



Ground layer plant diversity and phenology with fire in a high rainfall savanna

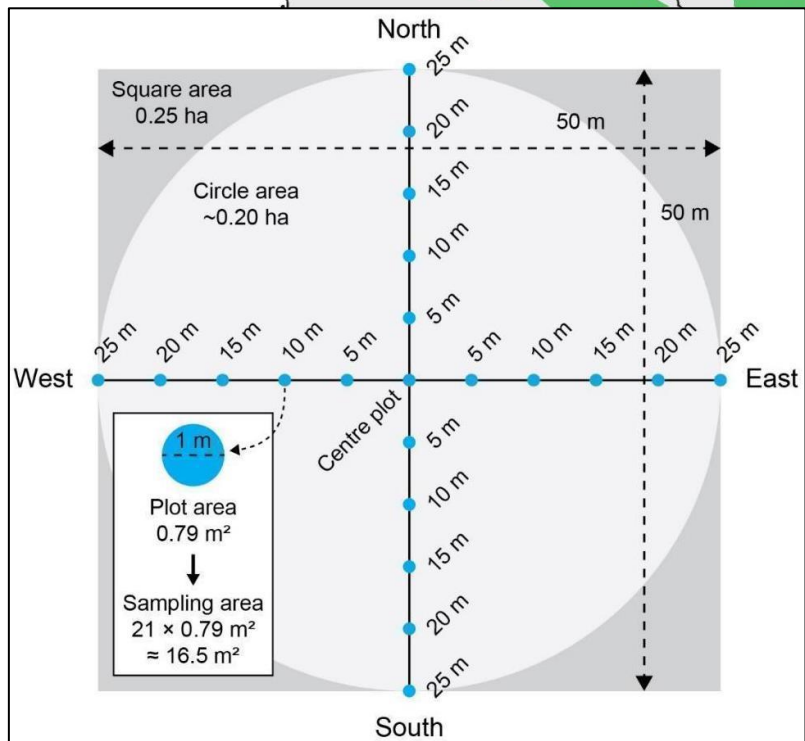
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Archibald, Stephen Syampungani

ROYAL
BOTANIC
GARDEN
EDINBURGH



Miombo Ecoregion

Mwekera Forest Reserve, Zambia



(Olson et al., 2001)



