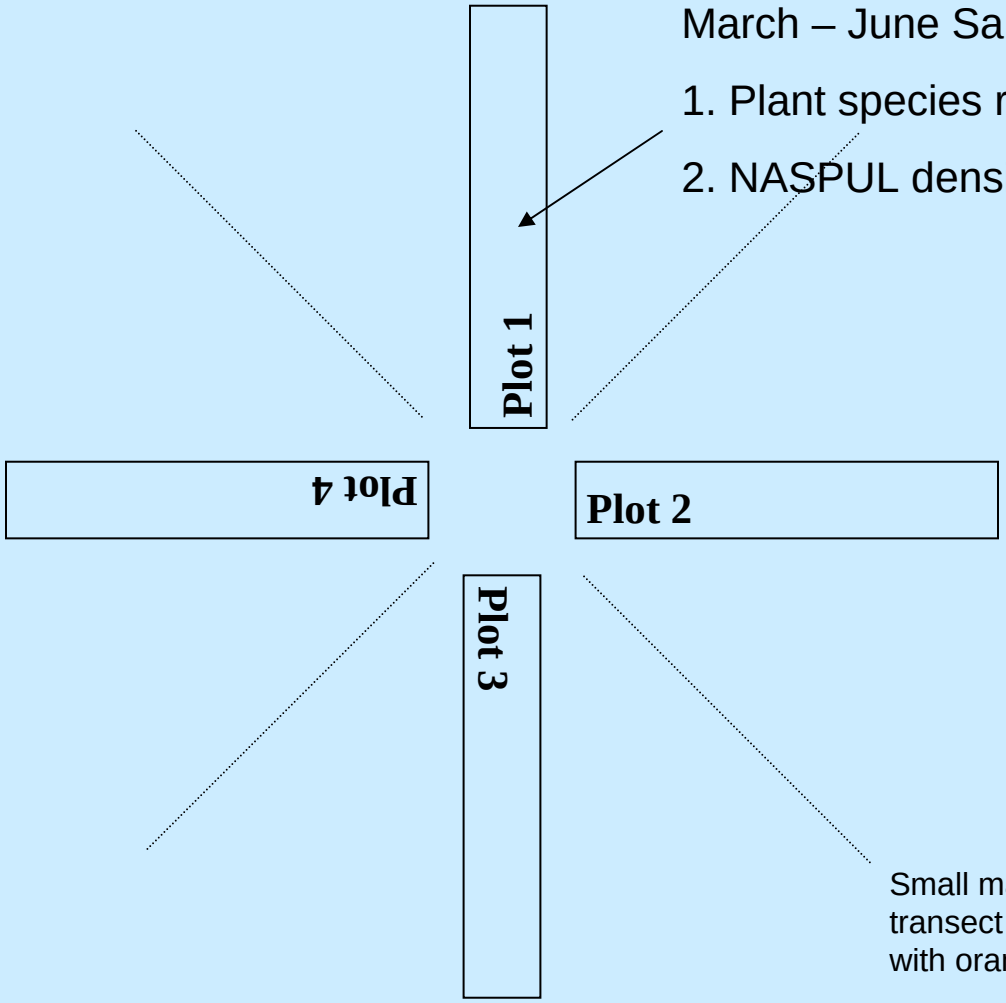
3L - Sandy also does the blocks/ buffers in this site.

Exotic Species	Notes	Exotic Species	Notes
BRADIS		BRANIG	
CARPYC	lower (west) edge	Piptatherum (Smilo grass)	near the Loop Trail
Sonchus spp			
LACSER			

