

Rabbits (and feral cats)

Assoc Prof Katherine Moseby
University of New South Wales
Arid Recovery



UNSW
AUSTRALIA



70% of Australia is Arid or Semi-Arid





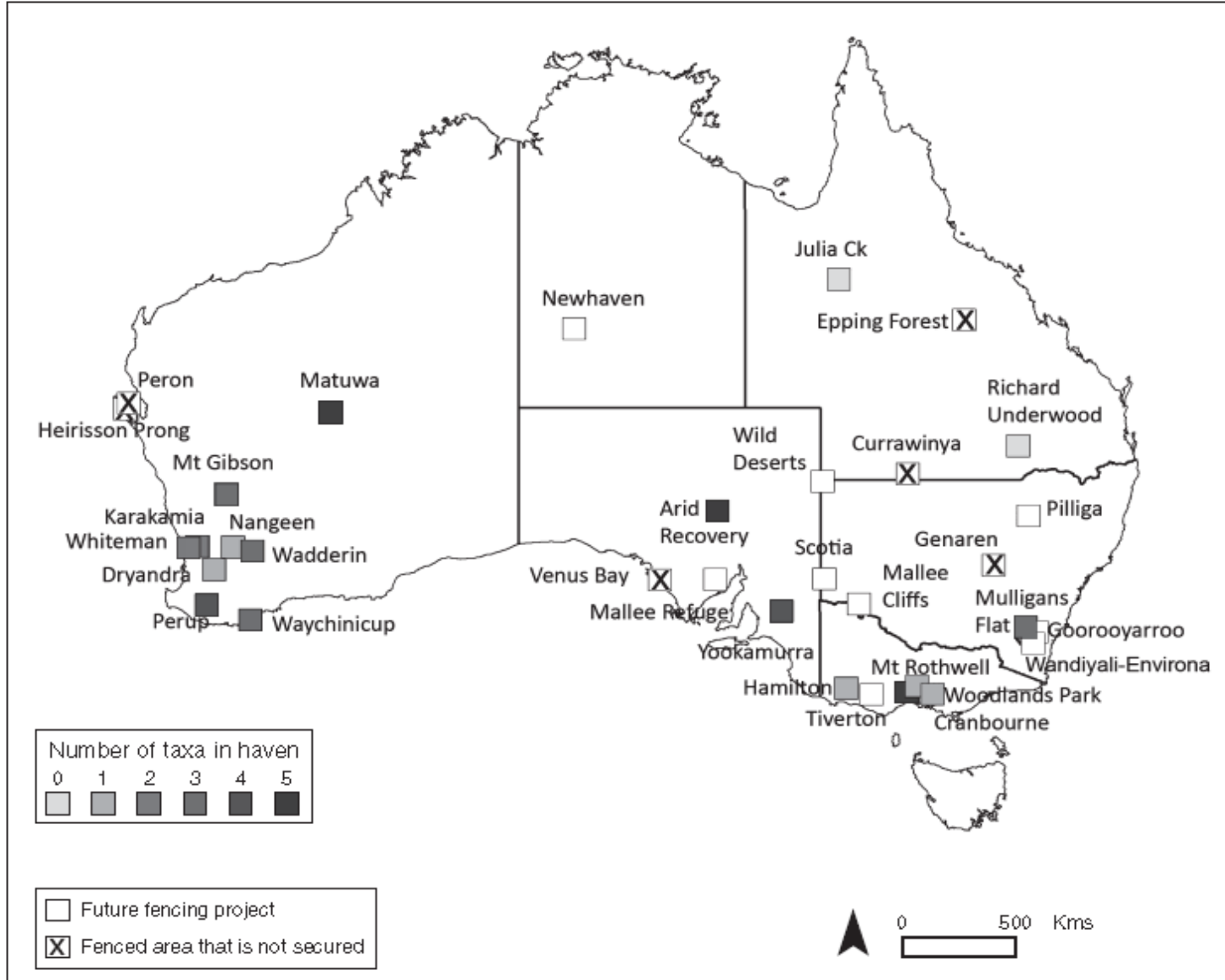
Exclusion fencing- 30mm aperture required for rabbit exclusion



