

# Practical ways of incorporating variation in fire intensity into fire management of African Savannas



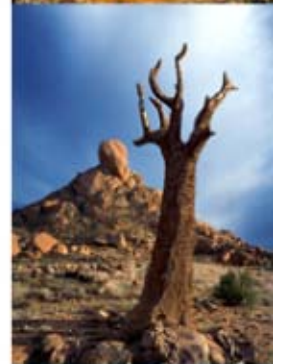
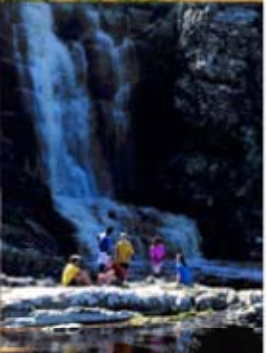
**South African  
NATIONAL PARKS**

Navashni Govender, Winston Trollope  
& Brian van Wilgen



# Background

Africa is a fire-prone environment, & the importance of fire in determining the composition, structure and function of these ecosystems is probably the oldest issue in savanna ecology that remains contentious



# Background

---

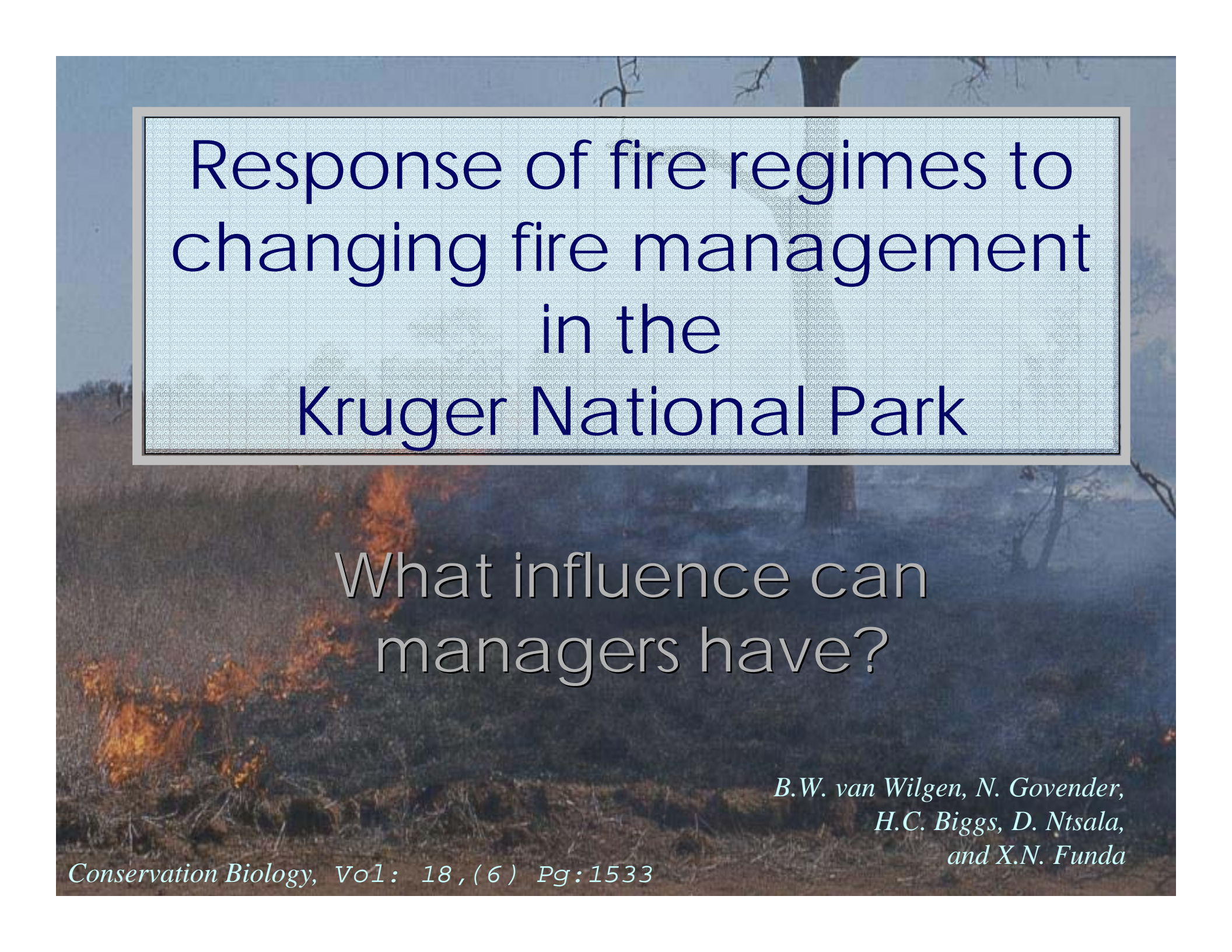
Fire management approaches have changed fundamentally several times over the past century