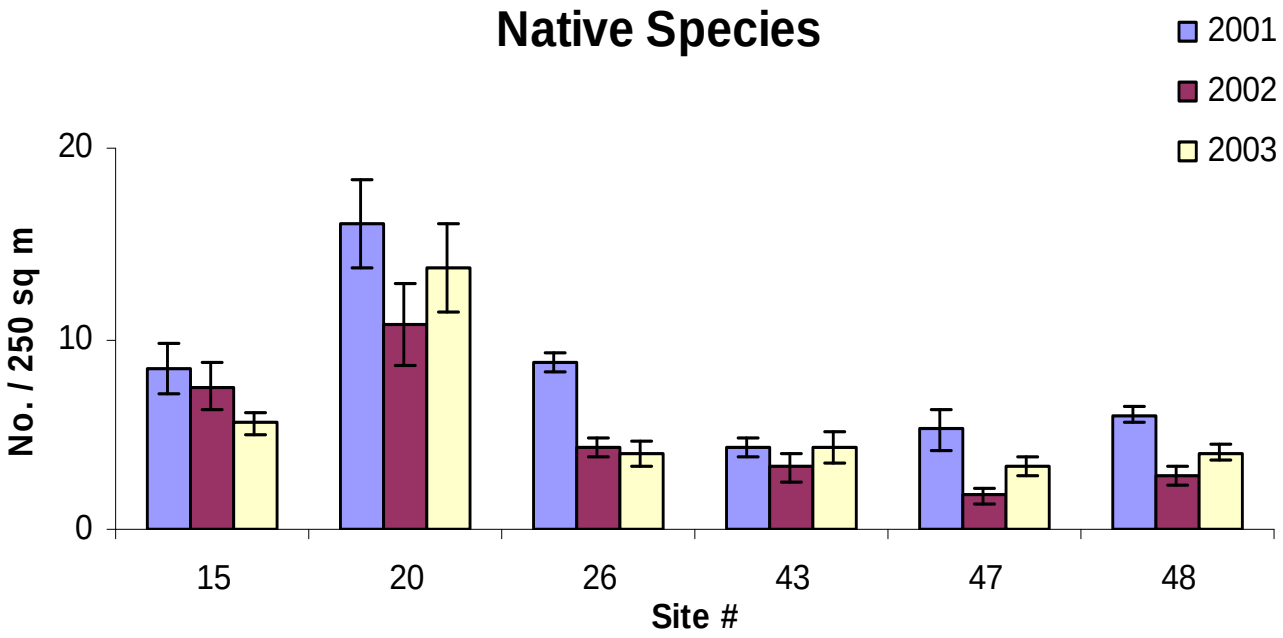
Enhancement Standards

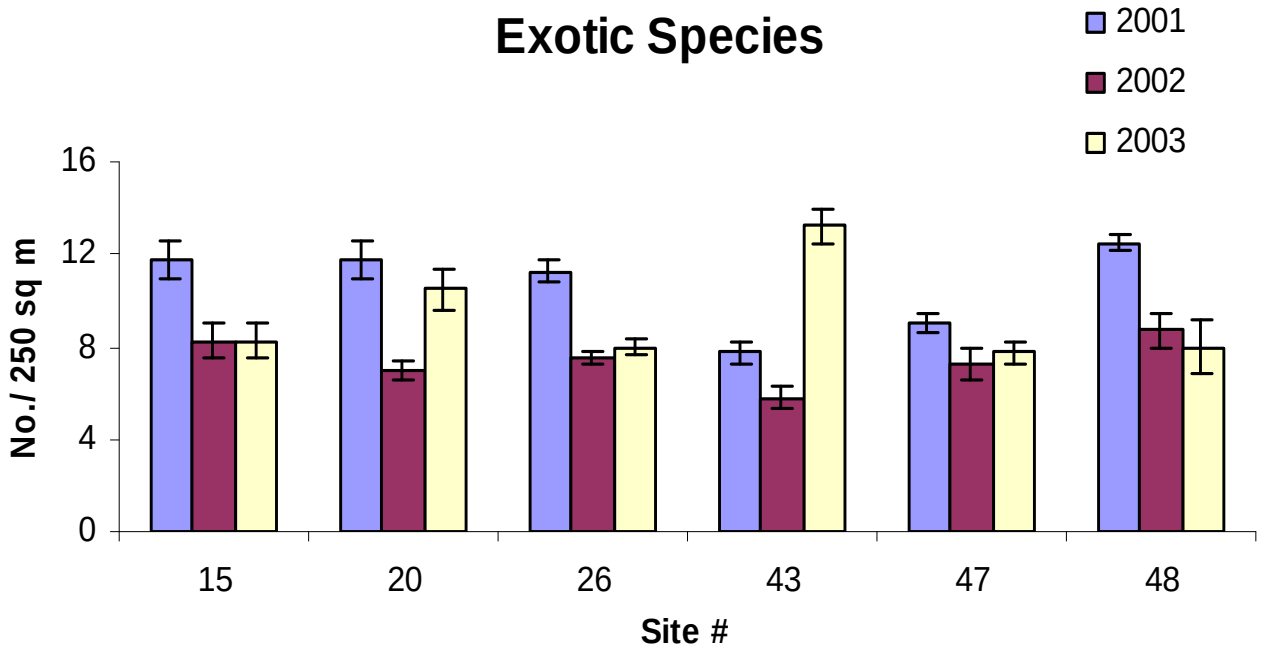
Perennial Bunchgrass Grasslands at Starr Ranch