Fenced Conservation Reserves in Australia

*** very few are rabbit free

(from Legge et al. 2018 Wild. Res.) small- only cover a few hundred square km



Rabbit Eradication

- Arid Recovery- 6,000 ha
- Wild Deserts- 4,000 ha
- Mallee Refuge- 900 ha



Warrens

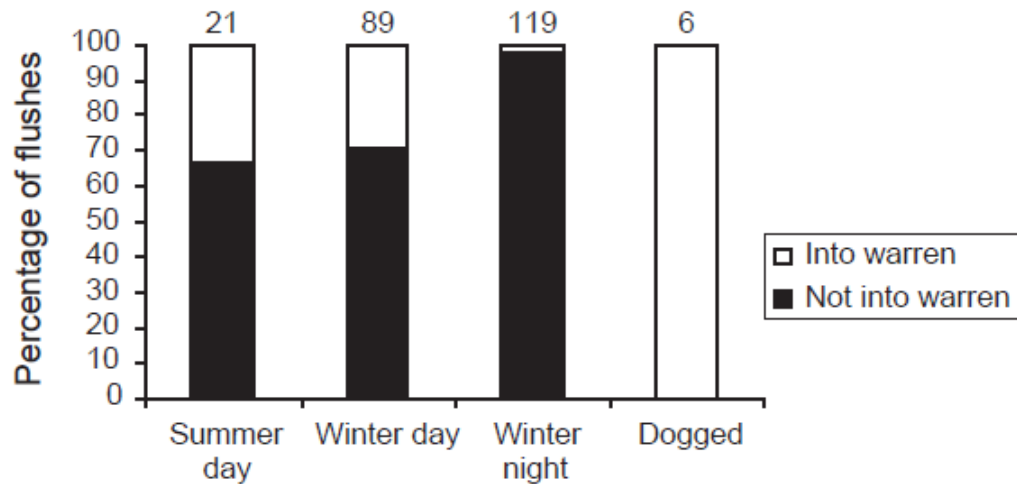
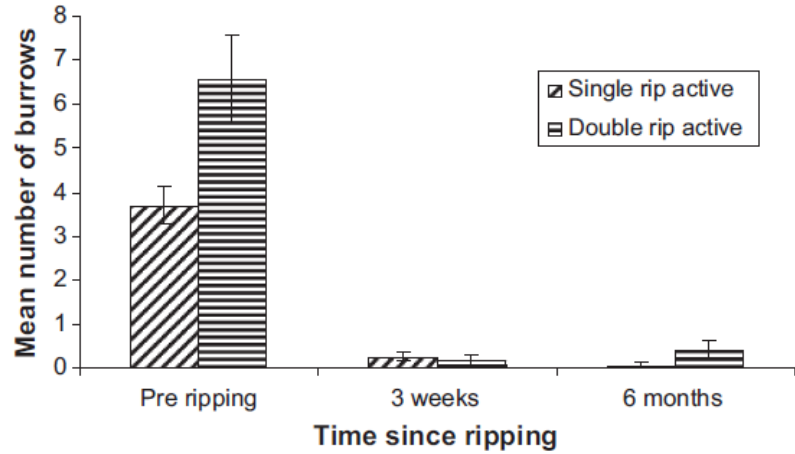
poison oats, map warrens, collapse, fumigate, trap holes and buckheaps



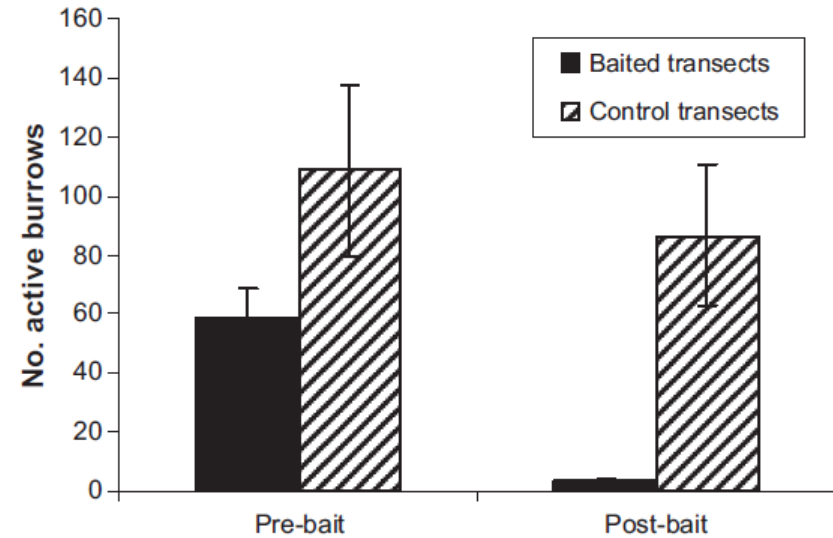
Track transects



Optimum methods



Method	No. of rabbits treated	No. of rabbits that died during treatment
1080 poison oats	8	1
Shovelled	10	3
Phosphine tablets	11	10
Chloropicrin gas	10	8
Control	10	1

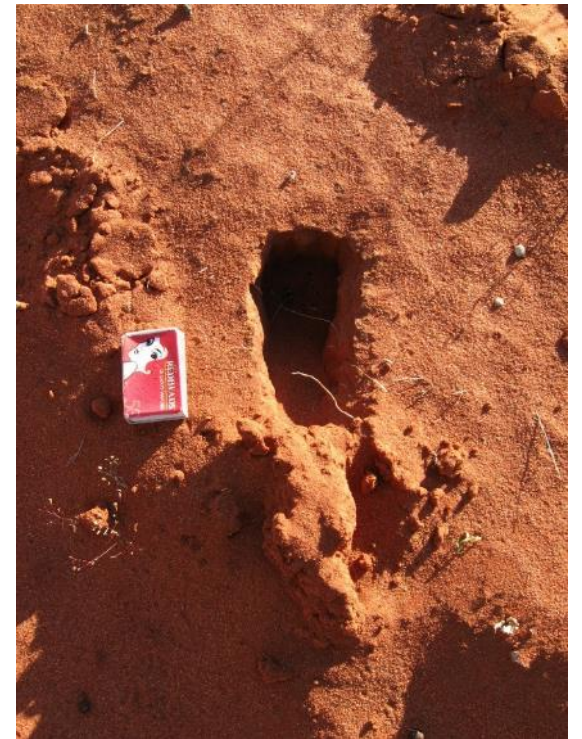


Successful- Wide Range of Species Reintroduced



Native vs introduced burrowers

- Bettong/bilby digs contained 80% more seedlings than rabbit digs
- Bettongs/bilbies produce more than twice as many foraging pits than rabbits
- Bettong/bilby digs are more variable in size and shape