Reasons for change driven by philosophical debate:

Is fire necessary?  
(protection vs active burning)

Are ecosystems stable?  
(fixed vs variable burning practices)

Should we interfere?  
(natural fire vs prescribed burning)



# Response of fire regimes to changing fire management in the Kruger National Park

What influence can  
managers have?

*B.W. van Wilgen, N. Govender,  
H.C. Biggs, D. Ntsala,  
and X.N. Funda*

*Conservation Biology, Vol: 18, (6) Pg:1533*

# Conclusions

---

Management did not appear to have had a large influence on:

Area burnt (which is related to rainfall and grass biomass)

Variability in fire return periods (which is related to variability in rainfall)

# Conclusions

---

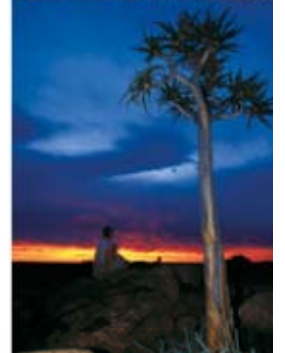
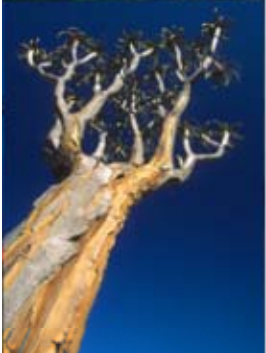
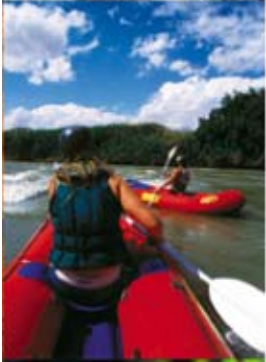
Management appeared to have influenced:

Spatial heterogeneity of fire patterns

Season of fire

# Introduction

- Calculated the FI from 956 experimental fires between 1982 and 2003 (Bryam's fire line)
- The influence of factors such as **post-fire age, season of fire** and **fuel moisture content** on fire intensity.
- The historic records were examined for effects on the fire intensity regime as a result of changing fire management approaches.



# Study site

1954

4 major landscapes

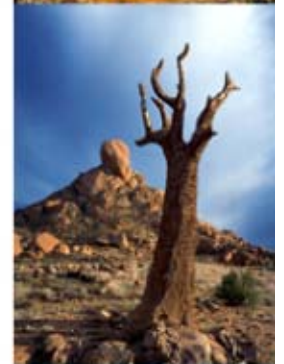
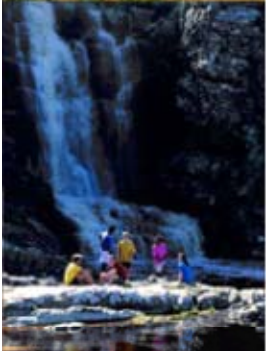
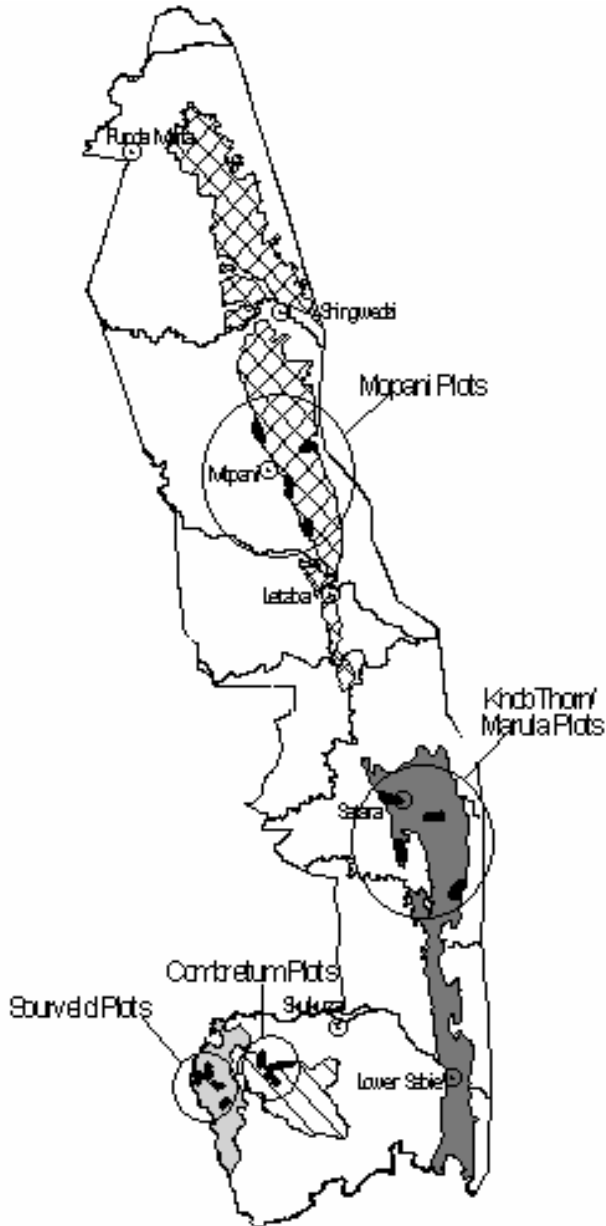
208 plots - +/- 7ha