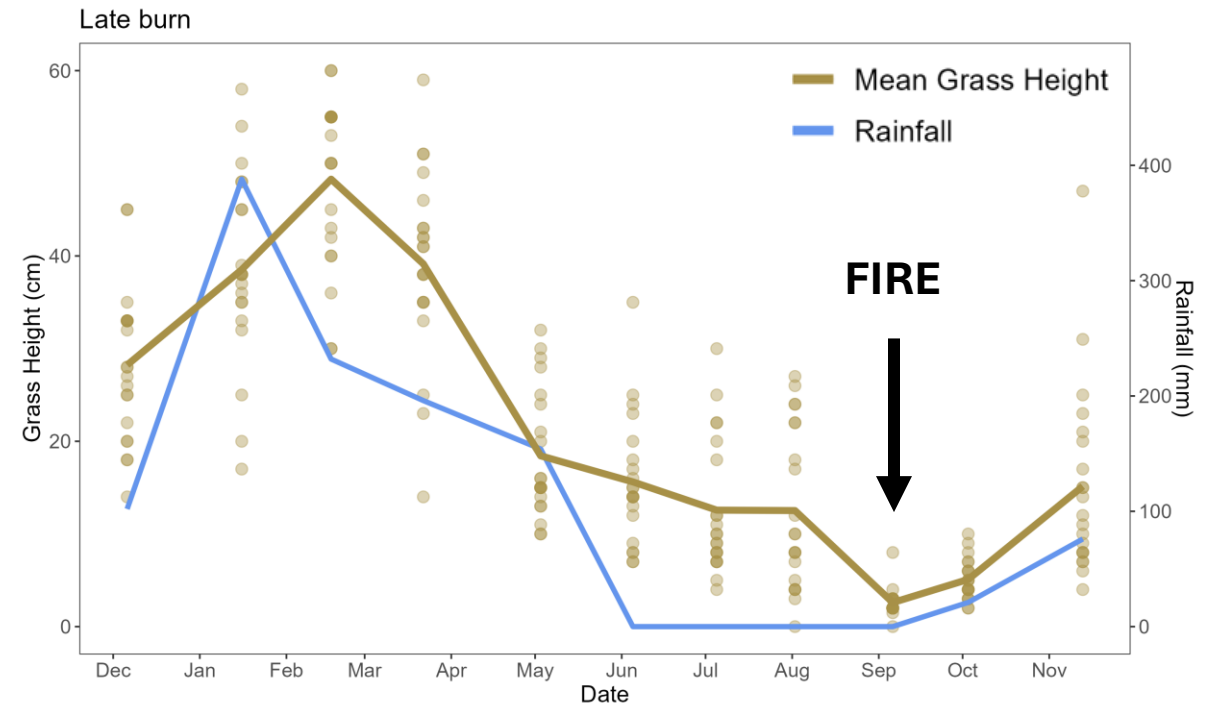
No-fire

Early-fire

Late-fire

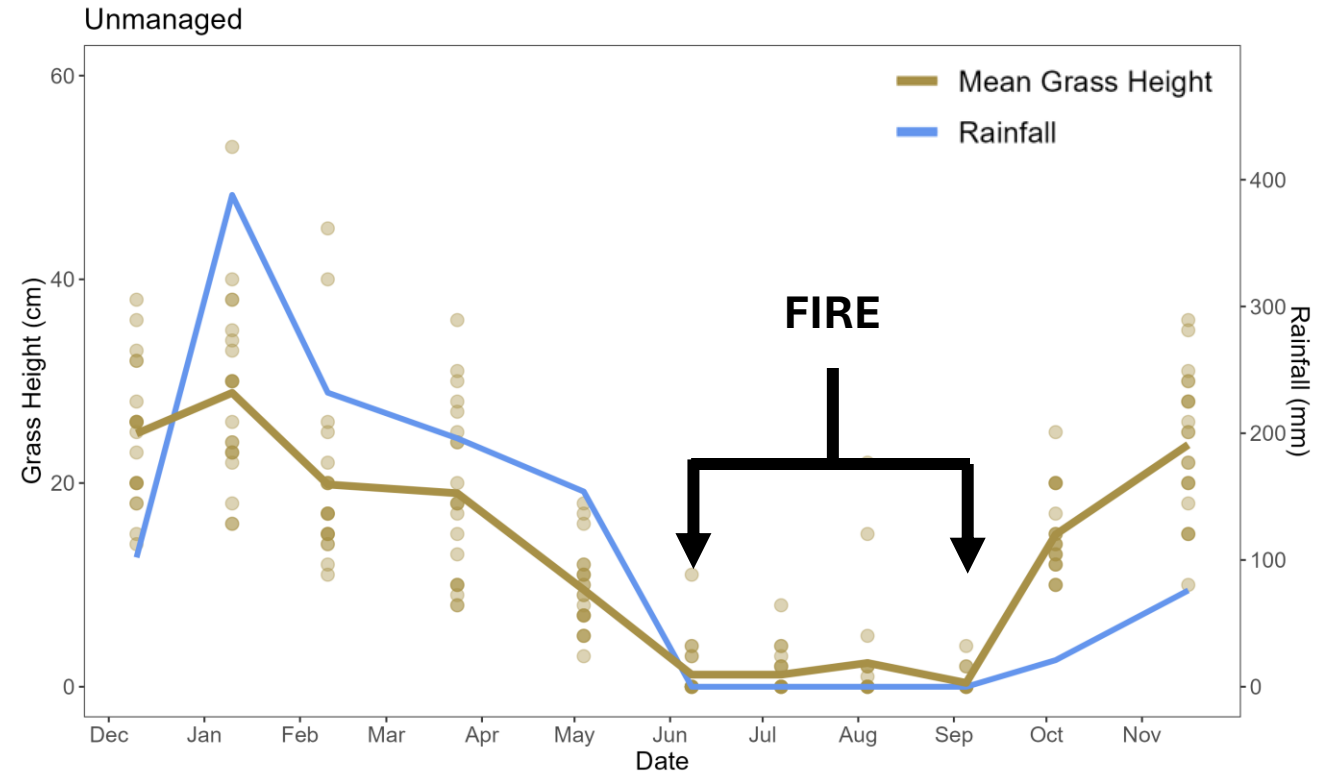
+ unmanaged

Annual late fire - it rains and the grass grows...



