



How long is too long: the response of woody plants to inter-fire intervals in grassy forests of the Border Ranges, NSW

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A NSW Environmental Trust-funded project

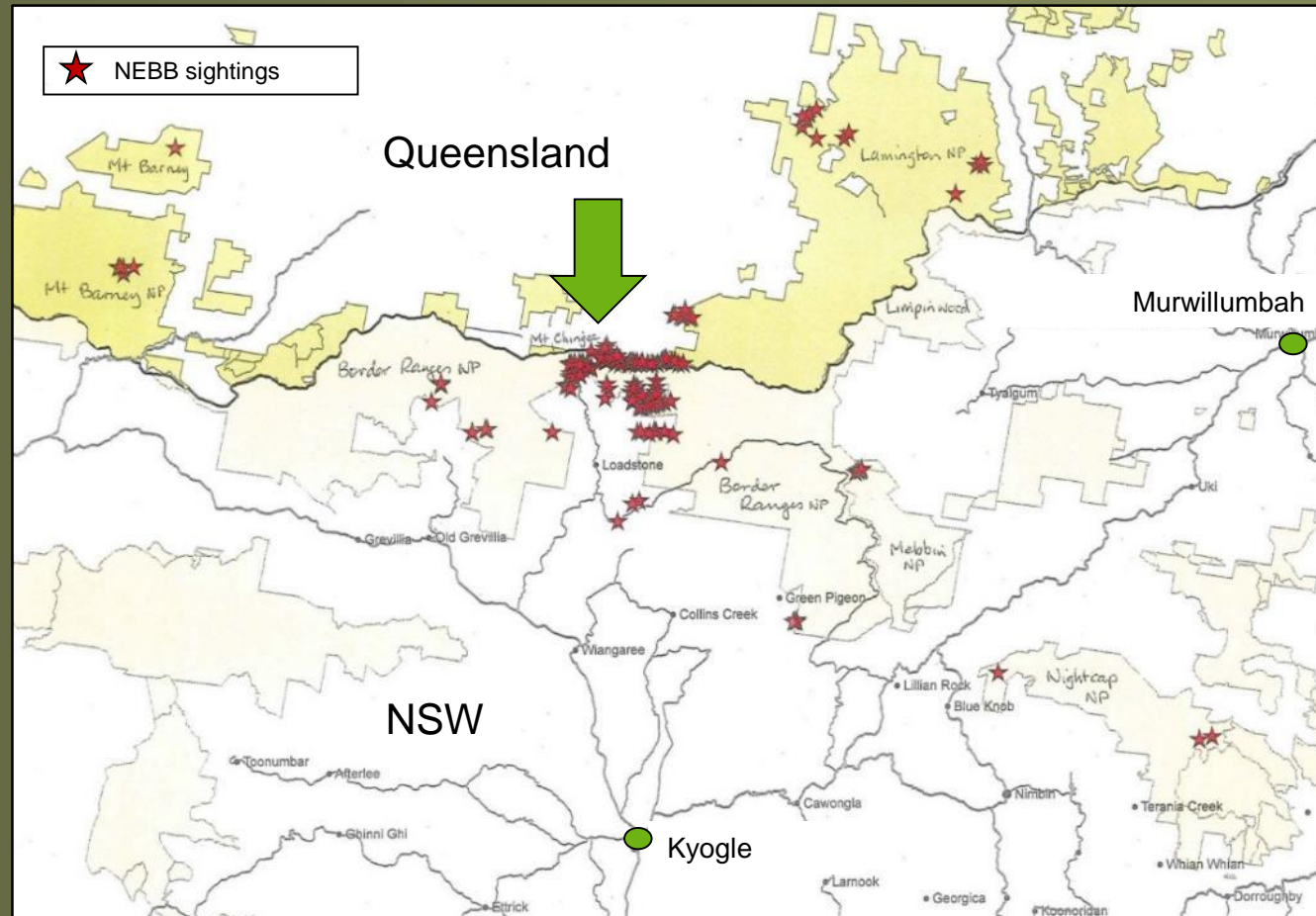
Recovering the northern population of the Eastern Bristlebird



Northern Eastern Bristlebird (NEBB)

1989: ~ 150 birds

2016: ~ 30 birds



Project partners

- NSW Office of Environment & Heritage (Liz Tasker, Penny Watson, Lynn Baker)
- NSW National Parks and Wildlife Service (Steve King)
- University of Queensland (Zoe Stone, Martine Maron)
- Wildsearch Environmental Services
- Fireland Consultancy
- NEBB Recovery Team
- Currumbin Sanctuary
- Private landowners
- Hotspots
- Northern Rivers FABC
- Penny the detector dog

