

AperTO - Archivio Istituzionale Open Access dell'Università di Torino

Differences in population size structures drive grass response to long-term livestock removal

This is the author's manuscript

Original Citation:

Availability:

This version is available <http://hdl.handle.net/2318/1902720> since 2023-05-09T14:41:42Z

Terms of use:

Open Access

Anyone can freely access the full text of works made available as "Open Access". Works made available under a Creative Commons license can be used according to the terms and conditions of said license. Use of all other works requires consent of the right holder (author or publisher) if not exempted from copyright protection by the applicable law.

(Article begins on next page)

Background

Exclosures are used worldwide to study the effect of livestock removal on plant community.

Characteristics of the studies that used long-term (≥ 10 years) exclosures in Desert Grasslands, in other vegetation types of the world and in the present study.

	Desert Grasslands median (min-max) N	Other Vegetation Types median (min-max) N	Present Study
Maximum age of the exclosure (years)*	28 (14-74) N = 16	30 (10-83) N = 61	104
Number of exclosures	1 (1-9) N = 16	3.5 (1-36) N = 62	10
Average exclosure size (ha)	72.40 (0.15-1x10 ³) N = 16	1 (0.01-6800) N = 49	1.1
Number of measurements	1 (1-6) N = 16	1 (1-30) N = 62	4
Length of the experiment (years)**	1 (1-74) N = 16	1 (1-72) N = 50	10
Number of growth forms (herbaceous/non-herbaceous)	2 (1-2) N = 16	2 (1-2) N = 62	2
Number of variables (cover, density, biomass)	1 (1-3) N = 15	2 (1-3) N = 64	3
Number of studies accounting for repeated measurements***	2 / 5	10 / 21	Yes

Research questions

1. How does Desert Grassland vegetation respond to long-term grazing removal?
2. Is grass response the result of differences in the number or the size of plants?
3. Does the response differ over time and in relation to precipitation patterns?

Methods

Where? Santa Rita Experimental Range (Arizona, USA).
10 long-term (88-104 yr) exclosures on Sandy Loam Upland Ecological Site.

When? 4 measurements over 10 years (2011-2020).

What? 3 measures of abundance (cover, density, biomass) of native and non-native grasses and cover of woody species.

How? Linear mixed models (fixed factors: grazing, year, GxY; random factor: transect).