Much harder to eradicate in the stony or mallee country



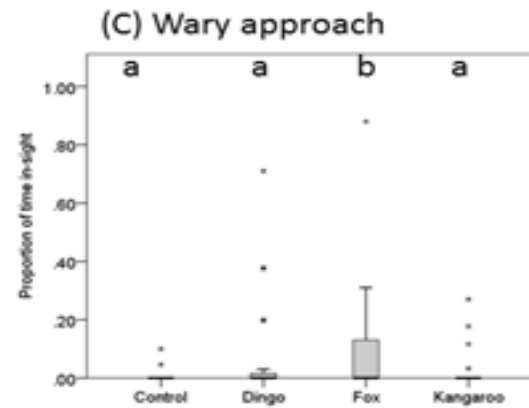
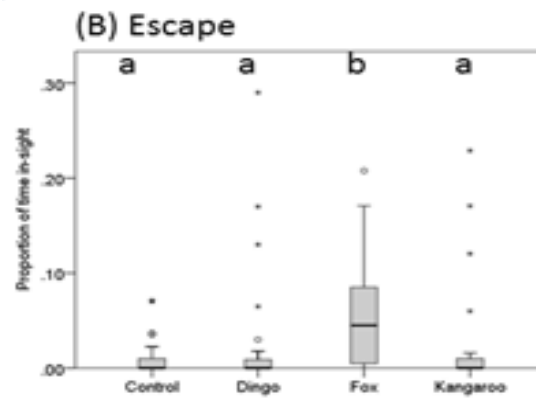
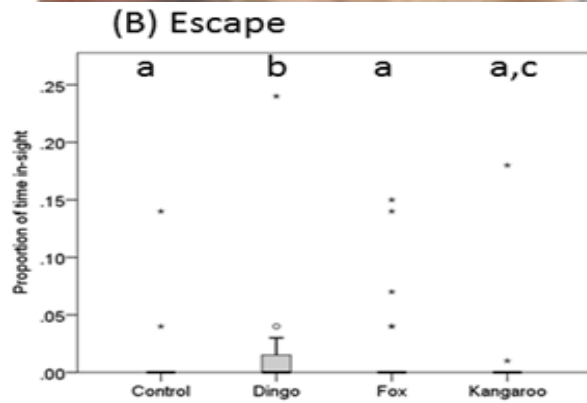
Why are rabbits so successful compared to native species?

- Exposed bettongs, rabbits and bilbies to predator models (fox, dingo, kangaroo, bucket)





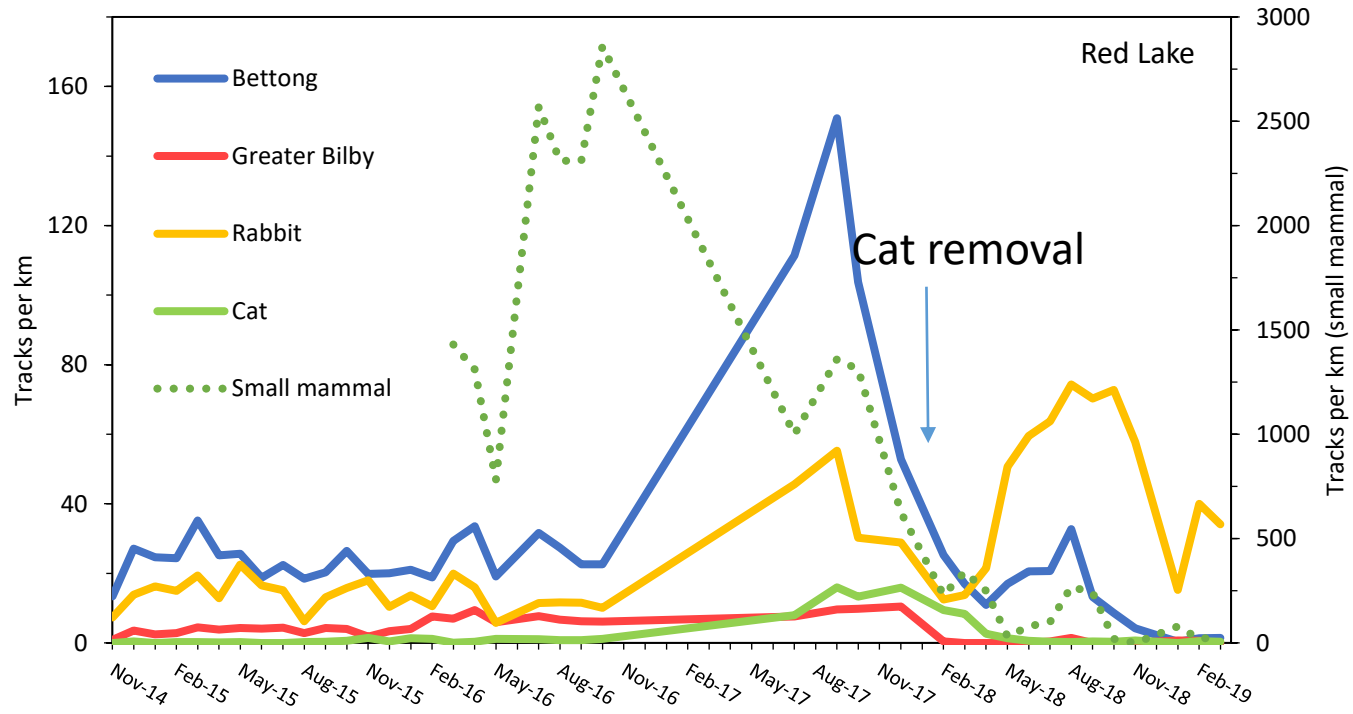
Anti-predator Behaviour



Deep evolutionary experience explains mammalian responses to predators

Rosemary Atkins, Daniel T. Blumstein, Katherine E. Moseby, Rebecca West, Matthew Hyatt, Mike Letnic (2016)