12 replicates

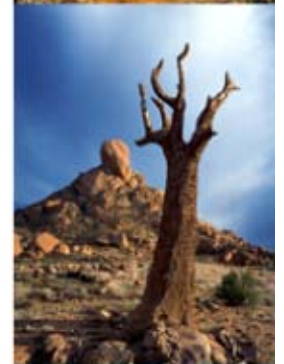
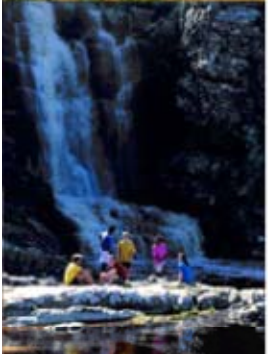
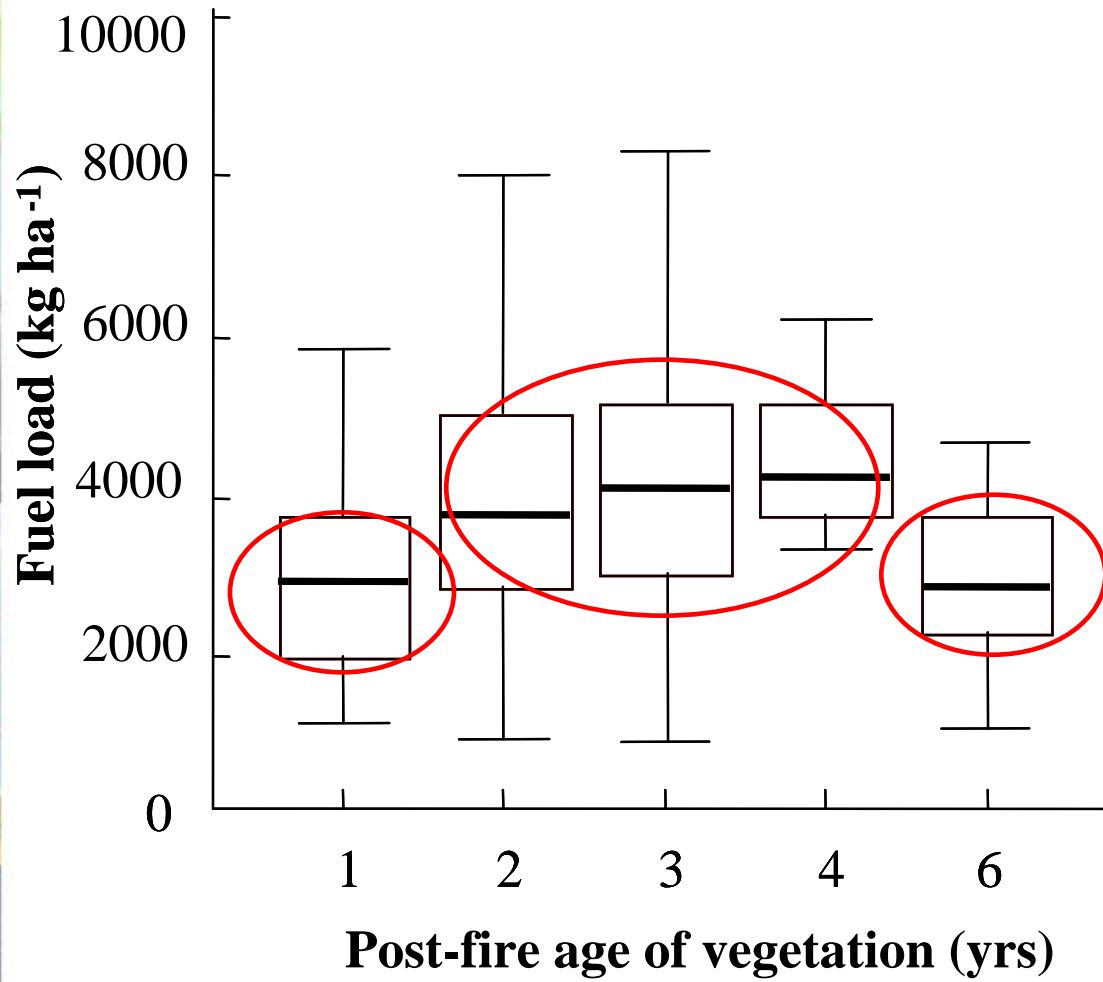
Granite & basalt