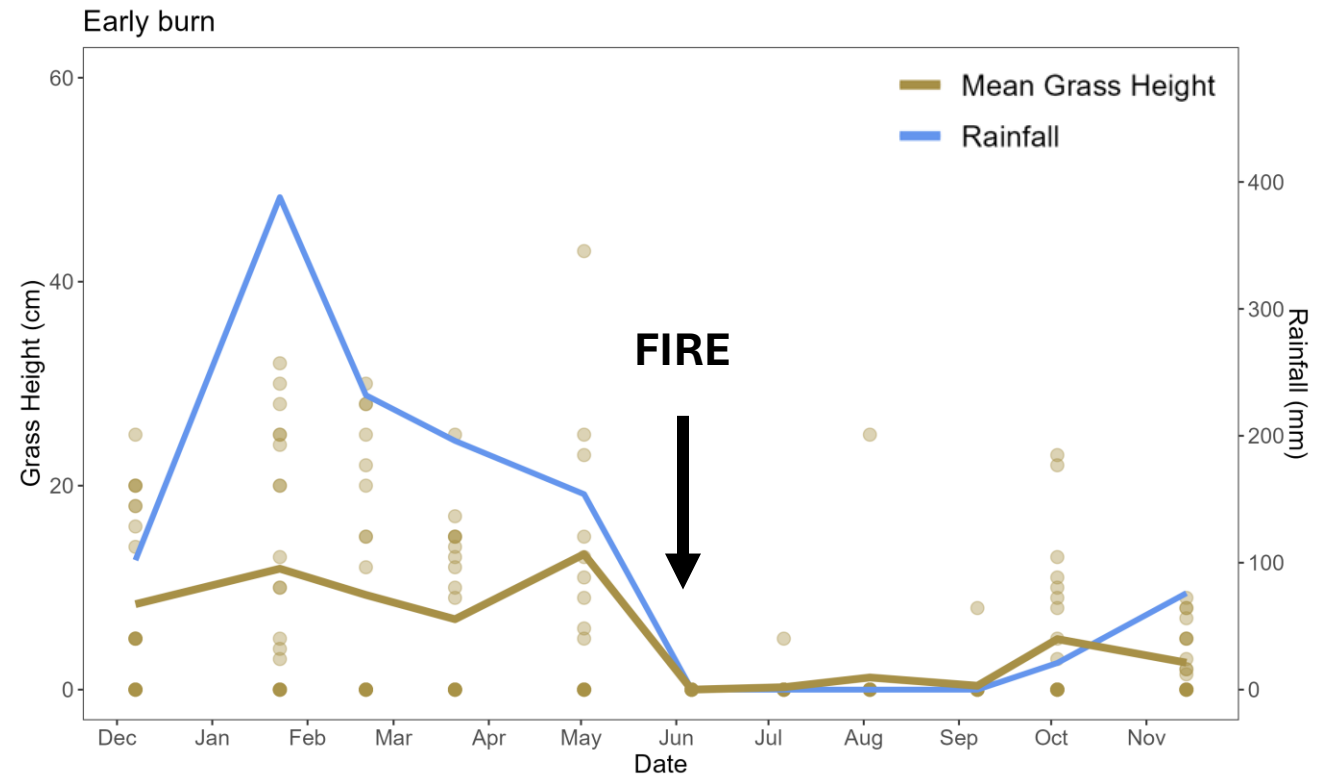
Dec 2022 – Nov 2023

Unmanaged fire - it rains and the grass grows...