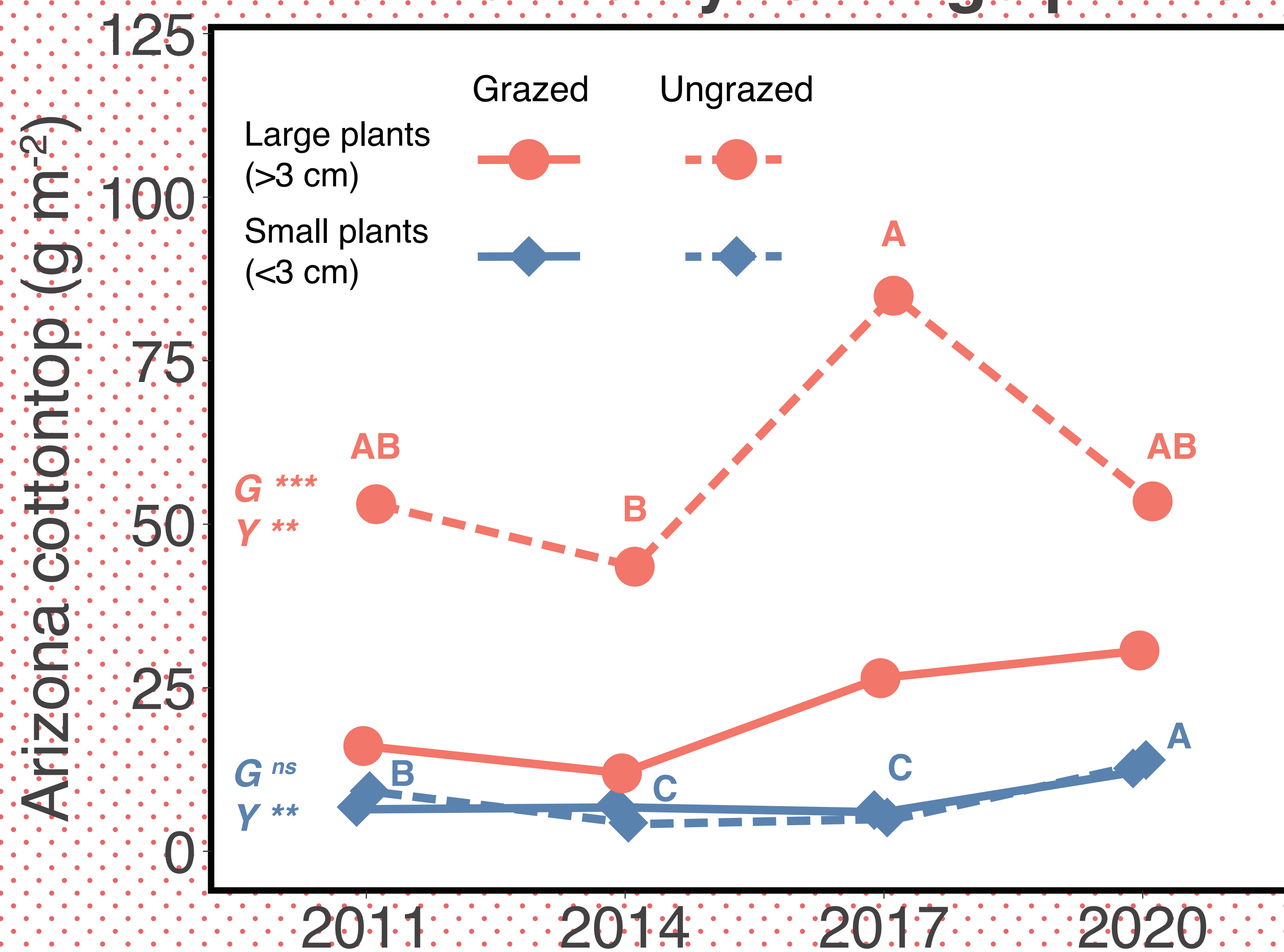


Exclosure 40 - grazed transect

Exclosure 40 - ungrazed transect

Differences in population size structures drive grass response to long-term livestock removal

Biomass differs by grazing treatment only for large plants



Native perennial grass plants are larger in long-term ungrazed areas in Desert Grasslands