Rainfall gradient -  
750mm - 450mm

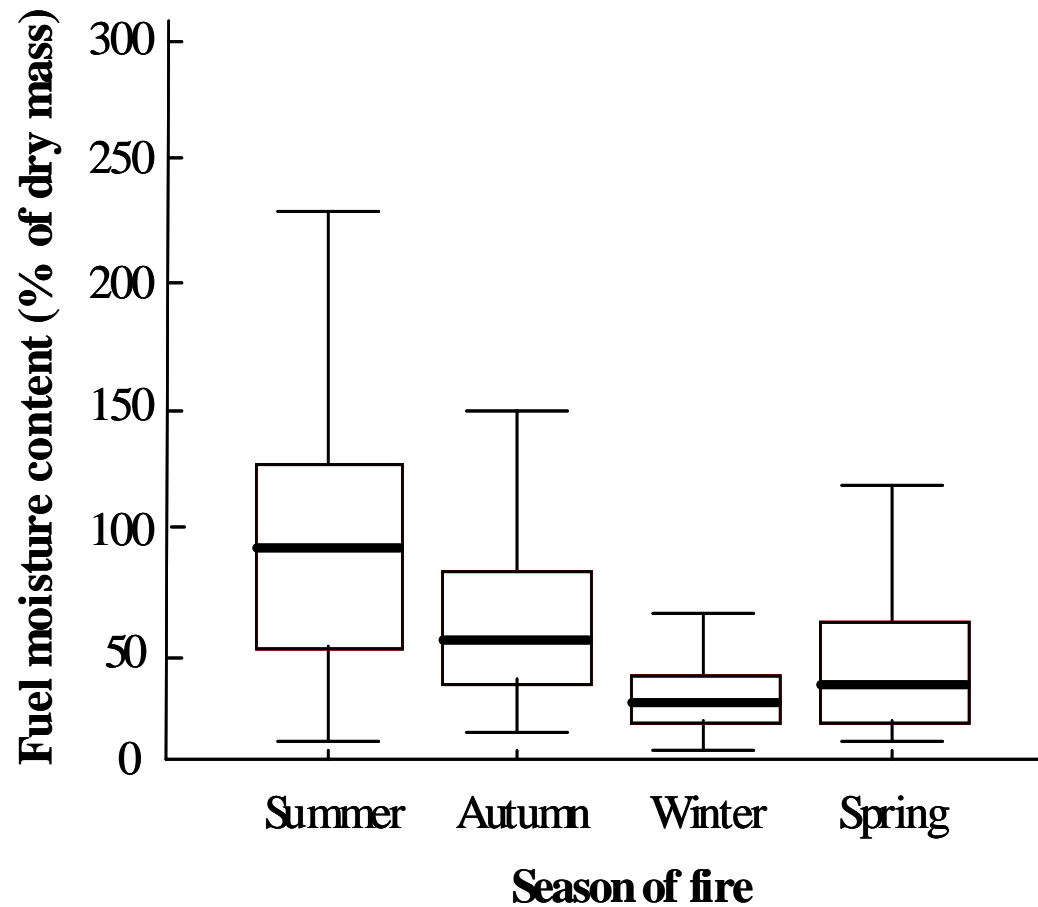
Combination of fire  
season and frequency  
treatments



