



Department of Biodiversity,
Conservation and Attractions

Does prescribed burning benefit threatened mammals in north Australian savannas?

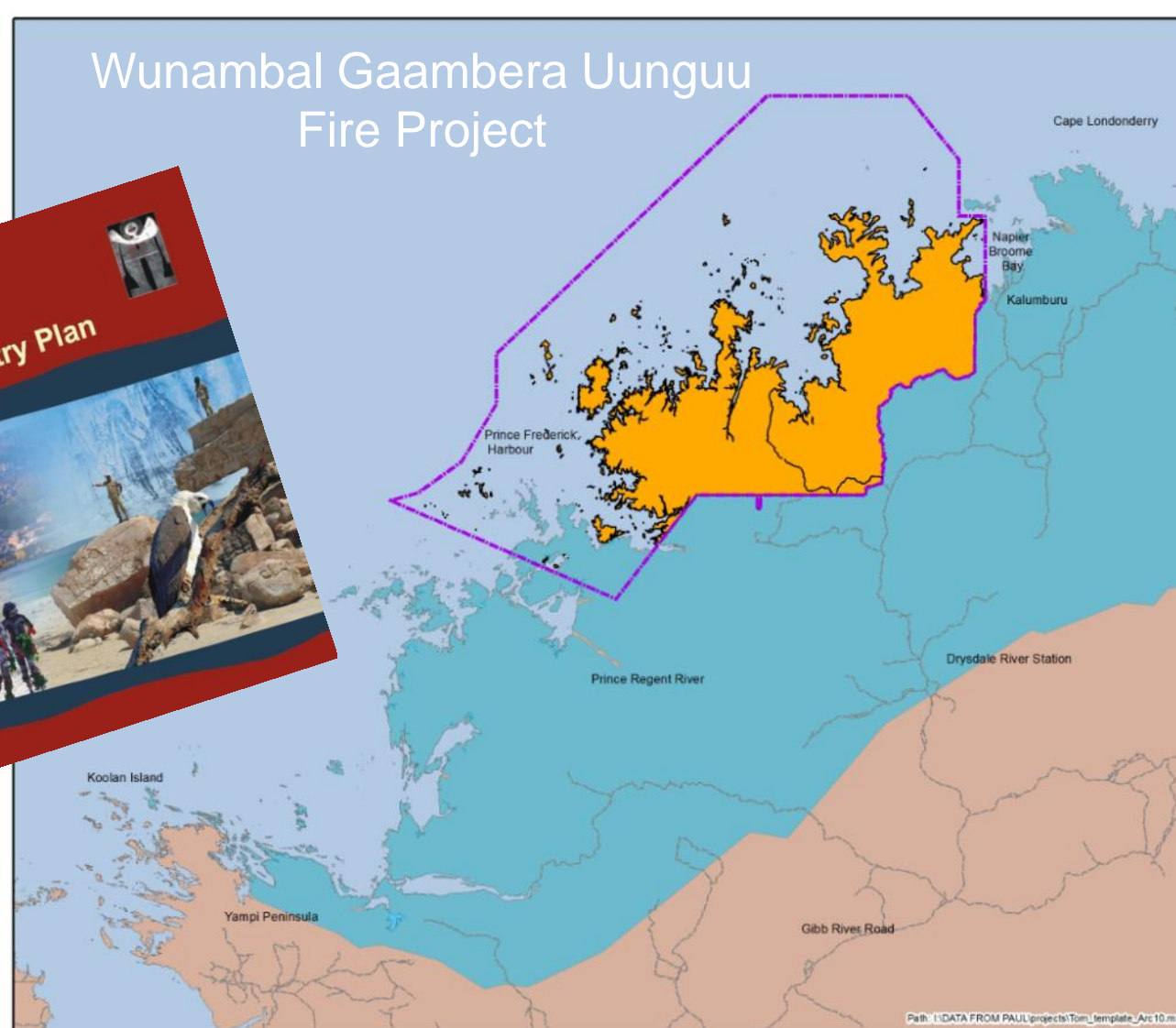
Ian Radford & Neil Wainia

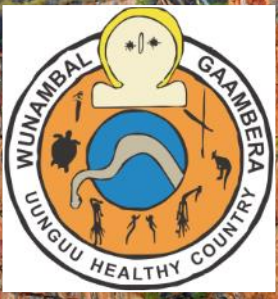
Co-authors: Leigh-Ann Woolley, Ben Corey, Tom Vigilante,
Wunambal Gaambera Aboriginal Corporation,
Ed Hatherley, Richard Fairman, Karin Carnes, Anthony Start