Rebound quickly



Max 3 litters a year
average 1 young



Max 4 litters a year
average 1.5 young

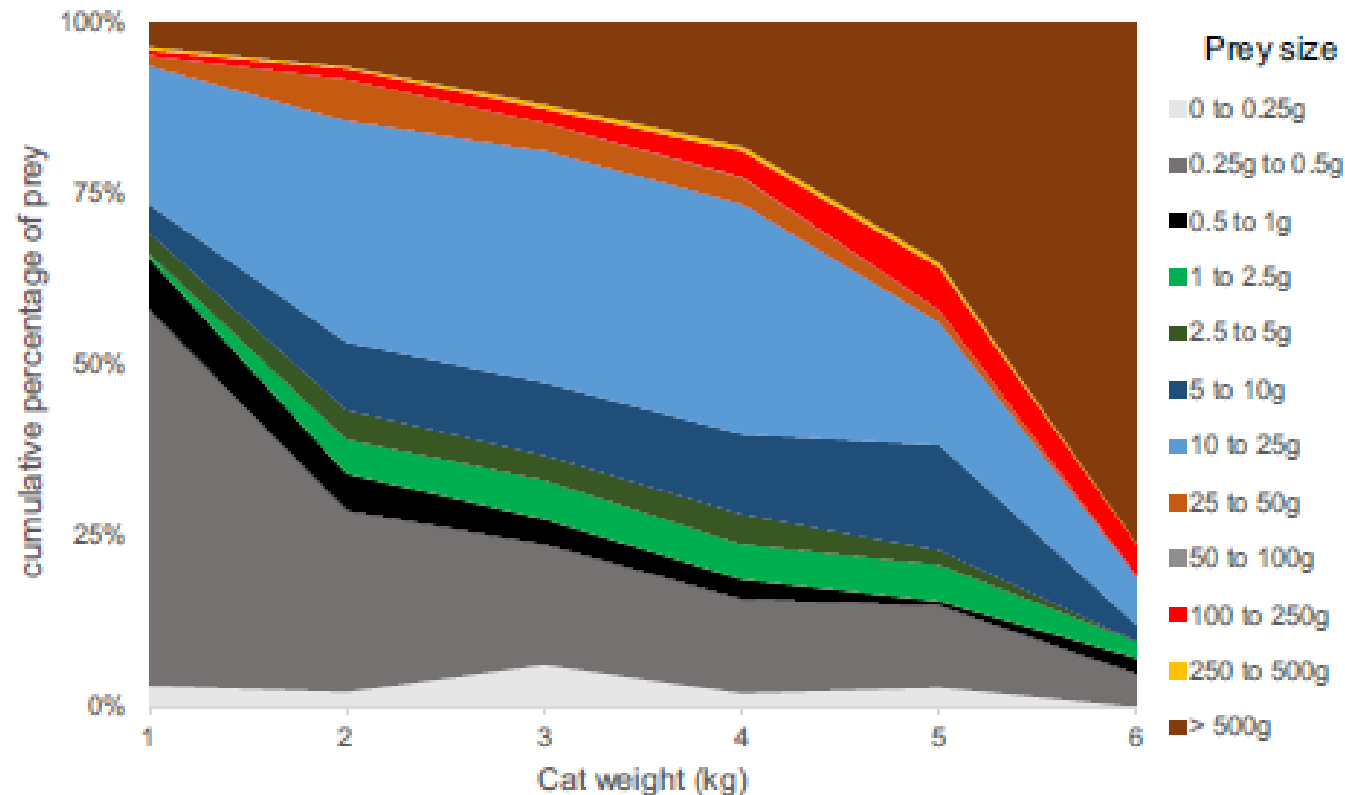


Max 8 litters a year
average 6 young

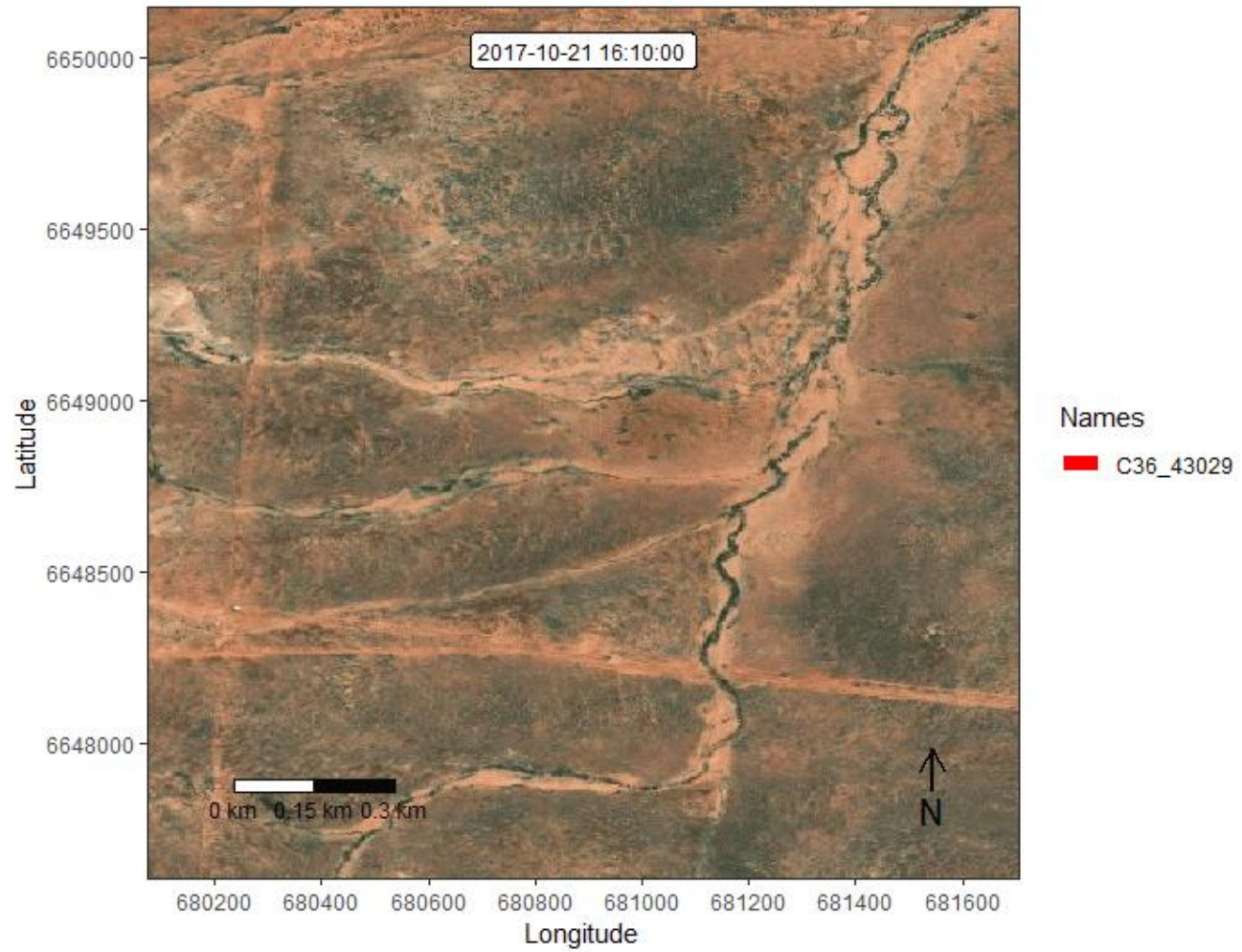


Relationship with feral predators

- Rabbits elevate feral cat numbers
- More rabbits = more cats
- Common prey item for cats in many parts of Australia