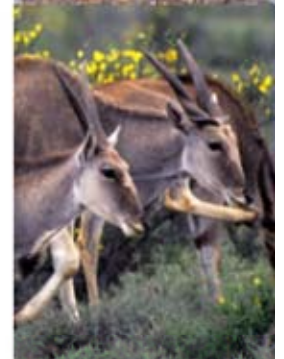
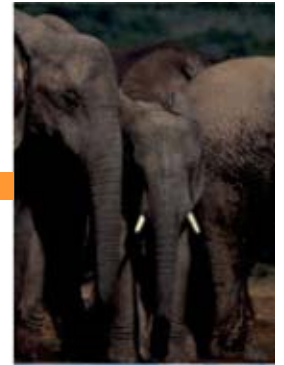
# Results



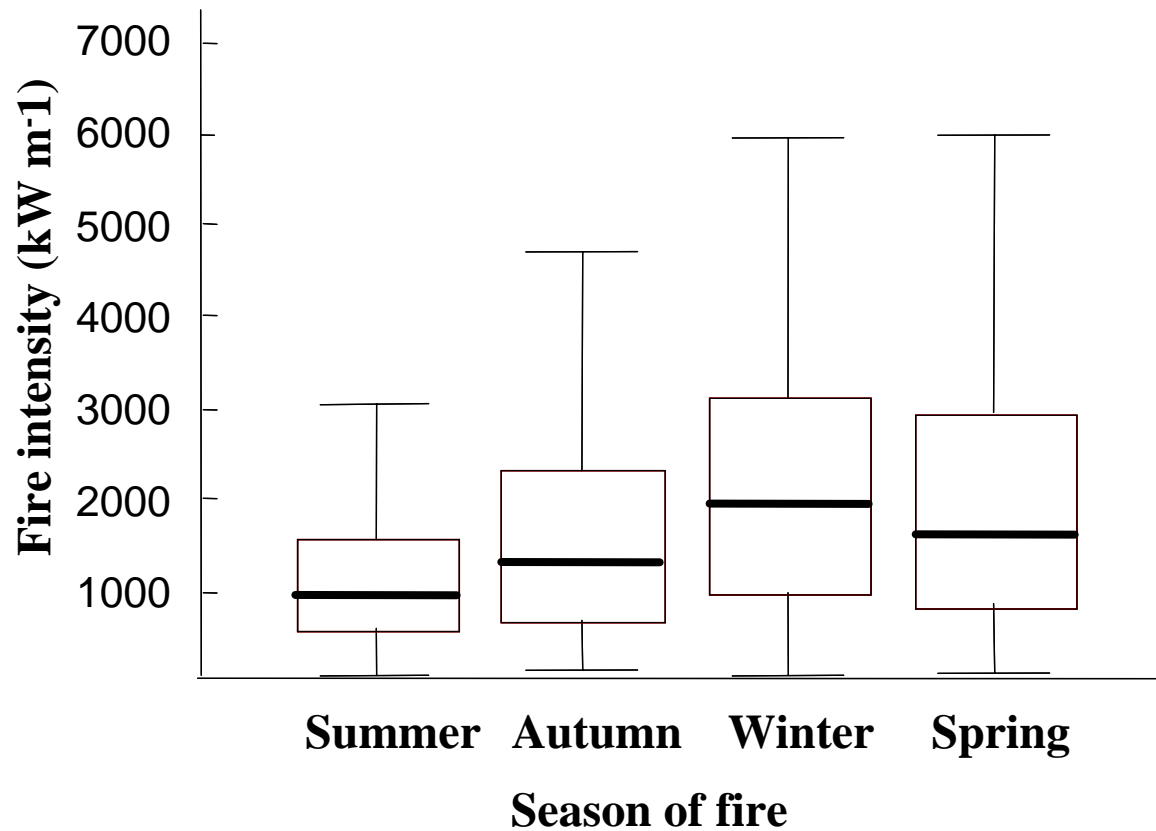
# Fuel moisture content



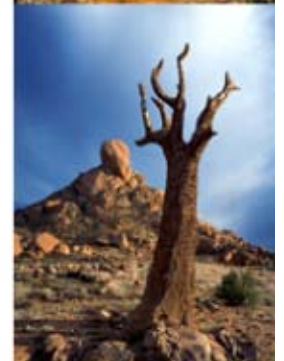
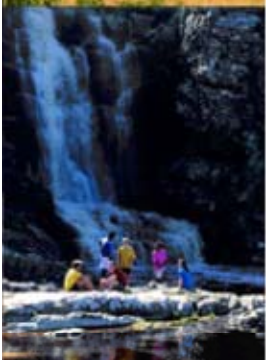
Significant differences in fuel moisture content and season.