Wunambal Gaambera Unguu Fire Project

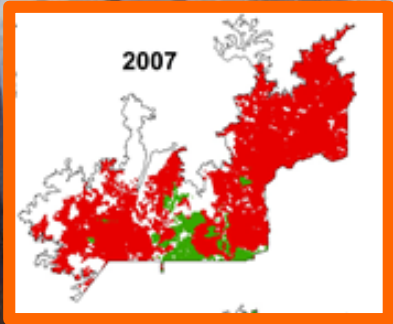




Talk Outline

- Fire management programs often report changes to fire metrics
- But few monitor for or demonstrate biodiversity benefits
- This talk uses monitoring at the Mitchell Plateau (north Kimberley) to ask whether there are biodiversity benefits from fire management

Fire regimes need to change in northern Australia

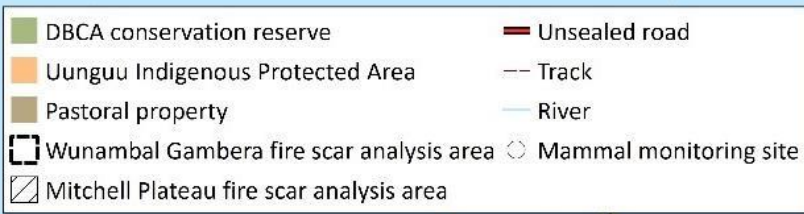


- Destructive, extensive LDS fires
- Threats to biodiversity
- Threats to cultural values
- Carbon outputs, greenhouse effect and climate change!

