

# The Savanna Convergence Experiment

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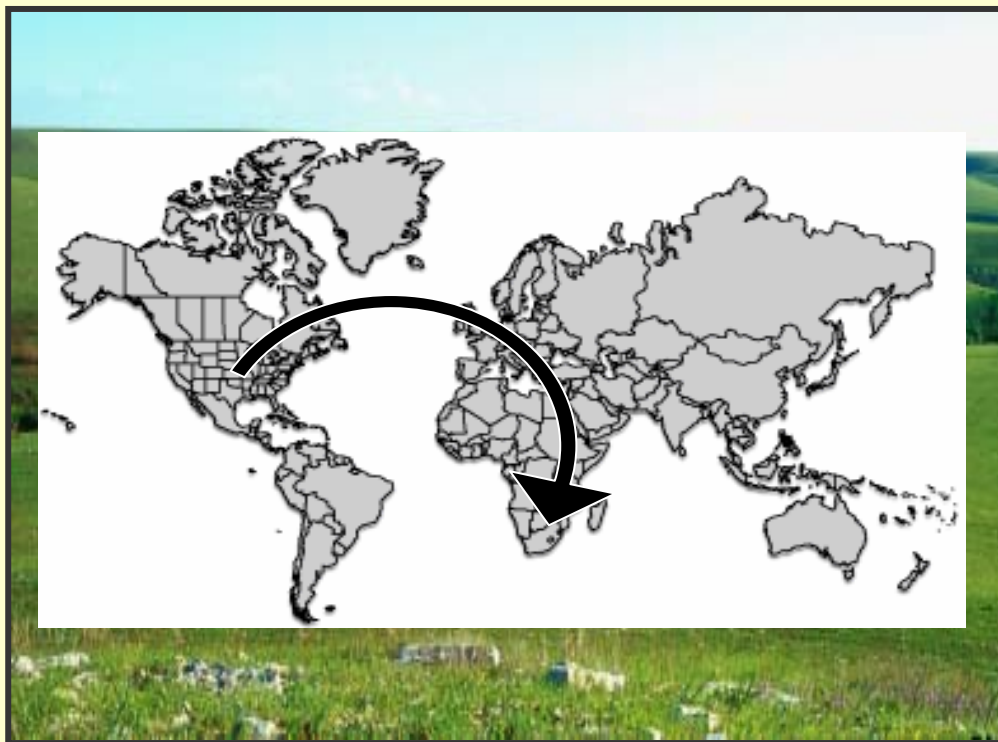
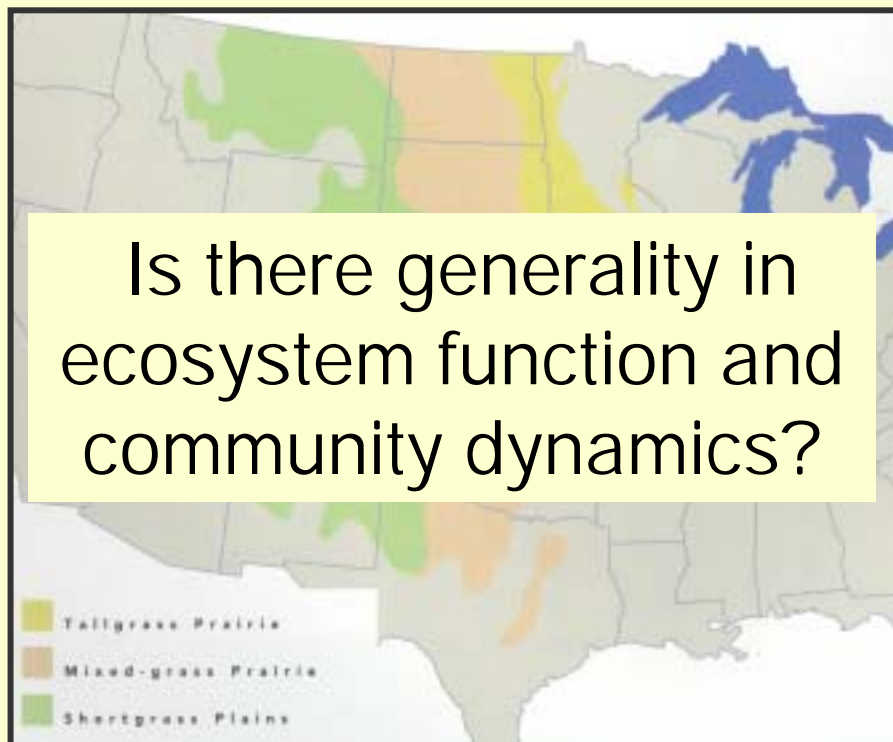