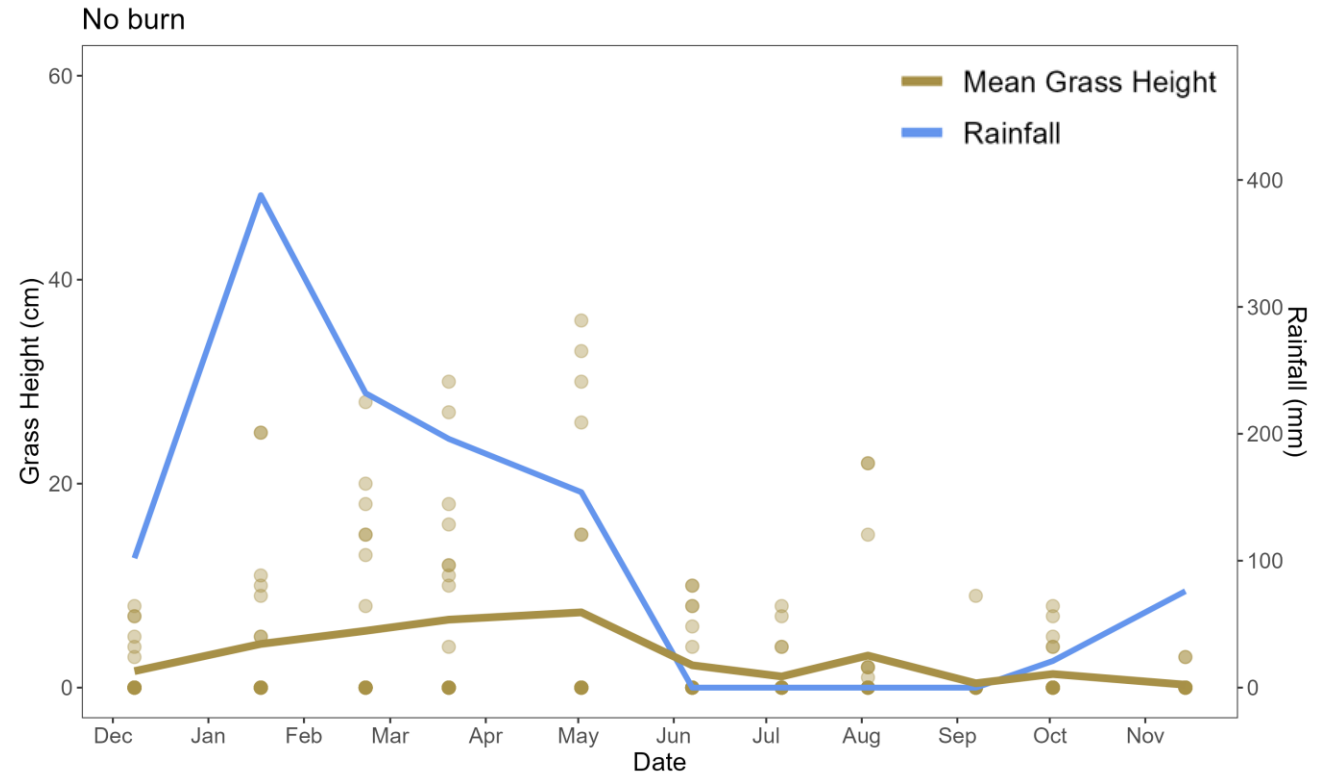
Dec 2022 – Nov 2023

Annual early fire - it rains and grass grows less



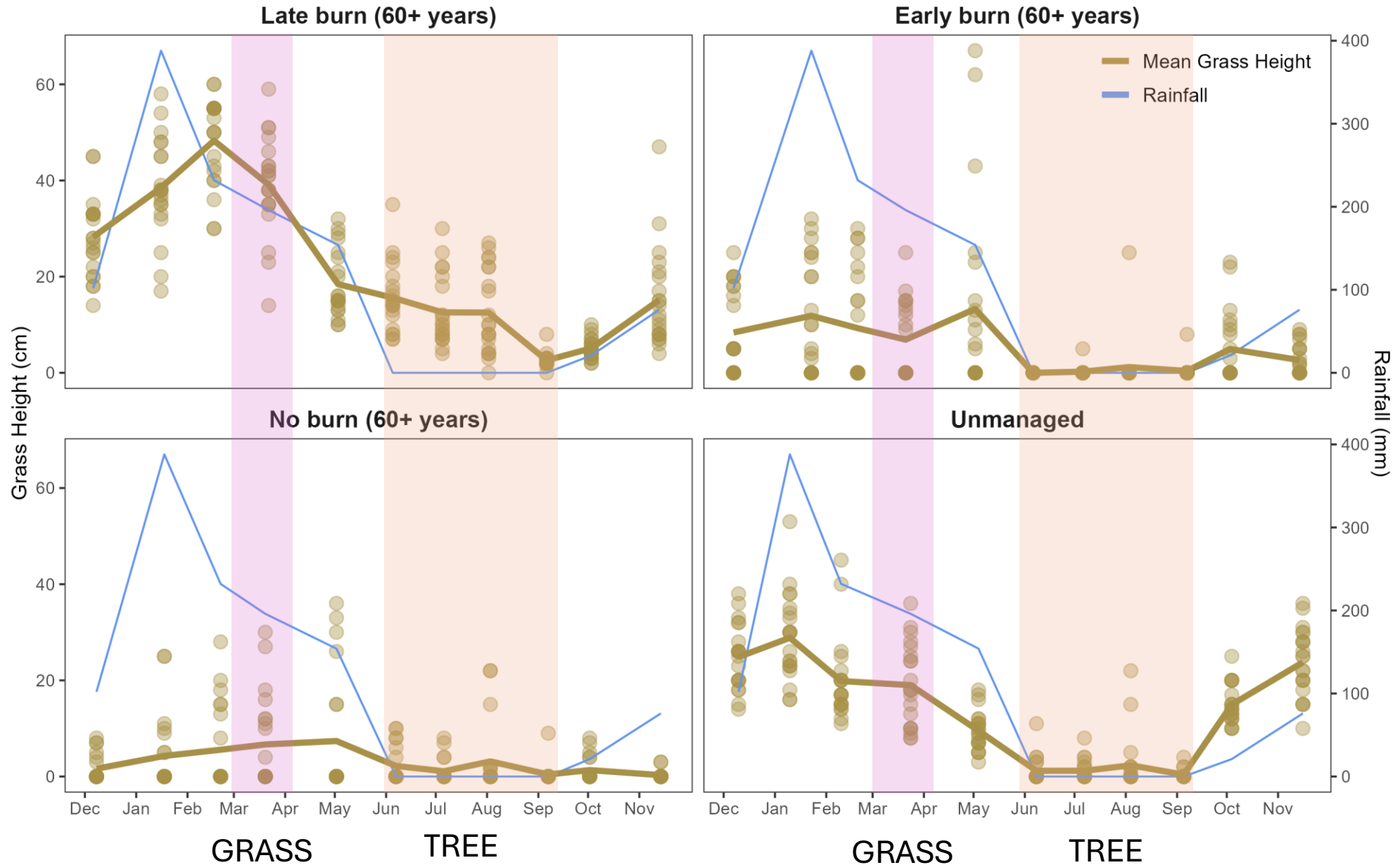