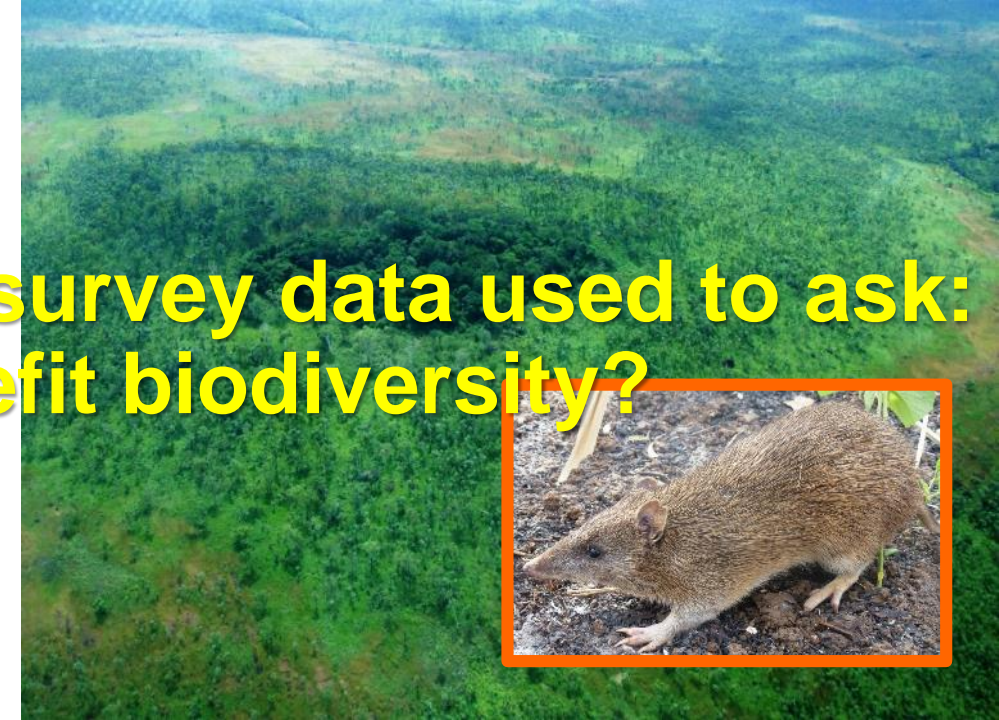
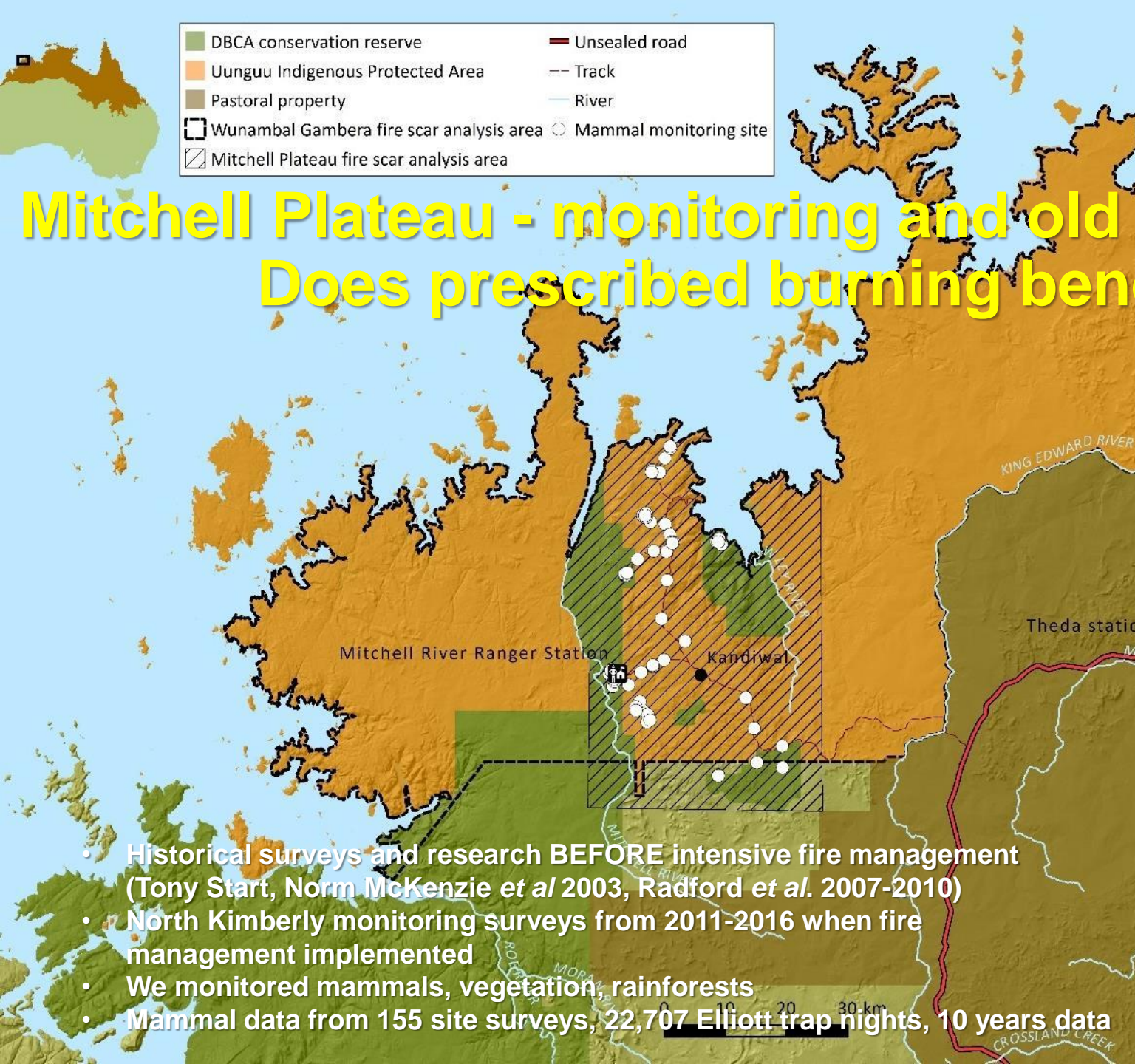
But can we benefit biodiversity, cultural values using fire?

- Fire management programs at Mitchell Plateau increased from 2008-present
- Under both WA Govt Initiative under “Kimberley Science and Conservation Strategy” & Wunambal Gaambera “Healthy Country Plan” Right-way fire