# Season of fire



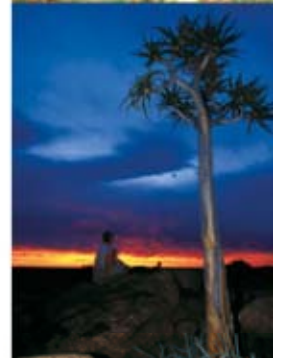
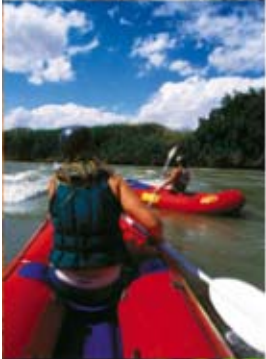
Significant differences in fire intensity were found between the seasons.



# Assigning FI to historic records

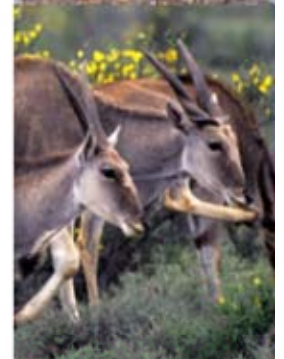
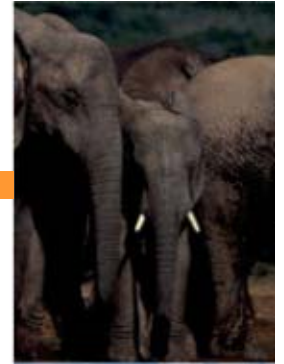
- Matrix of broad FI classes, based on the mean fire intensities
- For each season, the mean fire intensity for subsets of plots supporting different categories of fuel loads
- For each combination of season and fuel load, we assigned a classed fire intensity as follows:

Very low  
Low  
Moderate  
High  
Very high

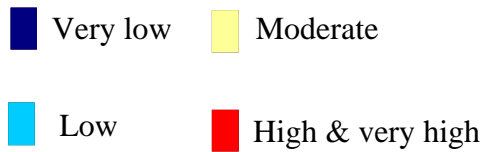
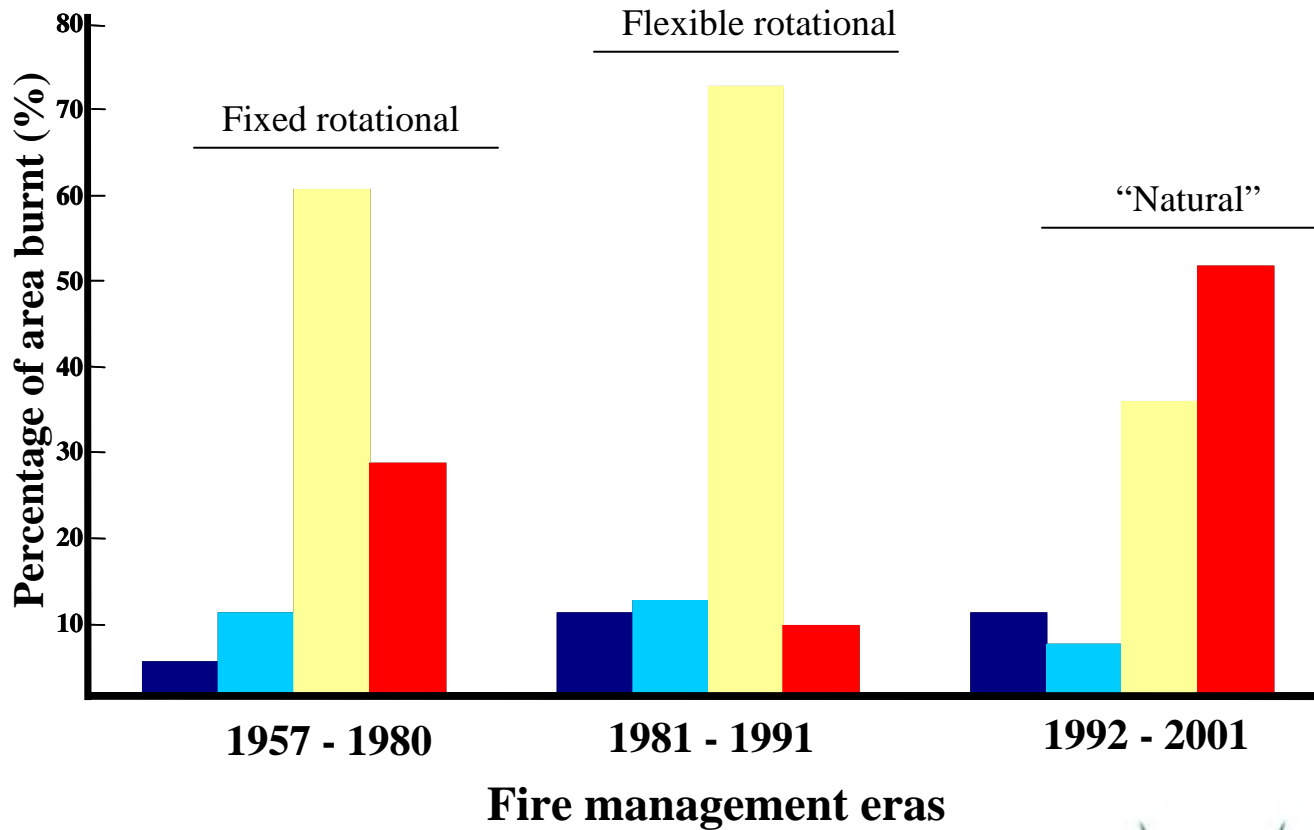