Dec 2022 – Nov 2023

No fire - it rains and the grass does not grow...

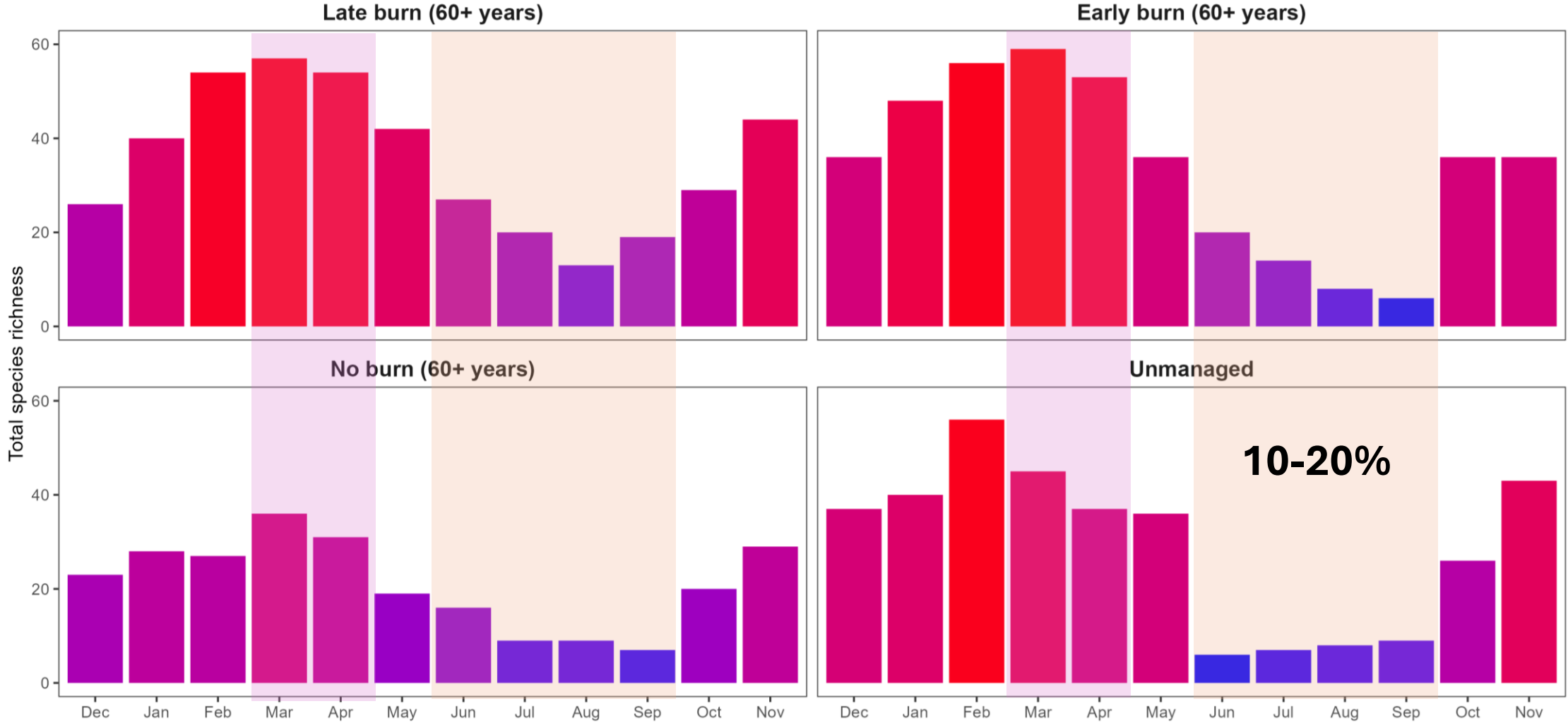


Dec 2022 – Nov 2023

When do we tend to sample plants?