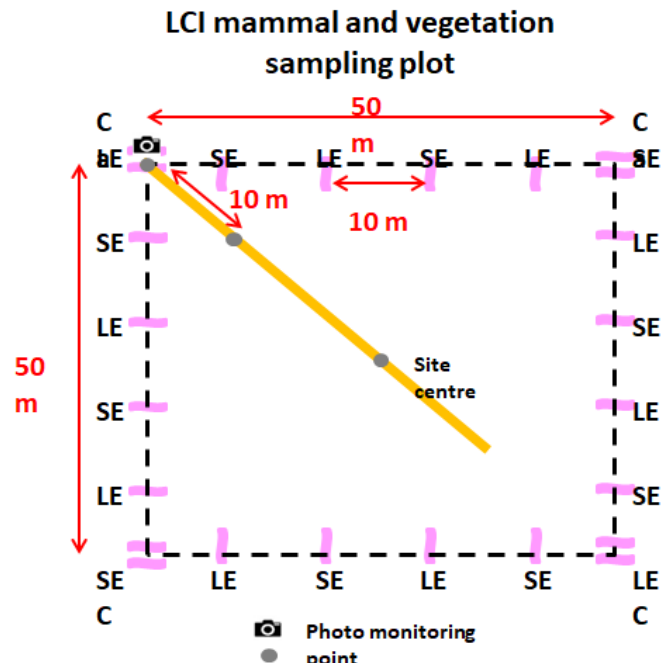




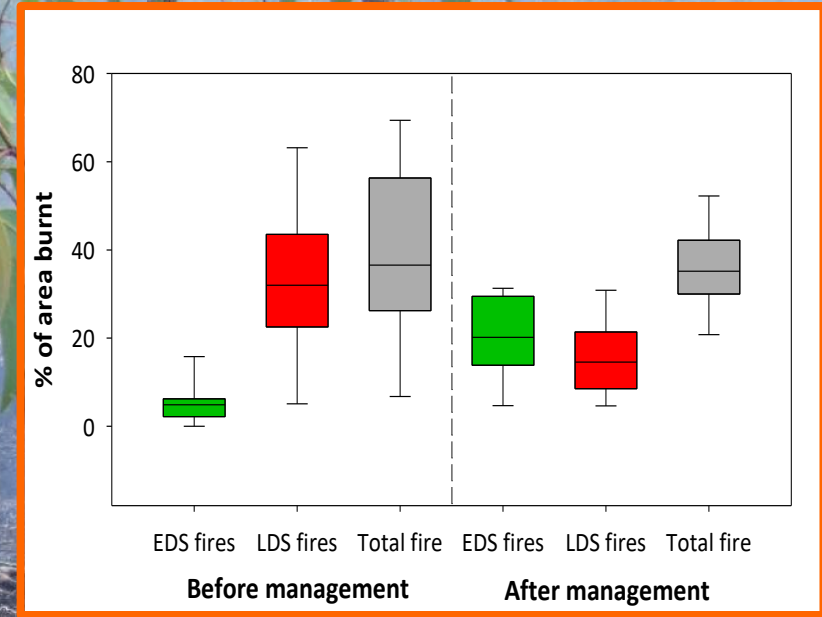
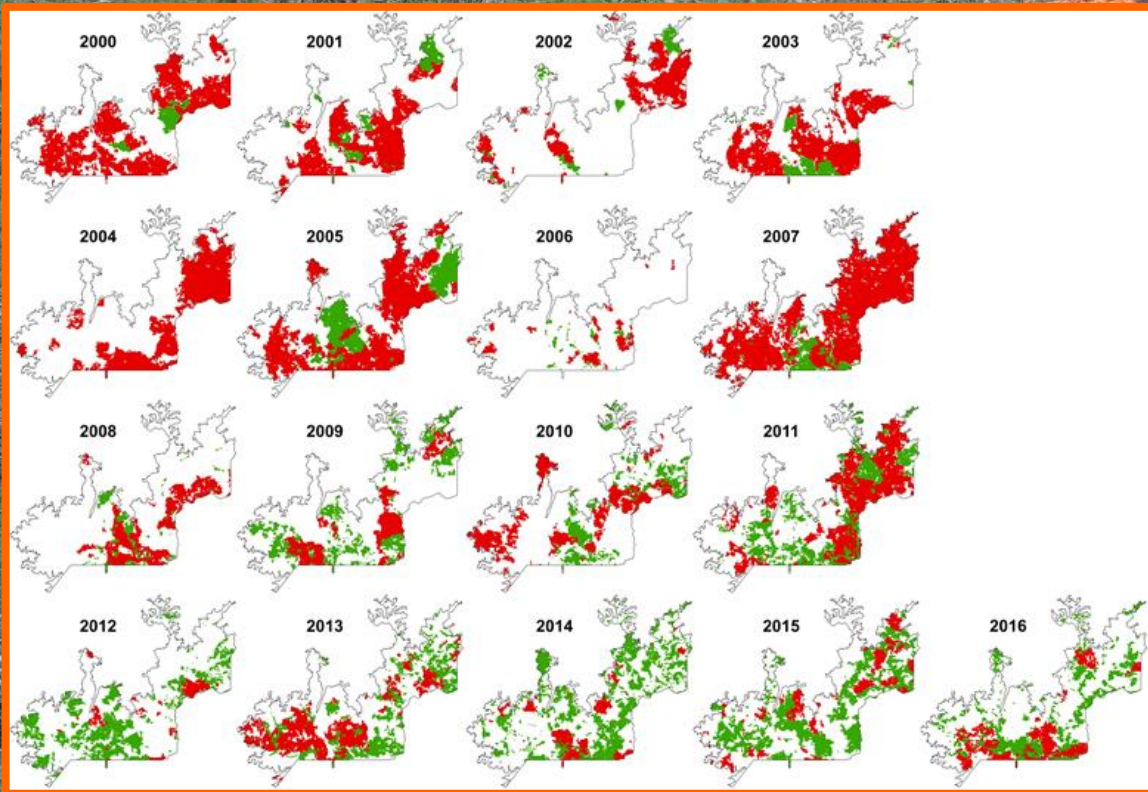
Mitchell Plateau - monitoring and old survey data used to ask: Does prescribed burning benefit biodiversity?