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# Mesic Savanna Grasslands of North America

## The Konza Prairie LTER Program



- Part of the US Long-term Ecological Research Program
- 25 years of intensive study
- Research focus on fire and grazing



# Similar drivers of ecosystem dynamics in NA & SA

Climatic  
variability



Fire



Grazing



# Structural similarities

Dominance by warm-season  
 $C_4$  grasses



$C_3$  forb species comprise  
the bulk of diversity



# Fire frequency and woody plants



**Annually burned**



**Infrequently burned**



# Differences in attributes of N. American and S. African mesic grasslands & savannas

Attribute	NA	SA
Age (rise of biome)	5-7 mya	40-60 mya
Age of extant community	8-10,000 yrs	4-6 million yrs
Historic megaherbivore richness (1)	49 species	45 species
Current megaherbivore richness (2)	2 species	33 species
Plant diversity (3)	Low	High
Soil nutrients (3)	High	Low
Climate	Temperate	Sub-tropical
Dormant season	Winter (cold)	Winter (drought)

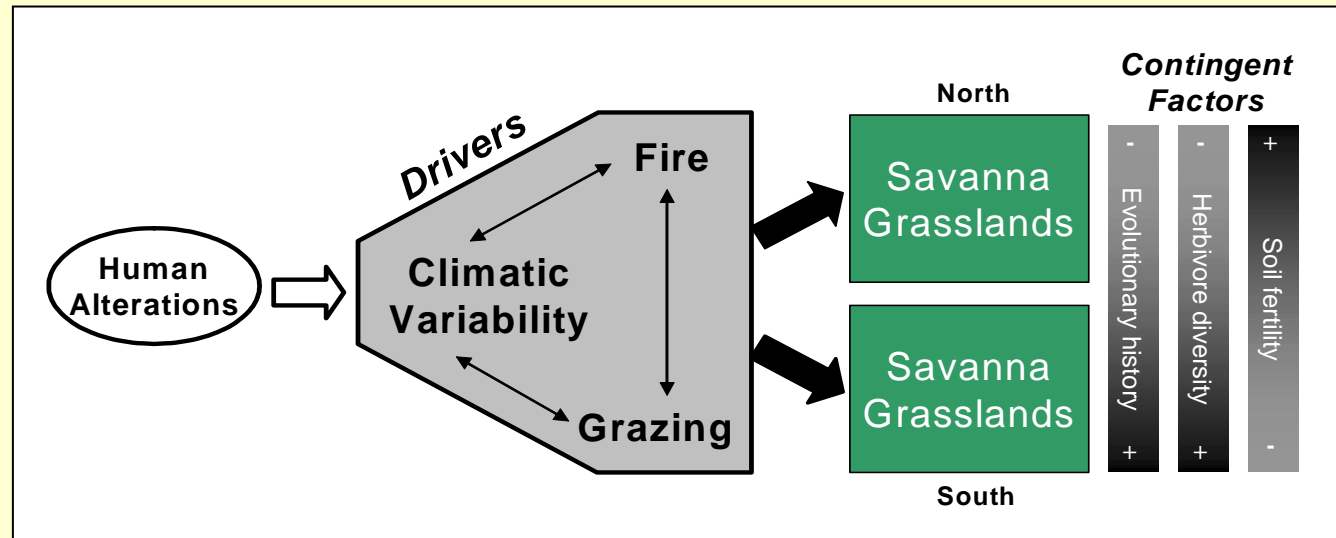
<sup>1</sup>Data from Martin (1984) for all megafauna of North America and Africa.