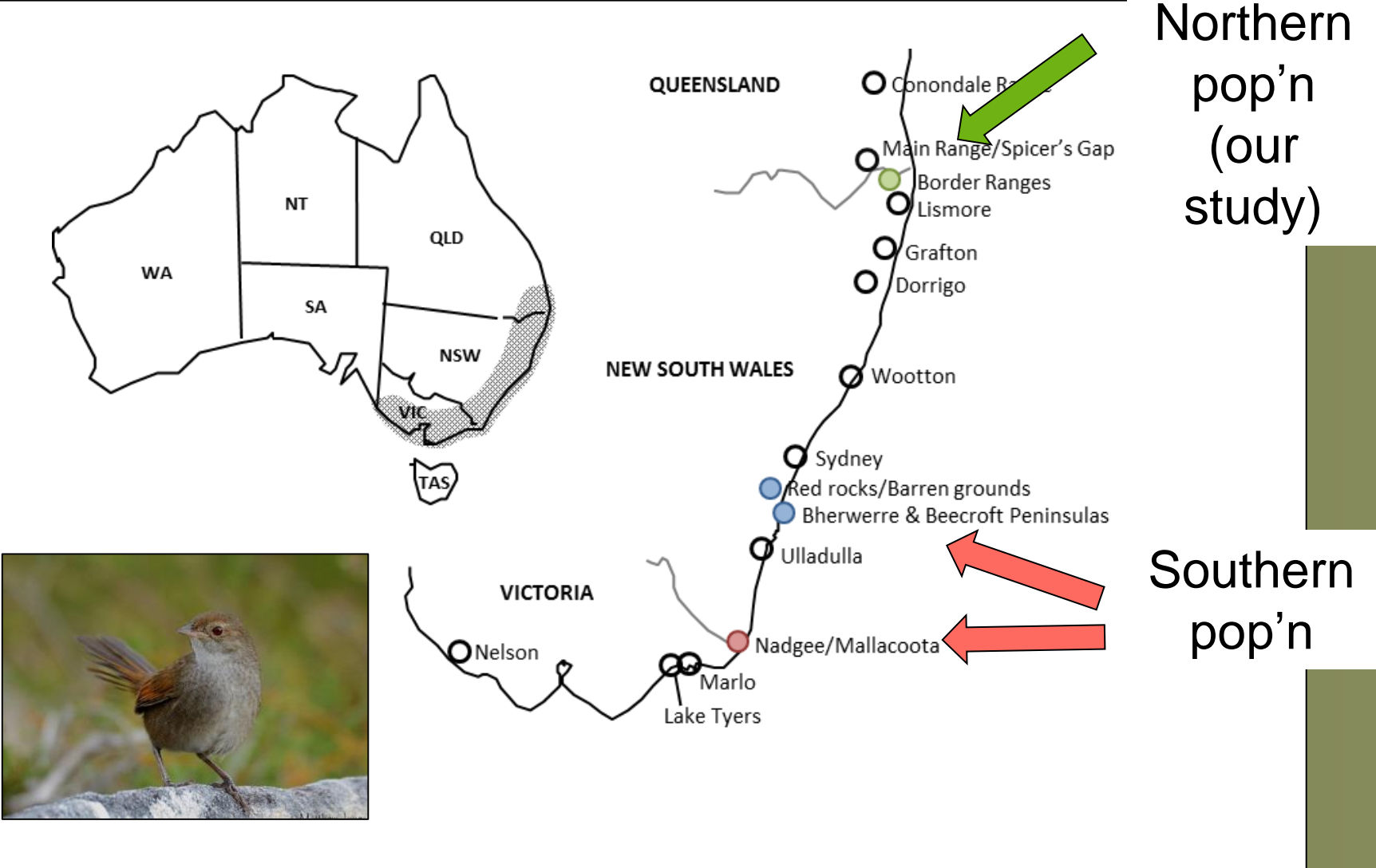


The Environmental Trust project



Understanding the fire-related dynamics
of the grassy habitat
of the Eastern Bristlebird (Northern population)

Eastern Bristlebird (*Dasyornis brachypterus*)





Habitat of Northern EBB

- Tall eucalypt forests with grassy understorey
- Open grassy patches
- Close to rainforest





Habitat of Northern EBB

- Tall eucalypt forests with grassy understorey
- Open grassy patches
- Close to rainforest
- Ground layer of tussock grasses (Poa, Sorghum, Themeda)
- Grass cover >65%, but not super-thick
- Low mid-storey cover



Increase in mid-storey density

Decrease in grass cover

Decrease in
fire frequency



3 sites

3-4 transects at each site

Transects are 25 x 4 m



Fire-proof
stake and
tag

All woody plants tagged unless >20 individuals of a species already tagged on LHS of transect, then that species wasn't tagged on the RHS.