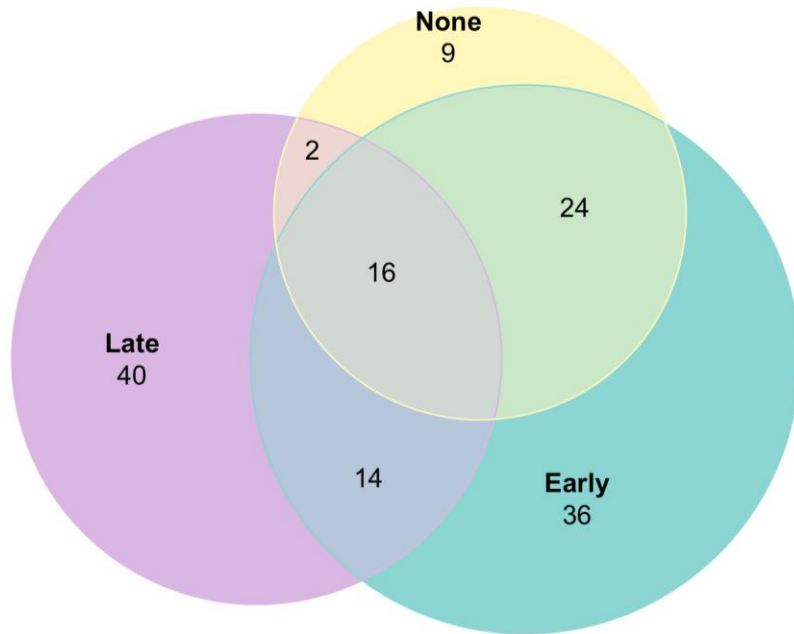


Ground layer richness through the year – time matters

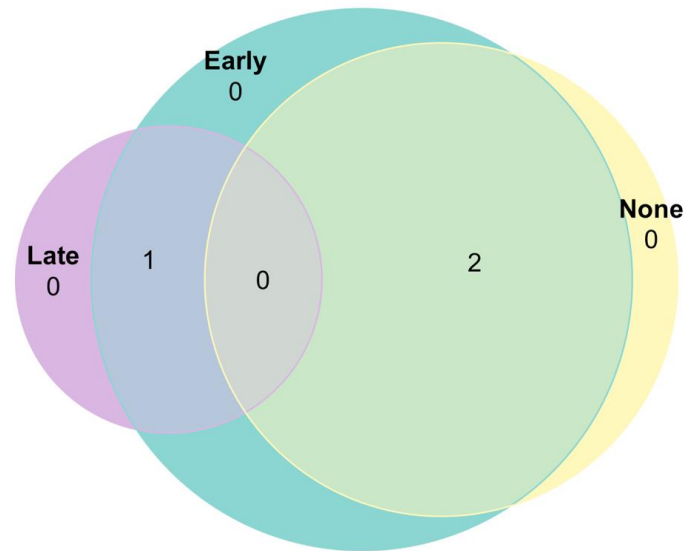


How does fire alter composition?

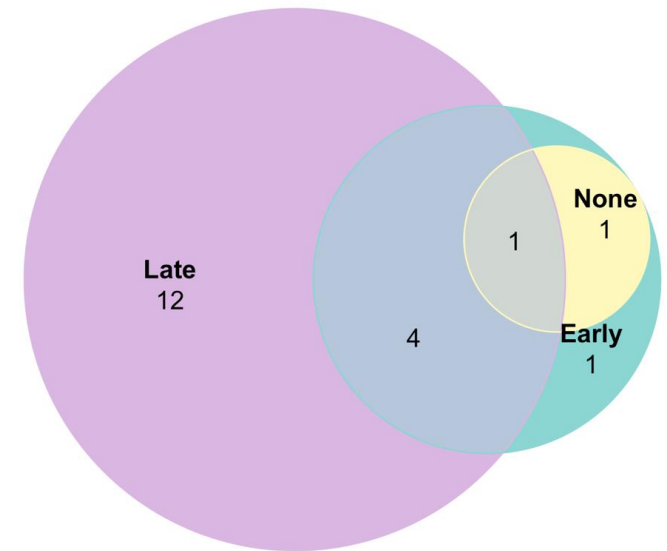
Total ground layer (141)