<sup>2</sup>Data for SA specific to Kruger Park and in NA for Konza Prairie (Kaufman et al. 1998).

<sup>3</sup>From Scholes et al. 2003a,b

# Are South African savannas and grasslands different from their North American counterparts? In what ways are they different and/or similar?

This issue of generality in ecology is key today, particularly with global change:



# How does one search for generality?

- Data mining and *post-hoc* comparisons

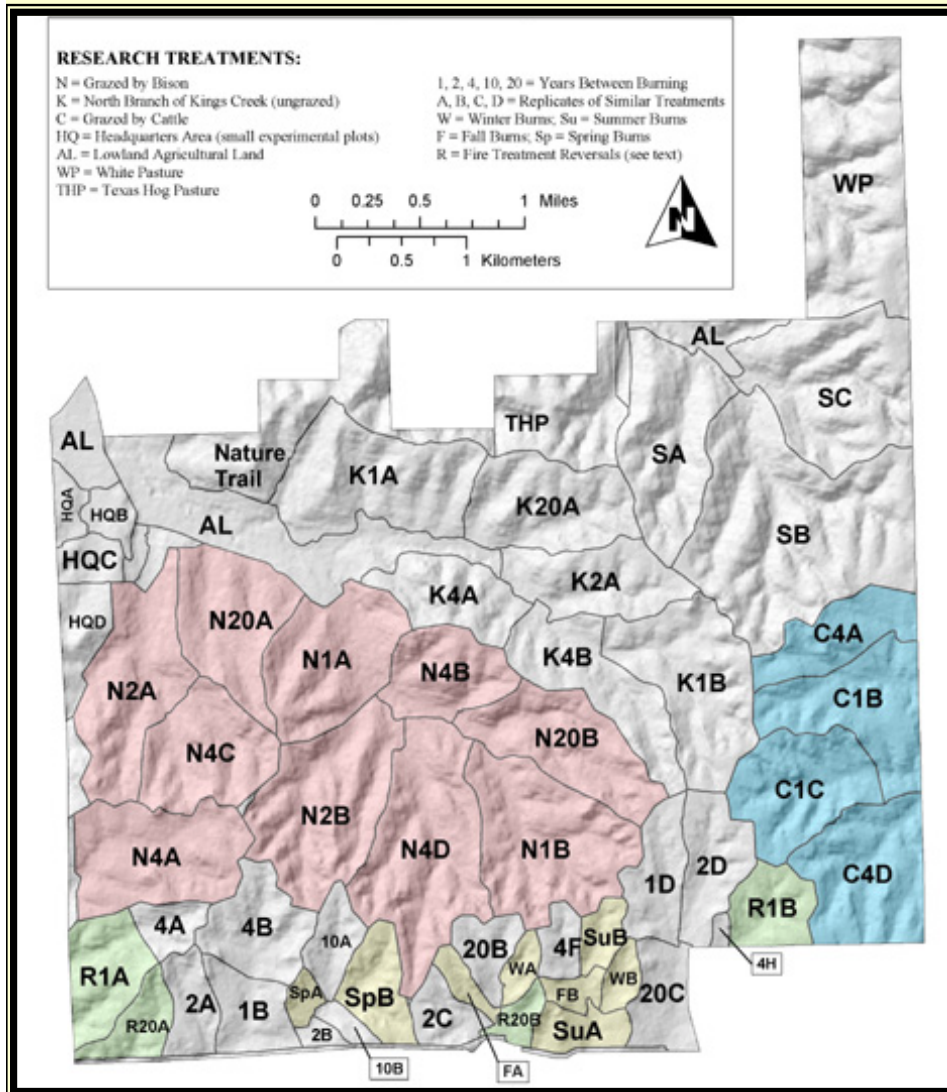
## Data compatibility problems

- Mismatch in temporal scale
- Mismatch in spatial scale
- Different experimental protocols
- Different measurement protocols