Pre-fire tagging

- 934 plants
- 40 species
- Six categories
 - Rainforest tree species (250)
 - Shrubs (215)
 - Eucalypts (167)
 - Wattles (128)
 - Casuarinas (29)
 - Exotic weeds (126)

Burns to date

Site	Richmond Gap
Planned burn	July 2014
Number of transects burnt	Two
Previous fires	2009 (PB), 2001 (wildfire), 1987, 1985, 1981
Most recent inter-fire interval (years)	4.9
Previous inter-fire intervals	8.0, 14, short
Pre-fire density of woody plants	2.5 / m ²
Post-fire survey	7 months post-fire



Before the fire



Three weeks post-fire



Seven months post-fire

Richmond Gap

Most recent inter-fire interval
4.9 years

Burns to date

Site	Richmond Gap	Cougal Park
Planned burn	July 2014	August 2015
Number of transects burnt	Two	Four
Previous fires	2009 (PB), 2001 (wildfire), 1987, 1985, 1981	2001 (wildfire), 1997, frequent
Most recent inter-fire interval (years)	4.9	13.8
Previous inter-fire intervals	8.0, 14, short	Short
Pre-fire density of woody plants	2.5 / m ²	0.6 / m ²
Post-fire survey	7 months post-fire	7 months post-fire



Before the fire



Three weeks post-fire



Seven months post-fire



Cougal Park

Most recent inter-fire interval
13.8 years

Results at 7 months post-fire

Richmond Gap (4.9 year interval)

- Reduction to 80% of pre-fire numbers
- Of 358 plants tagged pre-fire
 - 205 (57%) survived
 - 153 (43%) were killed
- 83 new woody plants appeared
- Post-fire density 2.0 plants / m²

Results at 7 months post-fire

Cougal Park (13.8 year interval)

- Increase to 467% of pre-fire numbers
- Of 255 plants tagged pre-fire
 - 183 (72%) survived
 - 72 (28%) were killed
- Est. 1007 new plants appeared (585 tagged)
- Post-fire density 3.0 plants / m²

Rainforest-associated species with potential to become trees



Celerywood
Polyscias elegans



7 months
post-fire

Three weeks post-fire

Celerywood
Polyscias elegans

Basal and root resprouts



RESULTS

Richmond Gap (4.9 year interval)

- 95% of pre-fire numbers

Cougal Park (13.8 year interval)