C3 grasses (3)



C4 grasses (19)

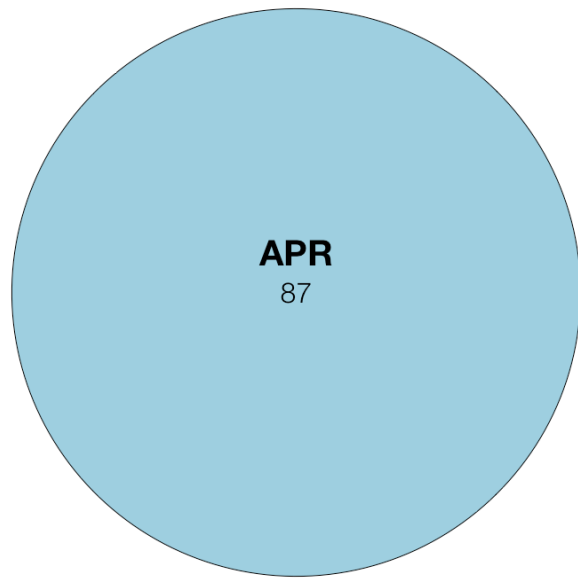


Grasses are ~ 15% of total ground layer diversity

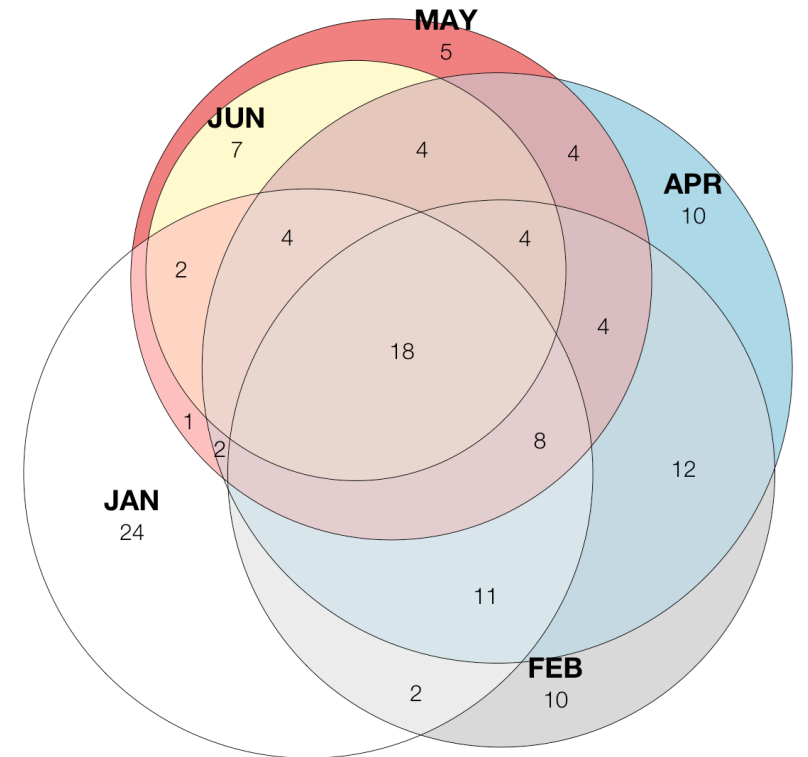
Composition changes within a year

April ~ 60%

June ~ 30%



January ~ 18% unique



JANUARY

- Sedges
- Non-graminoid monocots, e.g. orchids, gladioli
- Dicots, e.g. *Dorstenia*