- Historical surveys and research BEFORE intensive fire management (Tony Start, Norm McKenzie *et al* 2003, Radford *et al.* 2007-2010)
- North Kimberly monitoring surveys from 2011-2016 when fire management implemented
- We monitored mammals, vegetation, rainforests
- Mammal data from 155 site surveys, 22,707 Elliott trap nights, 10 years data



So, did fire regimes change?



- YES
- 2011 onwards much increased EDS burning
- Decreased extensive, high intensity LDS fires
- Less variable fire extent after management - less boom-bust burning cycle
- Smaller patch size
- More old growth (4+ years) patches
- NO decrease in annual area burnt

INCREASERS

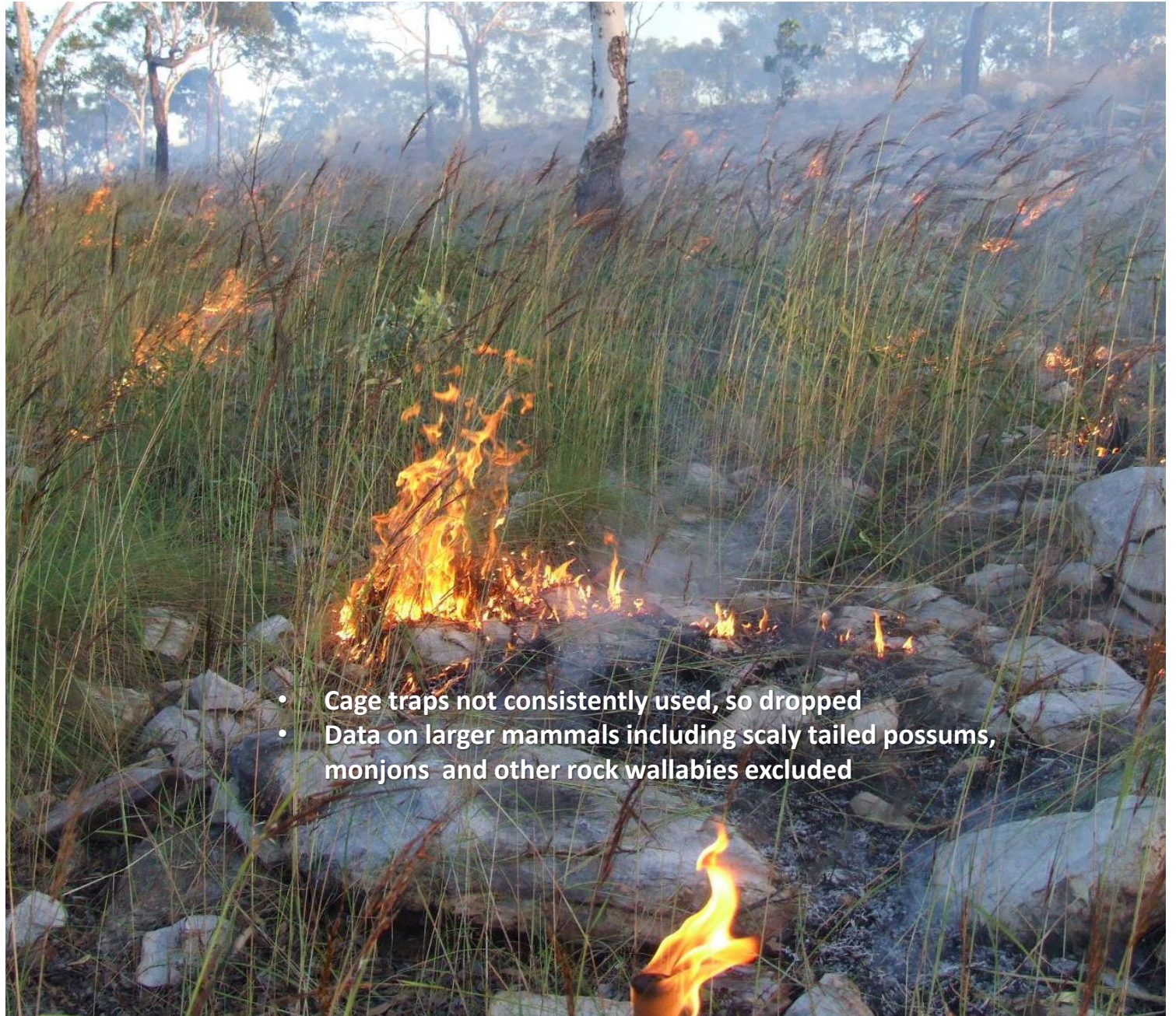
Did mammals change with fire management?