Spring Sampling Plot (5 x 50 m) Layout



6 Needlegrass Grassland Stands


Native Species
2001
2002
2003
20
10
0
No. / 250 sq m
15
20
26
43
47
48
Site #


Exotic Species
2001
2002
2003
16
12
8
4
0
No./ 250 sq m
15
20
26
43
47
48
Site #

Spring 2007

"Quick and Dirty" Qualitative Assessment

of

Needlegrass Grasslands * as Songbird Habitat

*** > 30 % cover *Nassella pulchra***

> 10 % cover *Nassella* spp. Jones & Stokes Associates, Inc. Orange County GIS 1993

Why "Quick and Dirty"?

- **ornithologist contracted for area searches in 2007 cancelled**
- **field crews (5) visit sites 1x/mo.**
- **field crews walk sites in grids to detect and control exotics**
- **minimizes additional human impacts to fragile habitat**

Grasshopper Sparrow

Over the past 30 years, populations of grassland birds have declined faster than any other group of birds in the U.S. (Peterjohn and Sauer 1999)

Western Meadowlark

	Breeder **GRASSHOPPER SPARROW**	*Winter Migrant* **SAVANNAH SPARROW**	*Breeder* **WESTERN MEADOWLARK**
Length (inches)	5	5.5	9.5
Head	Flat head	Angle between base of bill and forehead	
Bill	Large billed	Small billed	Sharp pointed
Breast	Unmarked, buffy	Streaked sides and breast, sometimes with central spot	Bright yellow underparts with broad black "V" on breast
Eye ring	Complete, white	None	None
Tail	No notch	Notched	Outer tail feathers white
Behavior, flight	Fly LOW over grass with very distinctive wingbeat - as if only flapping tips of wings (rapid and fluttery)	Flight direct vs. GRSP	Foraging birds walk or run on ground. When approaching nest, birds walk more stealthily with body closer to ground. Flight similar to that of quail and grouse, alternating periods of gliding with wings held stiff and periods of rapid wing beats below the horizontal.
Song	Male's common Primary Song delivered from fixed perch: 2 (sometimes 1 or 3) short, staccato, high-pitched preliminary notes followed by a long, dry, insect-like stridulation—*tsick* , *tsick* , *tsurrrrrrr* , *tip-tup-a-zeeeeeee* —superficially similar to Savannah Sparrow song.	3 part primary song of GRSP similar to Savannah Sp but GRSP ends in long trill and doesn't descend	Variable series of bubbling, flutelike notes ("spring is here")

	Year	Data		
	2007		2008	
Site #	GRSP Song	GRSP Visual	GRSP Song	GRSP Visual
9	1	0	1	1
15	1	1	1	1
20N	1	0	1	1
20S	1	1	1	1
26M	1	1	1	1
28LLE	1	1	0	0
28LLM	1	1	0	0
39	1	0	1	1
41	1	1	0	0
43	1	0	1	1
47	1	0	1	1
48	1	1	1	1