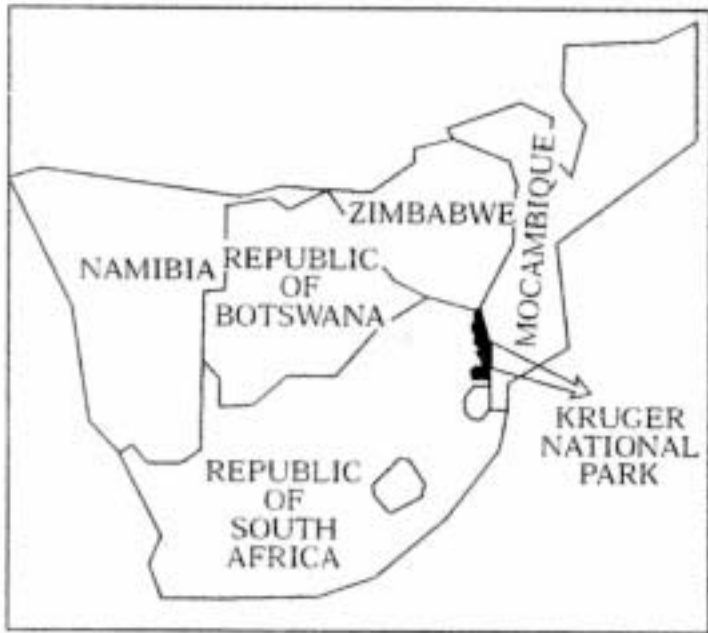
# Initiate comparative studies with identical protocols...

## 3 sites

## Konza Prairie > 25 years and ongoing...



# Kruger National Park Experimental Burn Plots - Satara



**Fire + Grazing**



# Ukulinga Research Plots

> 50 years and ongoing...

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## VELD RESPONSE TO FIRE & CUTTING

BLOCK I										BLOCK II										BLOCK III									
B	B	B	B	B	B	B	B	B	B	D	D	D	D	D	D	D	D	D	D	B	B	B	B	B	B	B	B	B	B
11	6	9	8	2	10	1	3	4	7	2	7	6	4	10	5	11	8	1	9	4	5	6	9	2	10	8	11	7	3
A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C	C	C	C	C	C	C	C	C	C
1	8	11	2	6	3	9	4	7	5	9	8	2	11	6	7	5	4	3	10	1	2	6	3	7	9	4	10	11	5
C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D
8	2	11	9	6	4	10	3	5	1	4	5	10	2	11	8	6	1	9	3	4	1	5	7	2	3	11	10	6	9
D	D	D	D	D	D	D	D	D	D	B	B	B	B	B	B	B	B	B	B	A	A	A	A	A	A	A	A	A	A
1	8	10	2	4	11	7	5	3	6	8	5	11	7	10	6	3	1	2	4	2	9	1	7	3	10	8	5	6	4

**REMOVAL TREATMENTS**

- CONTROL
- ANNUAL BURN AFTER 1ST WEEK IN AUGUST
- ANNUAL BURN AFTER 1ST SPRING RAINS OF
- BI - ANNUAL BURN FIRST WEEK IN AUGUST
- BI - ANNUAL BURN AFTER 1ST SPRING RAINS
- BI - ANNUAL BURN IN AUTUMN
- TRI - ANNUAL BURN FIRST WEEK IN AUGUST
- TRI - ANNUAL BURN AFTER 1ST SPRING RAINS
- TRI - ANNUAL BURN IN AUTUMN
- ANNUAL MOWING 1ST WEEK IN AUGUST
- ANNUAL MOWING AFTER 1ST SPRING RAINS
- 

**UTILIZATION TREATMENTS**

- NO MOWING
- ONE CUT EARLY IN SEASON WHEN GRASS IS HIGH
- ONE CUT TOWARDS END OF FEBRUARY
- TWO CUTS ONE AT B & ONE AT C