TABLE: Mean animals pre and post treatment (per 1000 trap nights). ANOVA using raw log transformed numbers of trapped animals. Trap effort included as a covariate within ANOVA.

Species		Pre-treatment	Fire management	Trap Effort	Management
Common species					
<i>Conilurus penicillatus</i>	+	0.1	5.9	0.01 (0.909)	5.83 (0.017) *
<i>Dasyurus hallucatus</i>	-	19.7	14.1	5.84 (0.017) *	2.77 (0.098) .
<i>Isoodon auratus</i>		5.3	4.4	<0.01 (0.998)	0.29 (0.592)
<i>Isoodon macrourus</i>	+	4.1	8.8	1.02 (0.315)	3.11 (0.080) .
<i>Melomys burtoni</i>	+	2.6	3.6	5.76 (0.018) *	2.75 (0.099) .
<i>Mesembriomys macrurus</i>	+	0.6	1.7	3.22 (0.075) .	3.94 (0.049) *
<i>Pseudomys delicatulus</i>	-	3.4	0.7	2.64 (0.106)	16.53 (<0.001) ***
<i>Pseudomys nanus</i>		4.1	12.1	0.06 (0.814)	1.84 (0.177)
<i>Rattus tunneyi</i>	-	10.1	6.2	55.85 (<0.001) ***	9.31 (0.003) **
<i>Sminthopsis virginiae</i>	+	<0.1	3.6	0.31 (0.581)	7.95 (0.005) **
<i>Zyzomys argurus</i>	-	26.8	18.4	3.82 (0.052) .	5.75 (0.018) *
<i>Zyzomys woodwardi</i>	+	3.1	4.9	10.07 (0.002) **	5.21 (0.024) *
Functional Groups					
Small Dasyurids	+	0.3	4.0	0.30 (0.587)	8.48 (0.004) **
Generalist Rodents		49.4	41.5	20.18 (<0.001) ***	0.02 (0.897)
Critical weight range marsupials		29.6	27.3	4.22 (0.042) *	0.49 (0.487)
Large specialist Rodents	+	2.5	12.5	10.54 (0.001) **	12.83 (<0.001) ***
Habitats					
Mammals across all sites		81.6	85.3	15.98 (<0.001) ***	1.36 (0.246)
Sandstone sites		105.4	133.0	7.52 (0.008) **	2.12 (0.150)
Savanna volcanic woodlands	+	45.5	61.8	16.42 (<0.001) ***	10.62 (0.002) **