Needlegrass Grassland Enhancement

Long term Goal:

approx. 450 acres (182 ha) grasslands enhanced

	Grassland Enhancement	
Year	**Acres**	**Hectares**
1999-00	**240**	**97.12**
2000-01	**10**	**4.05**
2002-03	**6**	**2.43**
2003-04	**20**	**8.09**
2004-05	**10**	**4.05**
2005-08		
Total over 8 seasons	**286**	**115.74**

Weed Removal and Restoration: Field Crew Leader and Field Assistant Hours

Date	Grassland no.	No. in Crew	Start time	End time	Person hrs (crew*(hrs-lunch))	AT Cover (%) [1]	AT Tool [2]	Total person hrs AT removal	Total person Removal Tool [2]	Total hrs Non AT Weed Removal	Total hrs NonAt Acitivity [3]	Restoration	Total person hrs restoration

[1] **Cover Classes**
(R)are < 5%
(I)nfrequent 5 - 20%
(C)ommon 20 - 40%
(A)bundant >40%

Grassland numbers

2	11	20S	29U	47
3L	12	21	39	48
4	15	26BM	41	**(L)**oop (**C**)ut-(**O**)ff
5	16	28LL	43	
9	20N	28M	45	

[2] **Tools**
(B)ruscutter
(F)lamer
(H)oe
(HW) Handweed
(T)ractor

[3] **Restor. Activ. in Blocks:**
(**P**)lanting
(**W**)eeding
(BP)Block**P**rep

Costs

2004-05

Activity	Cost/acre *	Acreage
CYNCAR control	$100.00	342
Exotic control (grasslands)	$65.00	283
Restoration (CSS)	$230.00	46
TOTAL	$395.00	

* (costs based on $20/hour/person)

Conclusions

- **Since 1999, ± 116 ha (286 acres) in needlegrass grassland enhancement of 450 acres targeted**

- **Experiments that test mowing to enhance grasslands are ongoing**

- **Long term monitoring and persistent mapping and control of new and annually changing exotics is an integral part of the Starr Ranch grassland enhancement strategy**

California eBird

Audubon CALIFORNIA

prbo

Home | About eBird | Submit Observations | View and Explore Data | My eBird

Welcome to California eBird

environmental groups with the Tejon Ranch Company. The agreement will protect approximately 90 percent of the Tejon Ranch, including the Tehachapi Oaks Important Bird Area (IBA) and a significant expanse of the Antelope Valley IBA, and open new opportunities for Californians to enjoy this tremendous landscape firsthand. The agreement also ensures long-term and secure funding for land management and restoration with the newly-created Tejon Ranch Conservancy. Read more!

California Birding News

Grasshopper Sparrow nest discovered at Audubon's Starr Ranch!

At the Audubon California Starr Ranch Sanctuary in southeast Orange County, native needlegrass grasslands have been managed since 1999 in response to a decline in the dominant bunchgrass, *Nassella pulchra*. Staff scientists have initiated a series of experiments that test the effects of different timings and intensities of mowing to control exotics and stimulate the bunchgrasses. The seasonal field crew conducts grassland bird monitoring on 220 acres, focusing on Grasshopper Sparrow and Western Meadowlark as two indicators of habitat quality. Last season Grasshopper Sparrows were detected and the most exciting event this season has been the discovery by two field assistants (William Rodriguez and Dave Decker) of a Grasshopper Sparrow nest with five eggs. Click Here to learn more about Starr Ranch, and view live cams of other nests!