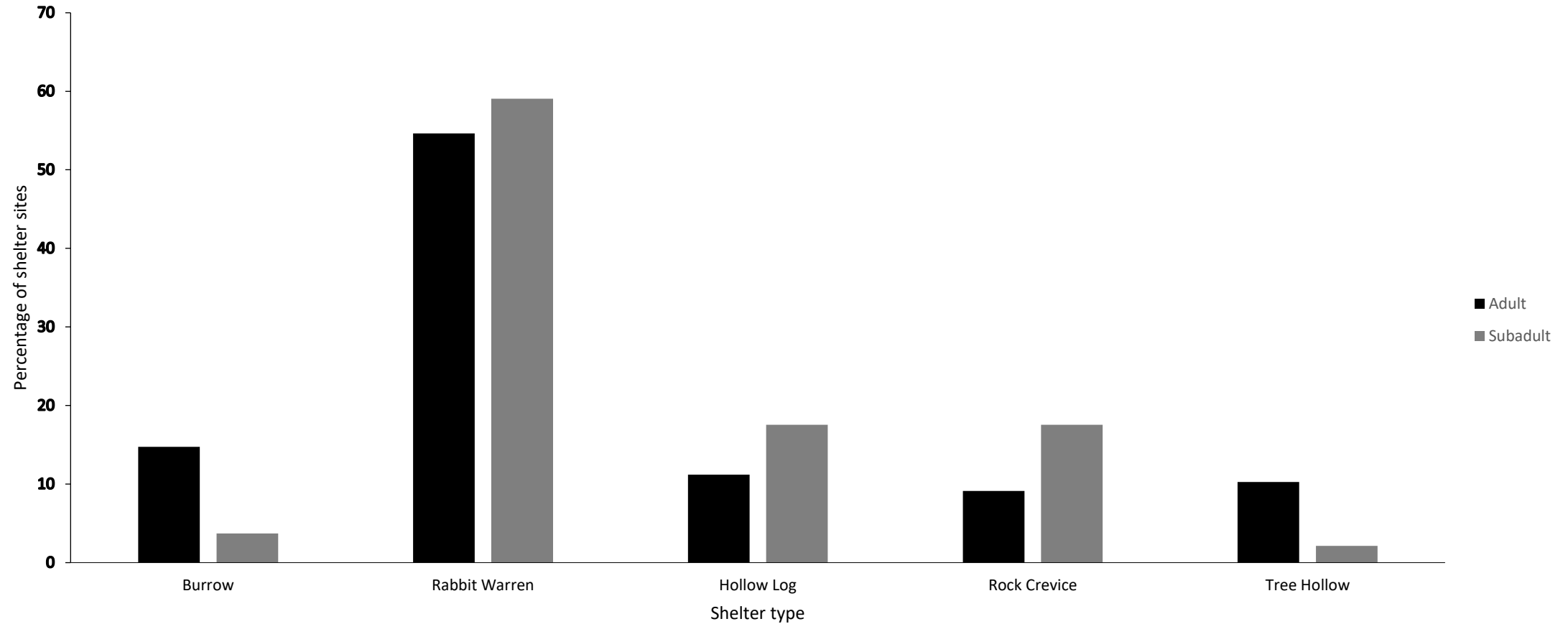




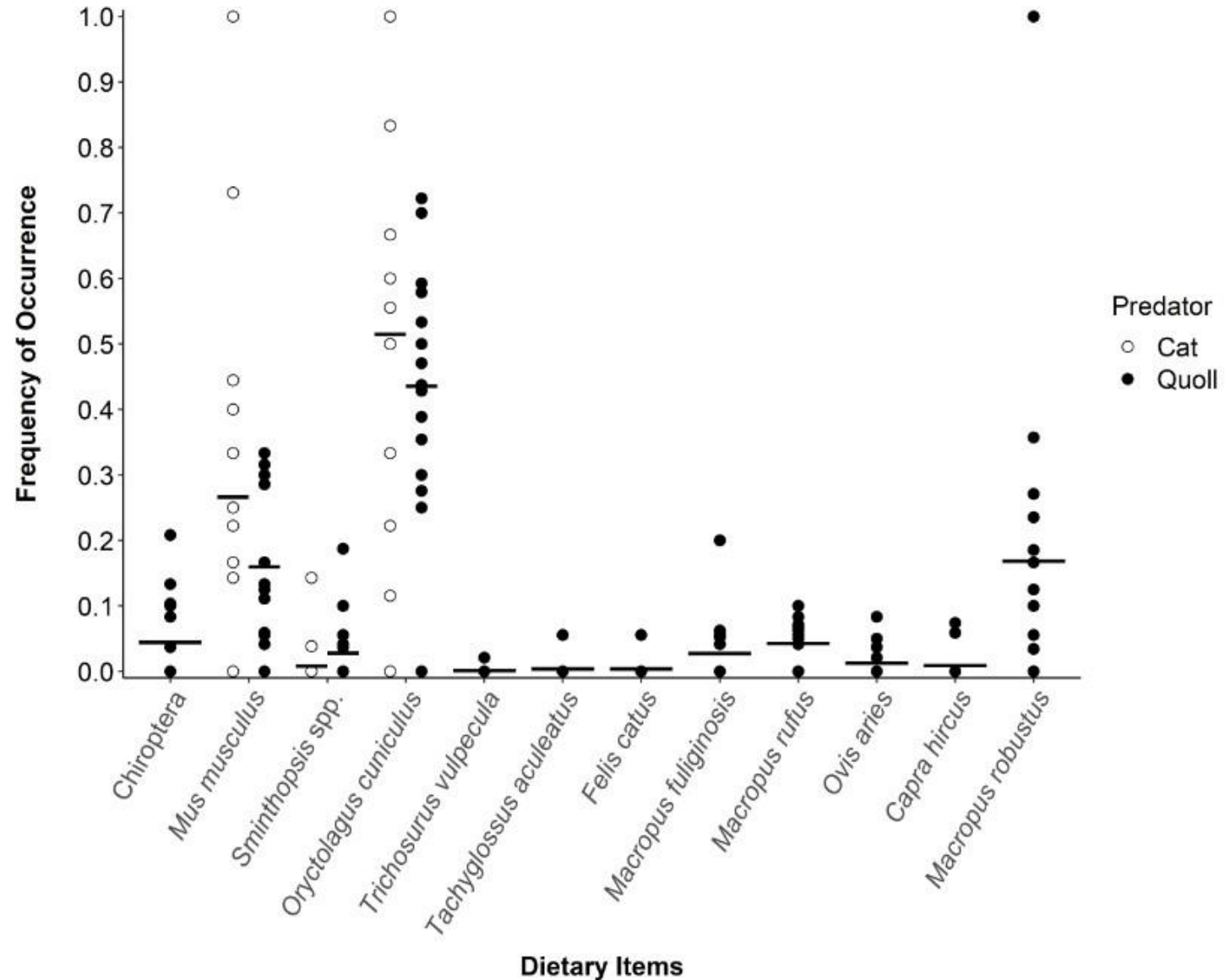
Western quoll reintroduction- Flinders Ranges



Rabbit warrens important shelter sites for quolls (and cats)