PLOT SIZE 15yds x 20yds

NB SPLIT TREATMENTS 6 & 9 ARE NOT CUT AT ALL DURING SUMMER

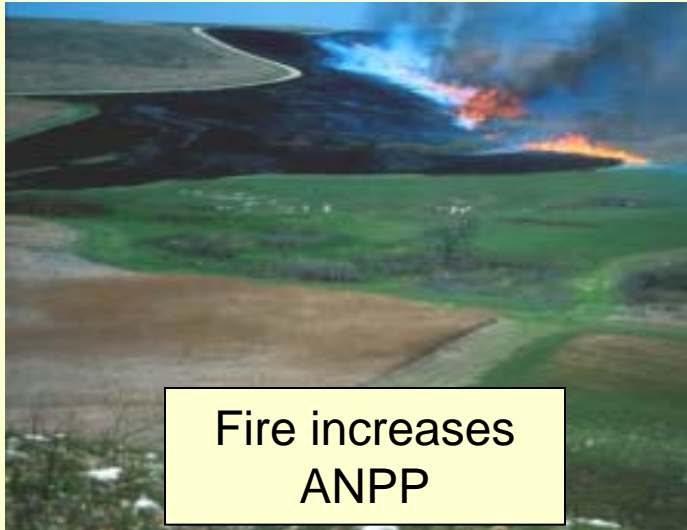


**Fire, no grazing**

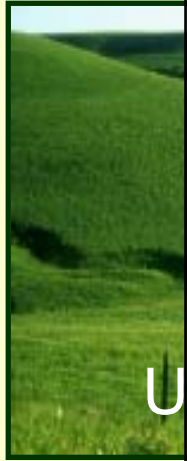


All sites have 1-yr, 3-4 yr and “no fire” treatments

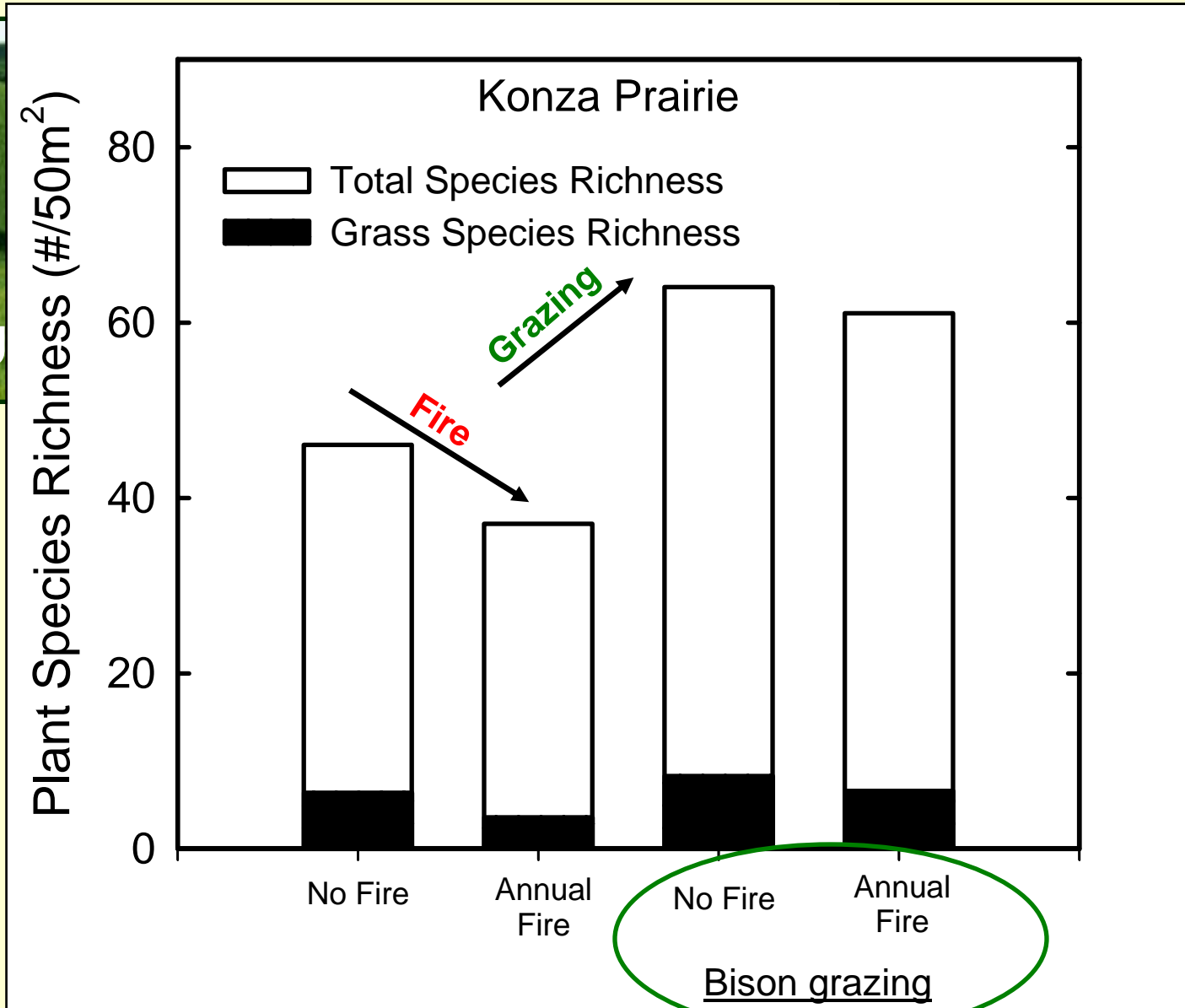
# Fire and grazing as independent and interactive factors at Konza Prairie