NSF

Wolf Creek Charitable

Overview

1. Upland Invasive Control & Restoration
   a. Non-chemical Artichoke Thistle Control
   b. Coastal Sage Scrub Restoration
   c. Needlegrass Grassland Enhancement

2. Riparian Invasive Control & Enhancement

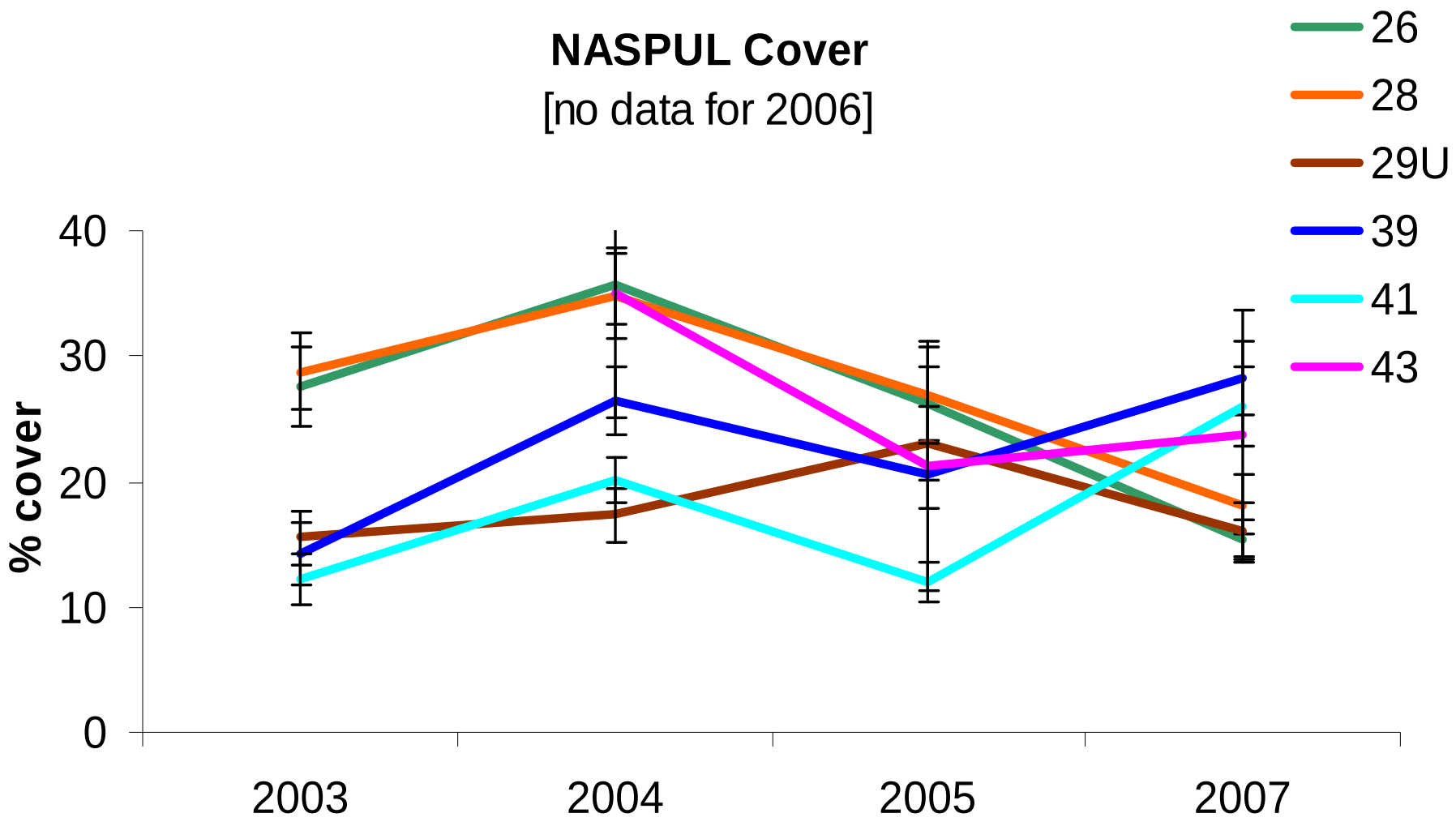
Effects of mowing on NASPUL density and cover, cover exotic forb and grass species

BACI Design

Baseline Data

6 NASPUL grassland stands

Spring, 2003 – ???


NASPUL Cover
[no data for 2006]
26
28
29U
39
41
43
% cover
40
30
20
10
0
2003
2004
2005
2007