DECREASERS

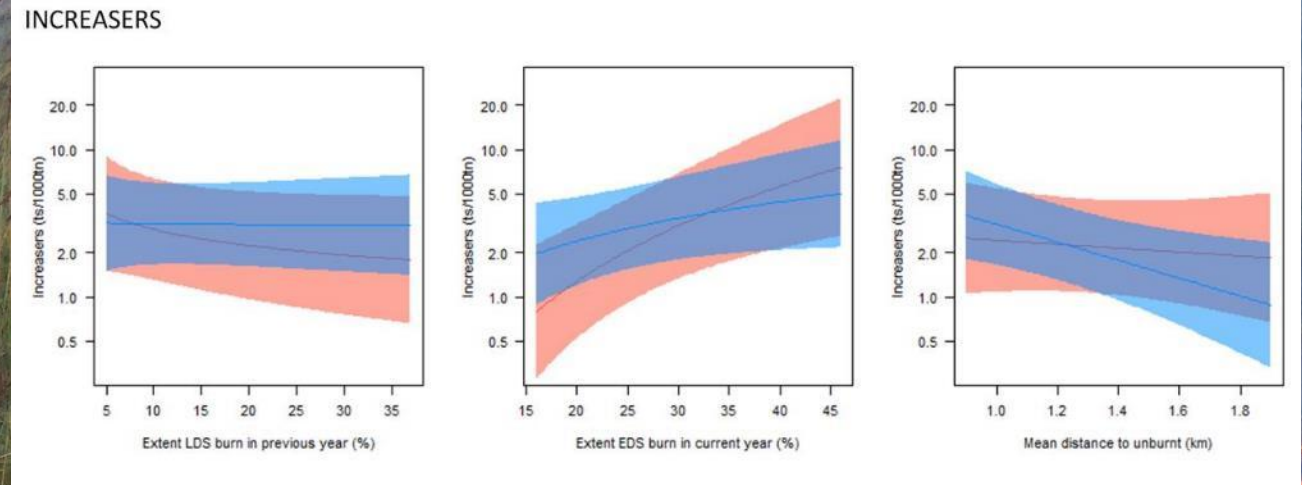




- Cage traps not consistently used, so dropped
- Data on larger mammals including scaly tailed possums, monjons and other rock wallabies excluded

Why did some species improve under increased management?

Explanatory variables



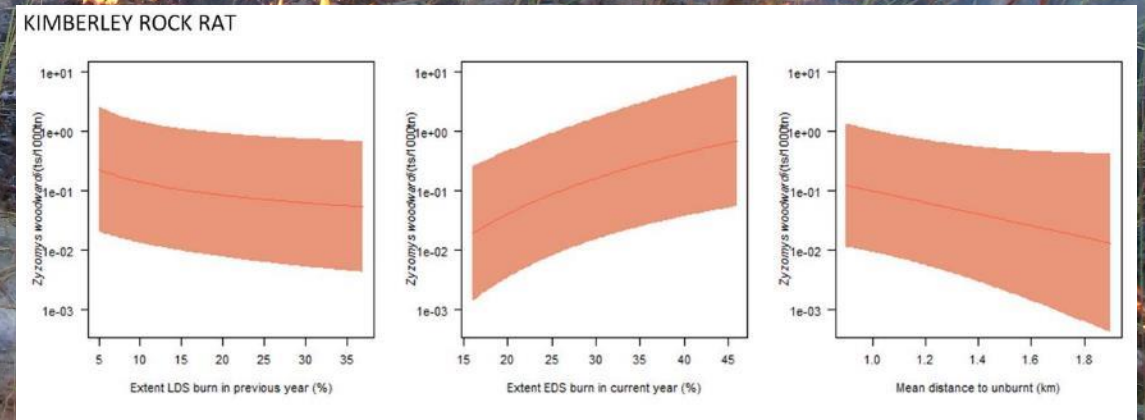
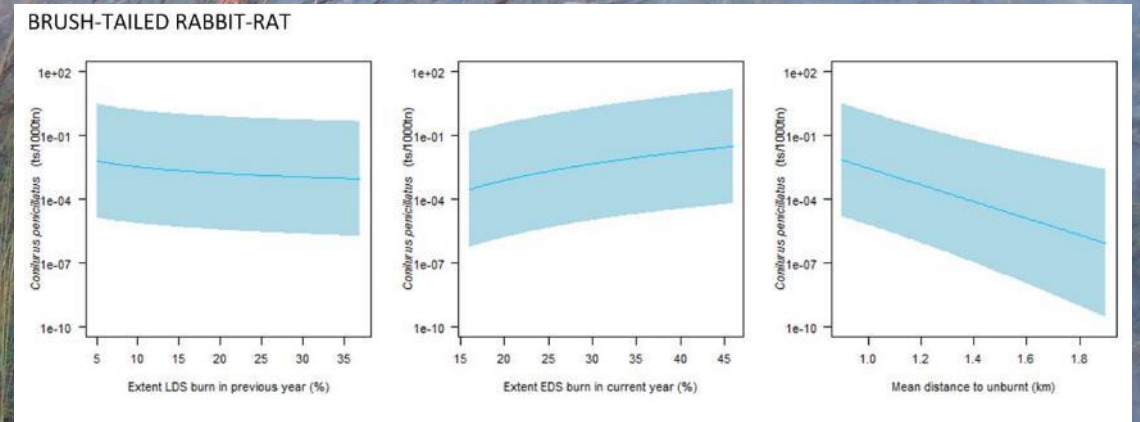
- “Incrasers” had positive response to EDS (more so at sandstone sites)
- Neutral or negative response to LDS burning
- Positive response to increasing patchiness (decreasing distance to unburnt veg)
- Increased EDS burning benefits “increasers”

possible explanatory variables:- EDS fire, LDS fire, TSLF, Dist nearest UB, rainfall PW, Old growth patches canopy cover, ground layer cover, site