# Grazing increases diversity



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# Fire vs. grazing effects in KNP?

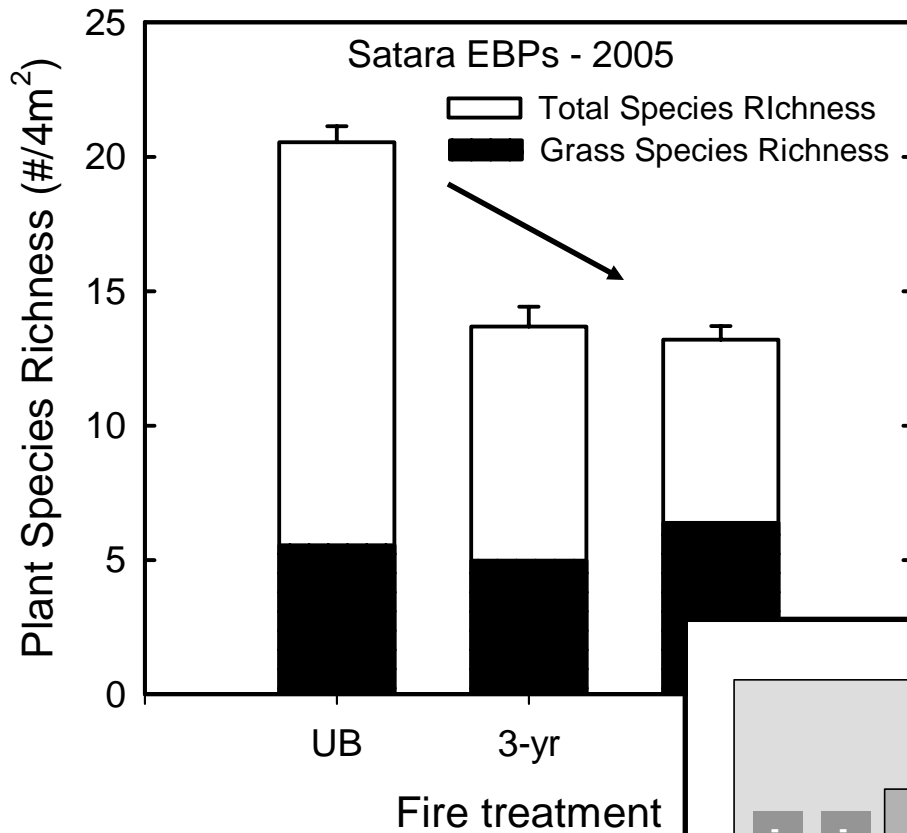
Satara EBP's...

## Also in Buffalo enclosure

- Single large herbivore (Bison vs. Cape Buffalo)
- Diverse herbivores vs. single herbivore

## Response variables

- Aboveground productivity
- Root biomass
- C and N cycling
- Species turnover, shifts in dominance



## Conclusions: yet to come



Predictions →