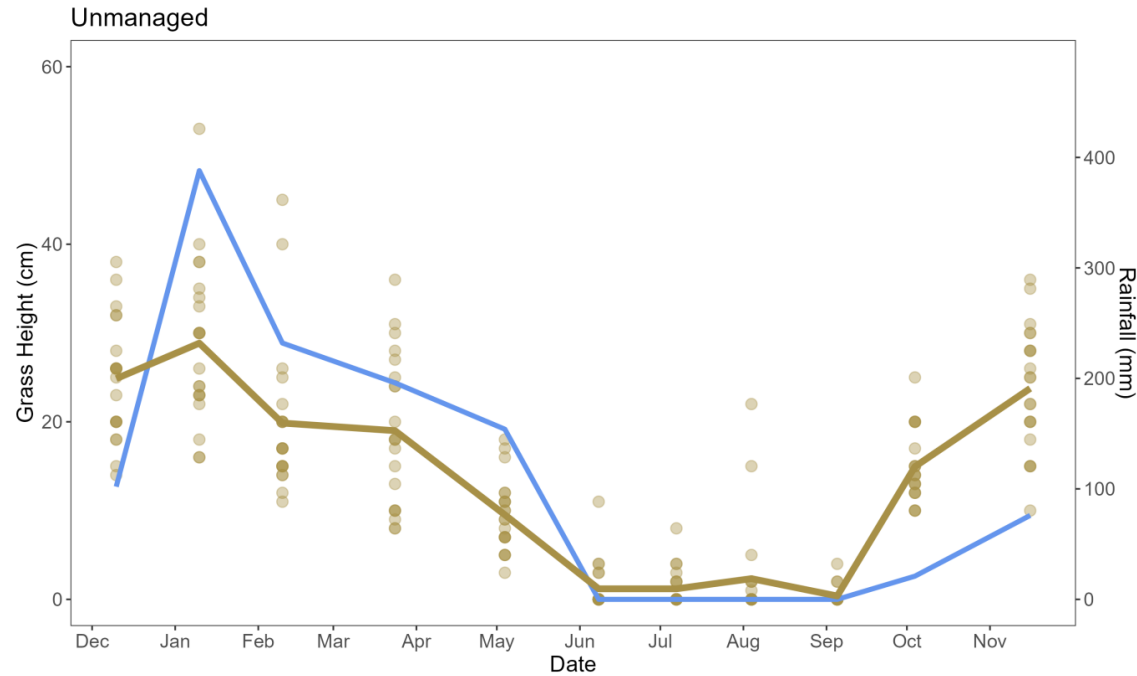
January 2020 – June 2020

Fire alters composition *and turnover* within a year

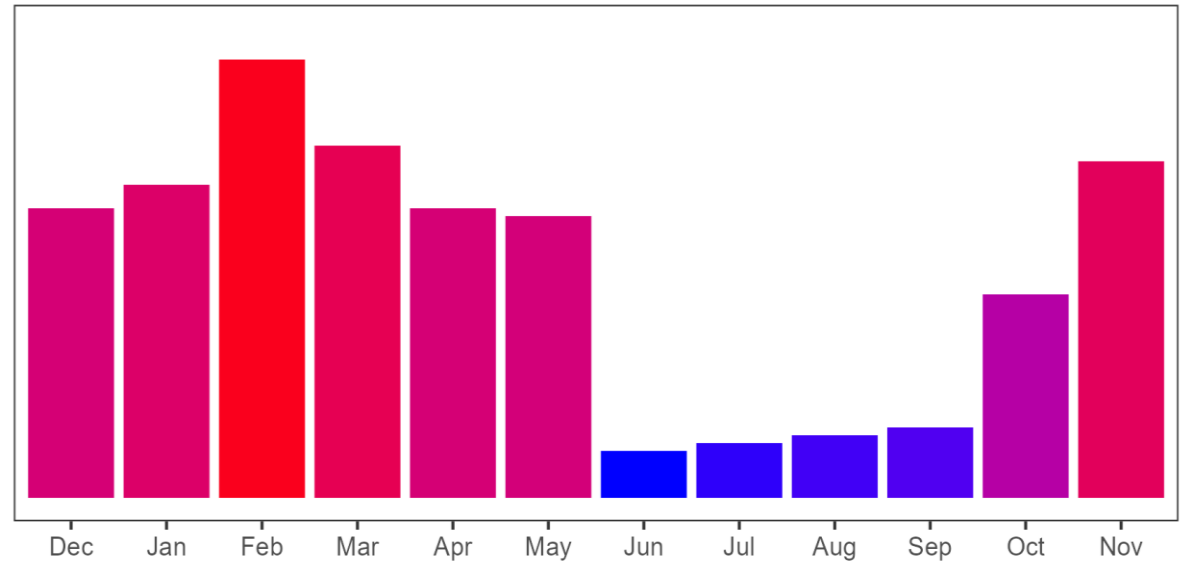
TREATMENT	RICHNESS	Dissimilarity	Nestedness	Turnover
Late fire	72	0.56	0.07	0.49
Early fire	90	0.67	0.09	0.58
No fire	51	0.68	0.13	0.55



Ground layer environments change through a season



Grass growth + curing



**Species accumulation
+ turnover**

What do these data mean?

- NBS interventions and evaluations need appropriate data
- Time of year matters for both richness and composition
- Fire in a seasonal environment facilitates richness and turnover
- Loss of fire dampens, possibly eliminates ground layer phenology
- Highly likely functional composition varies through the year



Thanks for listening!

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