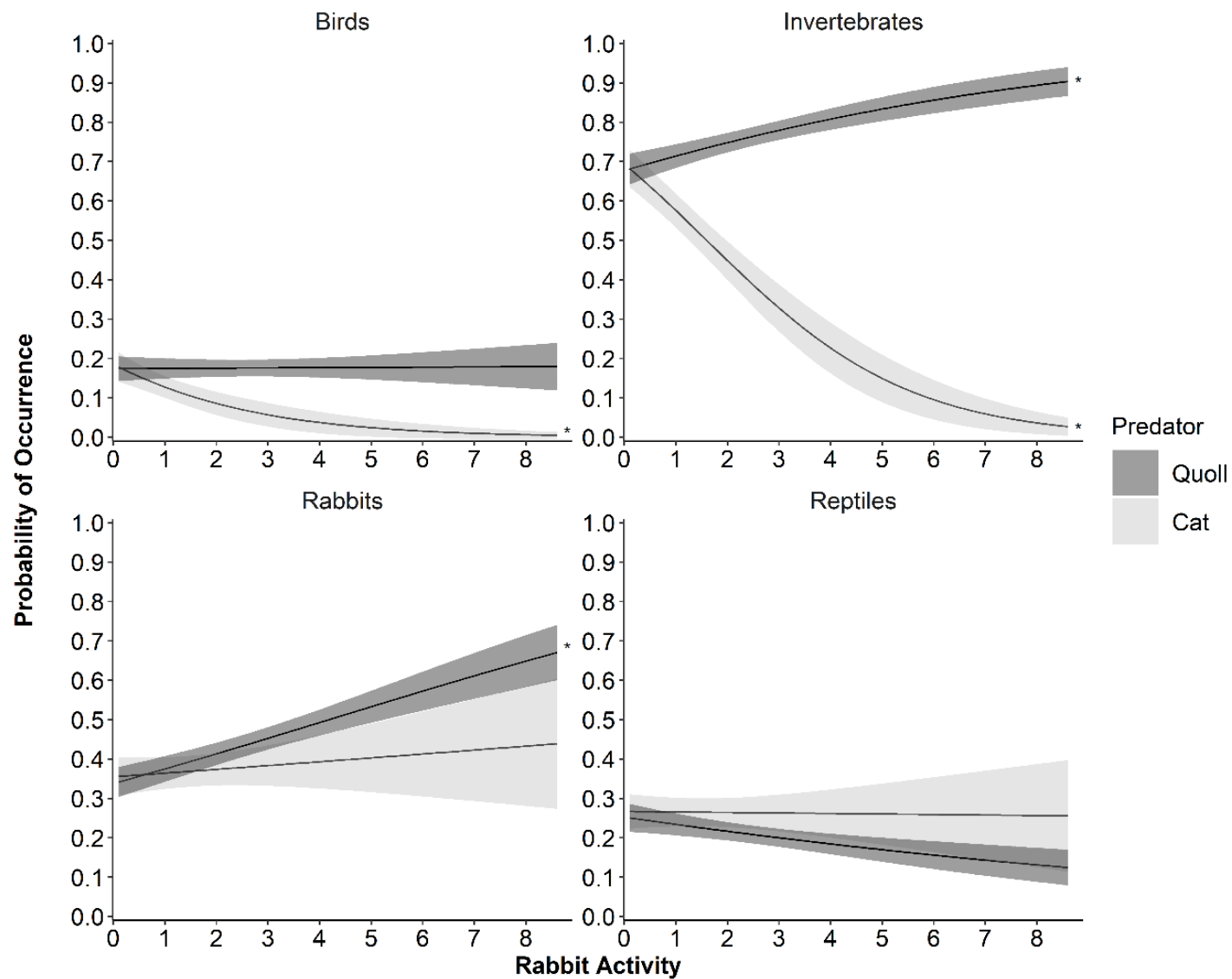


Rabbits most common dietary item for cats and quolls





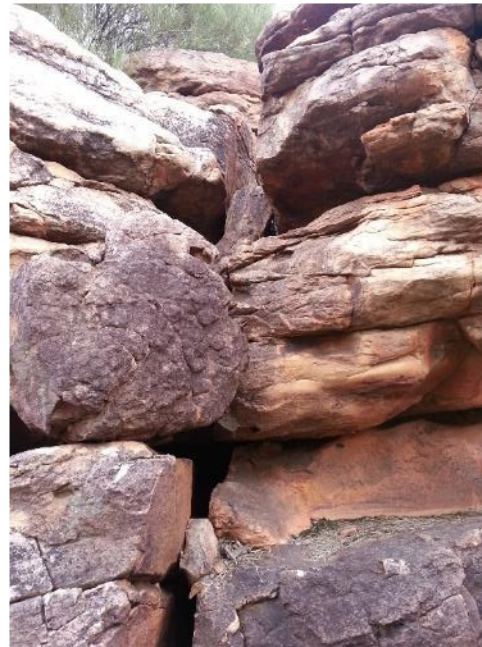
Cats more dependent on rabbit prey



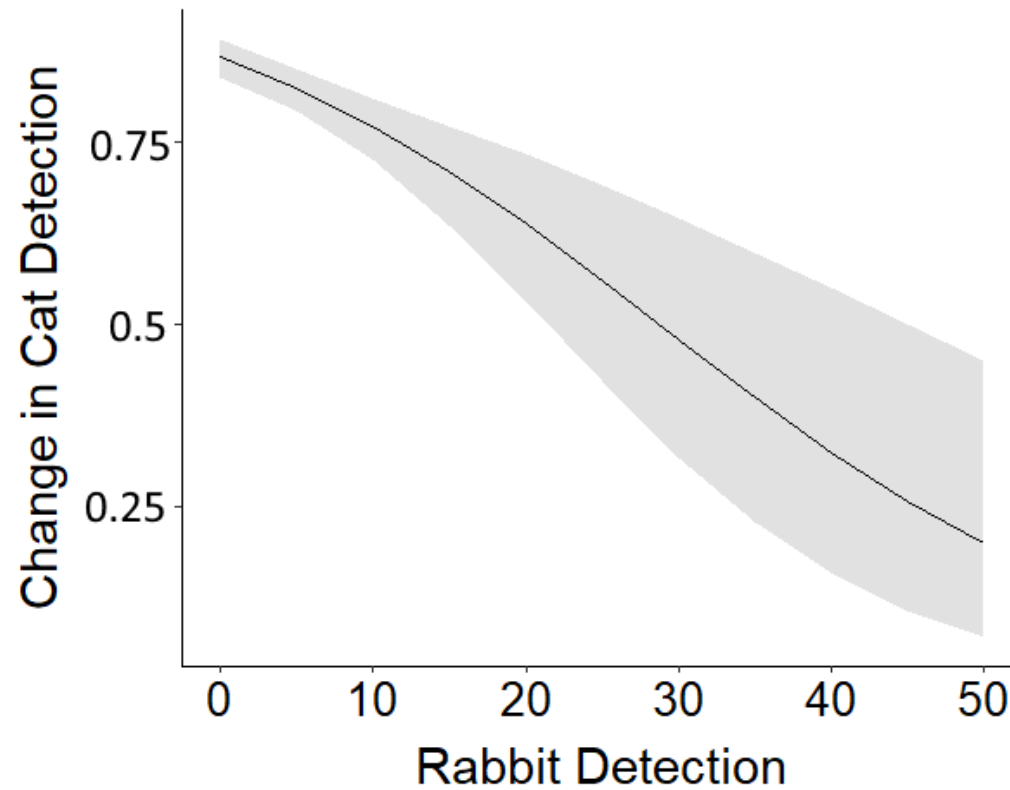
Cats but not quolls are spatially associated with rabbits

Species	Intercept	Cat	Rabbit	Time/ quolls	Season	df	logLink	AICc
Cat	0.28		0.10	-0.01	+	9	-658.9	1336.0
Quoll	0.31			-0.01	+	8	-952.9	1921.8
Rabbit	0.26	1.01			+	8	-2148.4	4312.9

Quolls have other shelter and diet options because they are smaller and more agile
Quolls can kill rabbits down their warrens