# Intensity matrix

Season of burn	Fuel loads (kg ha <sup>-1</sup> )				
	< 1000	1000 – 2000	2000 – 4000	4000 – 6000	> 6000
<b>Summer</b> (1 December – 31 March)	Very low	Low	Moderate	Moderate	Moderate
<b>Autumn</b> (1 April – 30 May)	Very low	Low	Moderate	High	High
<b>Winter</b> (1 June – 31 August)	Very low	Low	High	High	Very high
<b>Spring</b> (1 September – 30 November)	Very low	Low	Moderate	High	Very high

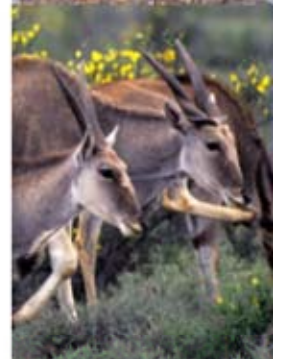
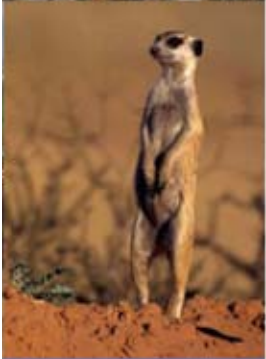


# Management influence



# Consequence of changing FI

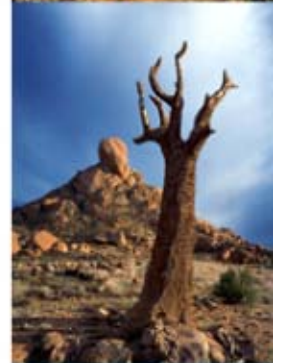
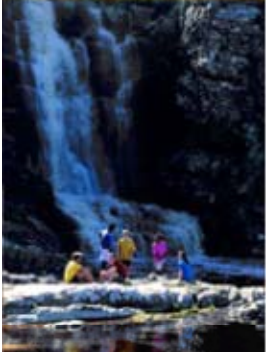
- Fire intensity has an effect on the savanna tree
- High intensity fires – kill aerial parts, re-sprout & keeping them within the fire trap, preventing recruitment
- Shift towards higher intensity fire



# Management implications

- Currently - seeks to diversify the range of FI
- Applying more fires early in the fire season
- The ecological impacts of fire on all elements of biota is poorly understood
- Variation in fire patterns & intensity -  
surrogates measures of achieving its  
diversity mandate

**Assist us - testing this  
assumption**



## Acknowledgements

South African National Parks

Fire team that maintained the fire experiment (especially Andre Potgieter)

Thank you