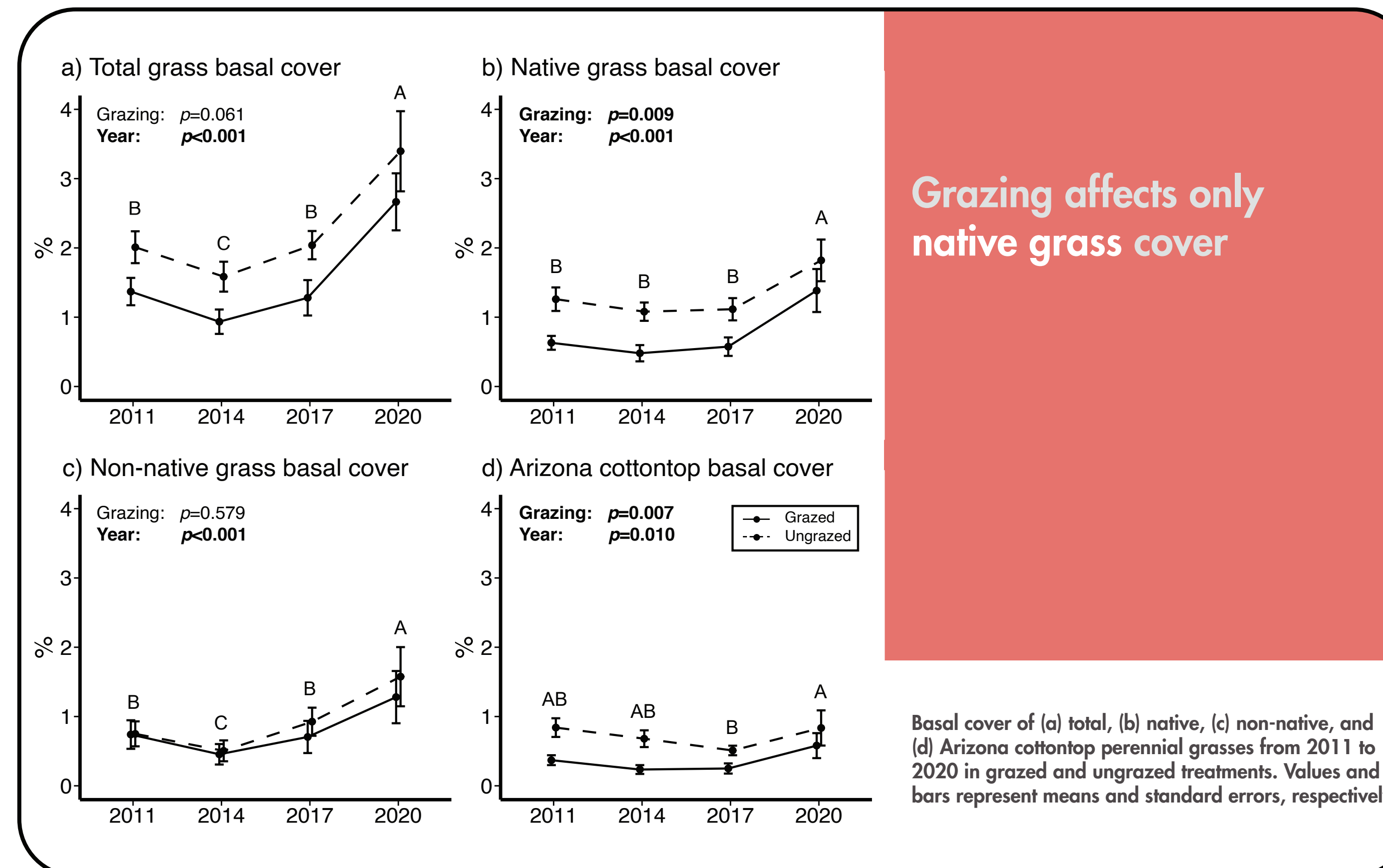
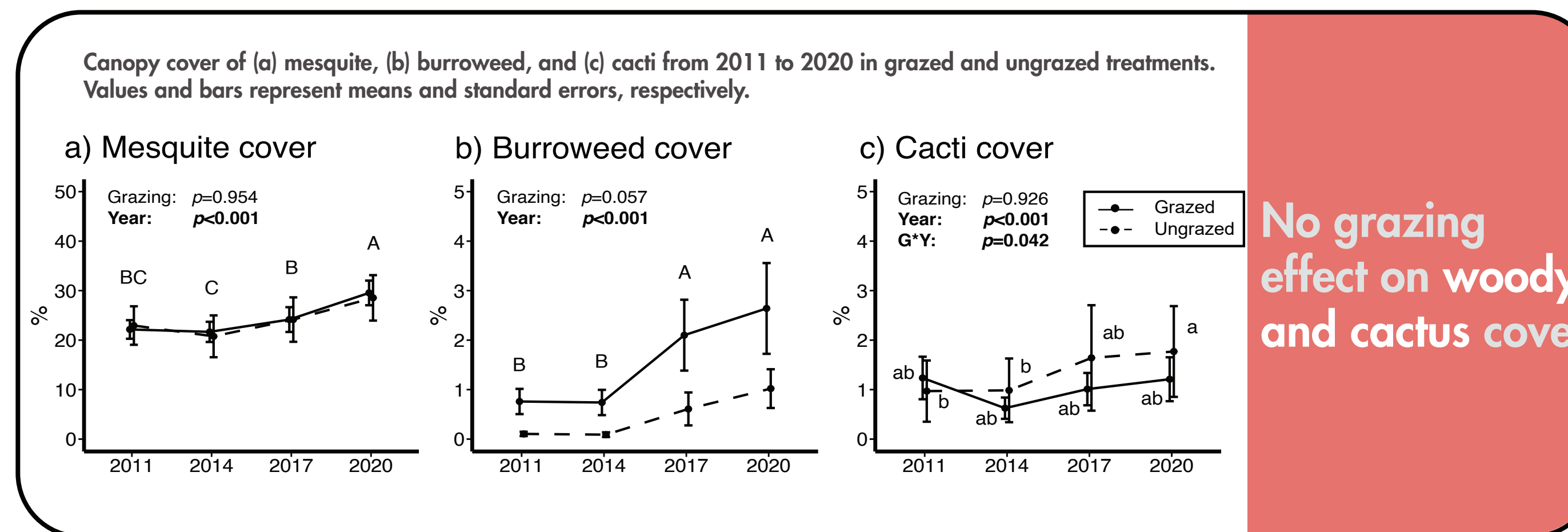
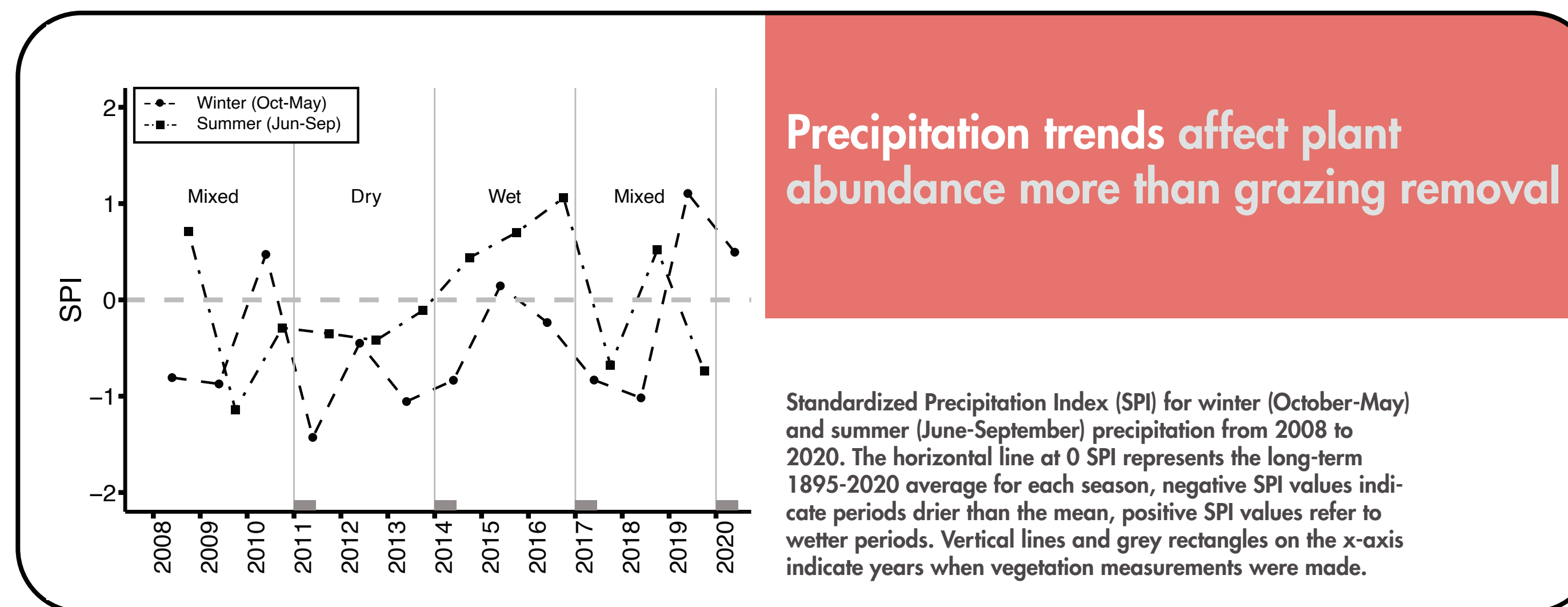


SCAN ME

ANSELMETTO¹ Nicolò, NOTA¹ Ginevra,
GORLIER² Alessandra, McCLARAN² Mitchel P.

¹ Department of Agriculture, Forest and Food Sciences, University of Torino, Grugliasco, Italy
² School of Natural Resources and the Environment, University of Arizona, Tucson, AZ, USA

Results



Conclusions

1. Long-term (>80 yr) grazing removal affected native perennial grasses, but not non-native grasses and woody species.
2. Response of native grasses to livestock removal was characterized more by plant size rather than the number of plants. This suggests that grazing may limit natives' vigor and longevity.
3. Fluctuations of winter and summer precipitation patterns influenced vegetation dynamics.