- 202% of pre-fire numbers



Celerywood
Polyscias elegans

Basal and root resprouts

Resprouters

Tree heath
Trochocarpa laurina



Muttonwood
Myrsine variabilis





7 months
post-fire



Cheese Tree
Glochidion ferndinandi

Basal and root resprouts



7 months post-fire



Coffee Bush
Breynia
oblongifolia



Basal and root resprouts

Native Rosella
Hibiscus heterophyllus

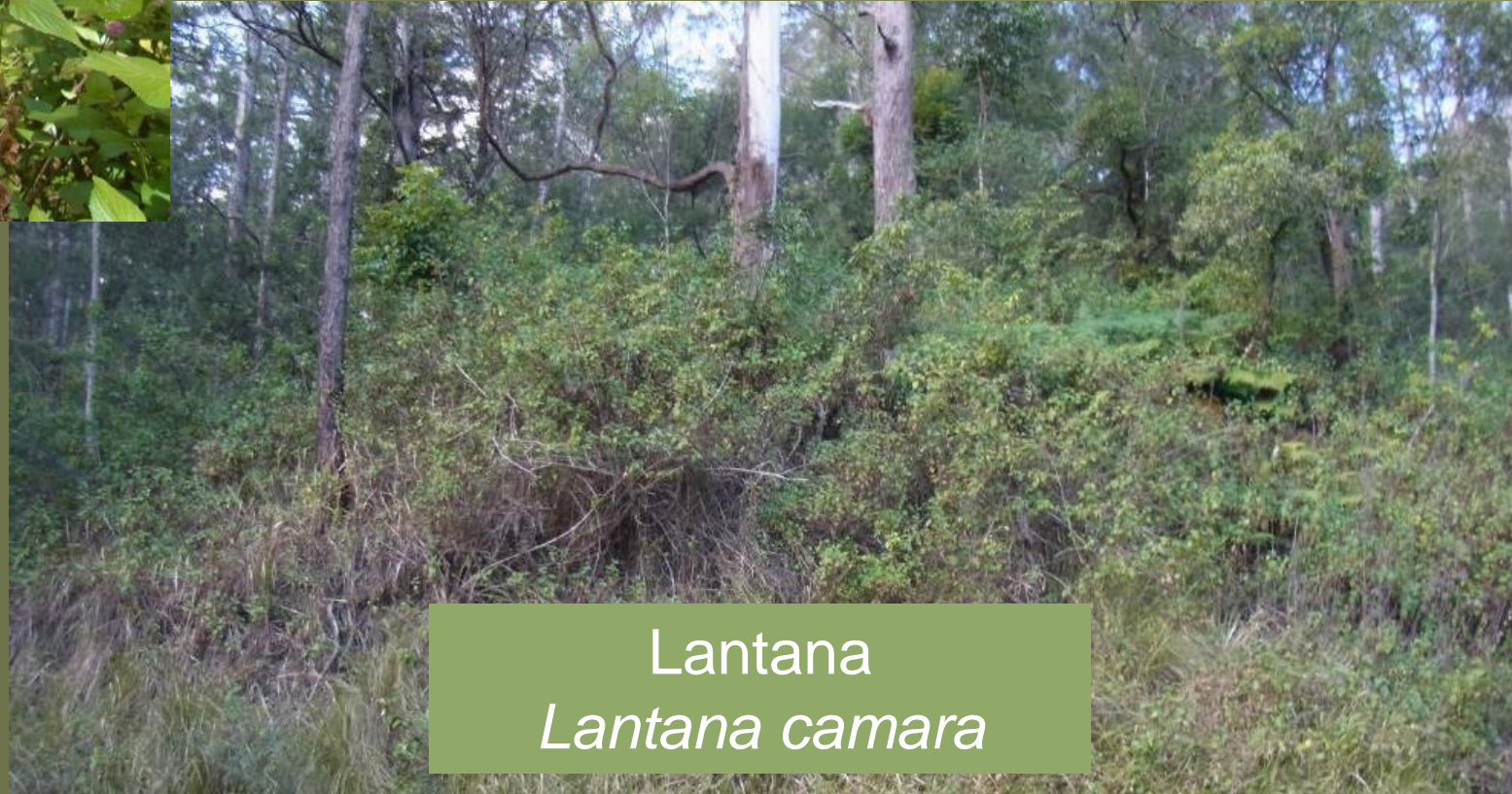


Obligate seeder



Crofton weed
Ageratina adenophora

Exotic shrubs



Lantana
Lantana camara

Lantana
Lantana camara



3 months
post-fire

Results at 7 months post-fire

Lantana – *Lantana camara*

Richmond Gap (4.9 year interval)

- 12 pre-fire plants were all killed, no new recruits

Cougal Park (13.8 year interval)

- 8 of 13 pre-fire plants survived, 26 new seedlings

Crofton Weed – *Ageratina adenophora*

Richmond Gap (4.9 year interval)

- All but 3 of 34 pre-fire plants killed, a few new seedlings → 22% of pre-fire numbers.

Cougal Park (13.8 year interval)

- 1 pre-fire plant killed, many new seedlings (approx. 100)

Wattles



Acacia irrorata



Acacia melanoxylon



7 months post-fire

Green Wattle
Acacia irrorata

Obligate seeder





RESULTS

Richmond Gap (4.9 year interval)

- 0 plants pre-fire, 14 after fire

Cougal Park (13.8 year interval)

- 6 plants pre-fire, 412 after fire



Green Wattle
Acacia irrorata

Obligate seeder



Black Wattle
Acacia melanoxylon

Basal and root
resprouts, plus
seedlings



7 months
post-fire



RESULTS

Richmond Gap (4.9 year interval)

- 2 plants pre-fire, 11 after fire

Cougal Park (13.8 year interval)

- 5 plants pre-fire, 54 after fire



Black Wattle
Acacia melanoxylon

Resprouts, plus seedlings

Summary

- 14 year interval allowed many woody species to increase population size considerably.
- 5 year interval was associated with a decrease for most woody species.
- Longer interval allows seedbanks to build up
- Longer interval allows roots to build up resources for future resprouts
- Woody plant density 7 months post-fire is:
 - 2.0 plants/m² at Richmond Gap
 - 3.0 plants/m² at Cougar Park

How long is too long, for keeping mid-story density low?

- 14 year interval too long at Cougal Park
- 5 year interval at Richmond Gap okay, for status quo (we hope)
- Research into fire regimes for maintaining grassy habitat in east coast subtropics:
 - Bunya Mountains 'balds' (Qld Herbarium)
 - Paul Williams and colleagues
 - SEQ fire experiments (Qld Forestry)

Keeping good quality grassy patches grassy:
Fires every 3-6 years



Recovering 'shrubbed up' sites

- Cougal Park – a second fire, soon:
 - Target: seedlings which germinated after 2015 fire, especially lantana and wattles
 - Before they shade out grasses
 - Before they first flower and fruit
- Short intervals can help clear out wattle seedbank

Recovering 'shrubbed up' sites

- Fire by itself often not enough
- Herbicide
 - Target: woody resprouts
- Cutting
 - Target: large plants which continue to produce seeds between fires

2.5 years
post-fire



THANK YOU