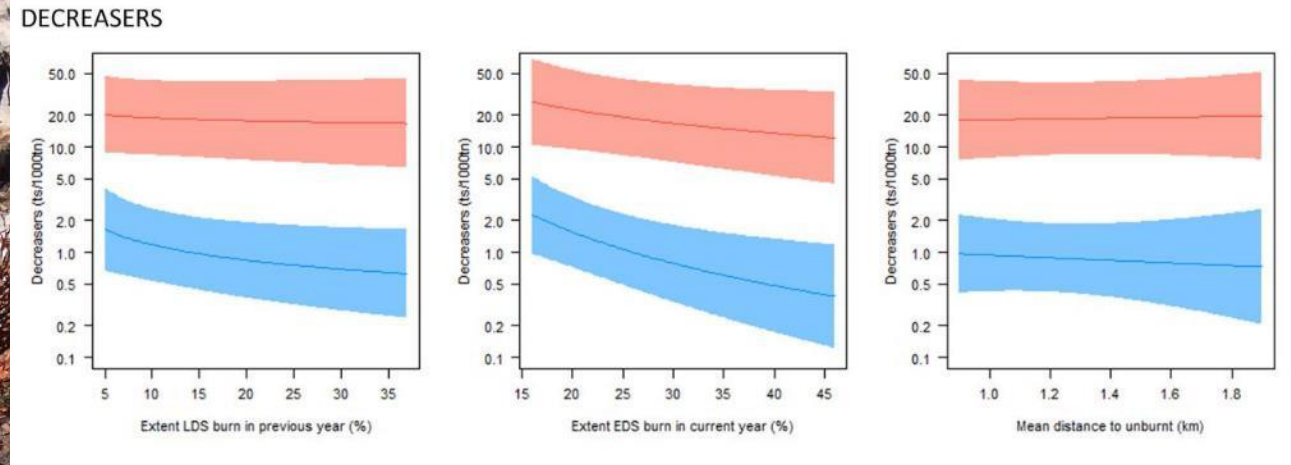
Conilurus & Kimberley rock rats showed classic “increaser” responses



- + response to EDS burning
- Negative/neutral response to LDS fire
- Positive response to increased patchiness



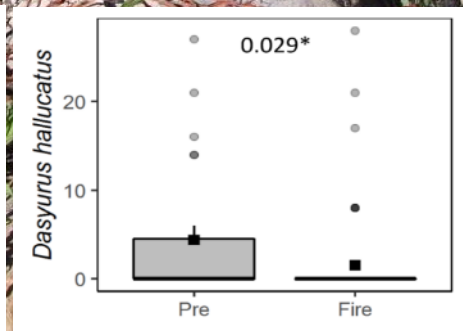
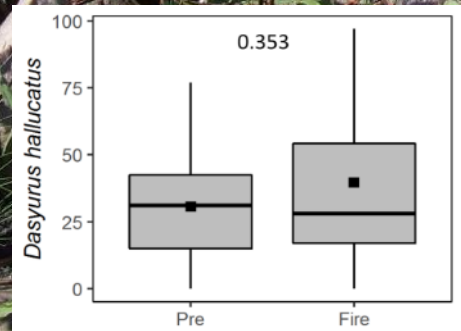
For “Decreasers” Habitat-linked fire responses very different



- “Decreasers” responded negatively/neutrally to all fire
- Big habitat response differences for “Decreasers”
- No fire patchiness response

Declines may sometimes be habitat linked

- Quoll declined with fire management in non-rocky savannas but not in rocky sandstone
- Declines among “Decreasers” greater in non-rocky habitats



Did prescribed burning benefit threatened mammals?

- We can change fire regimes
- With change some species increased, some decreased
- Arboreal rats & large endemic rock rats, common bandicoots, small dasyurids were all “Increasers” & responded positively to EDS burning
- These high conservation value species
- Northern quolls & common rodents were “Decreasers”
- But sometimes “Decreaser” performance was buffered from declines in rocky sandstone (e.g. quolls)
- Could perhaps argue for a net benefit of fire management????
- Negative fire response of “Decreasers” suggests we need to consider their fire management more closely
- ***This study highlights the crucial importance of Monitoring of target biodiversity to make sure negative consequences don't occur, or can be Mitigated***



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