Aerial baiting for cats most effective in areas where rabbits in low abundance



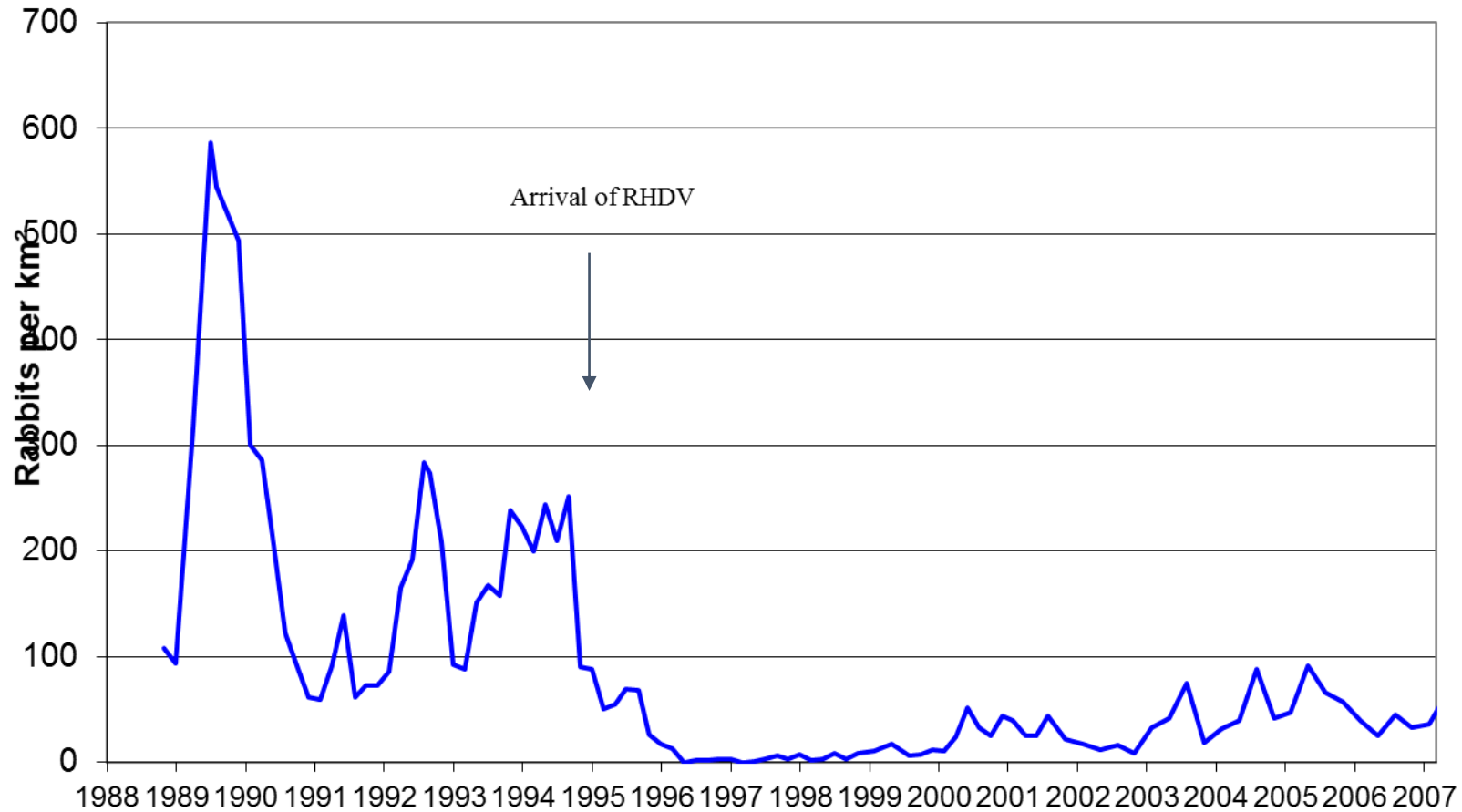
It's all about the net benefit

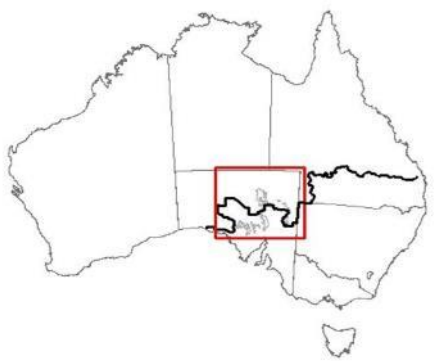
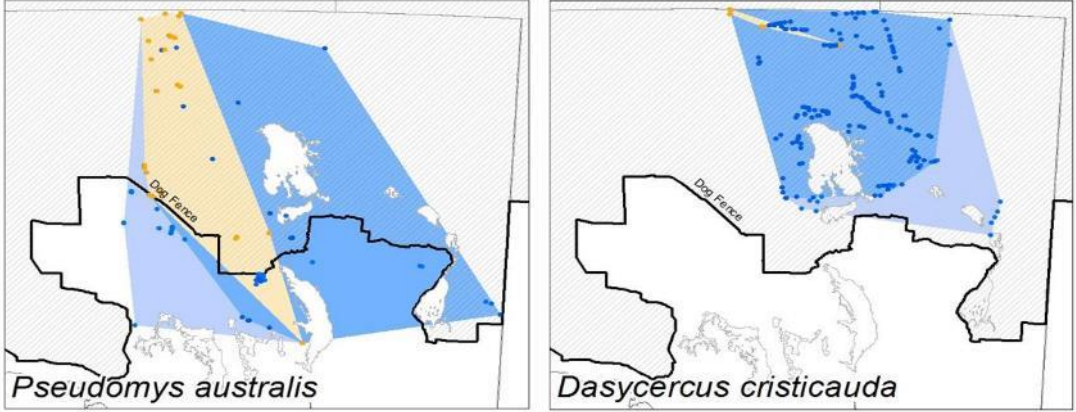
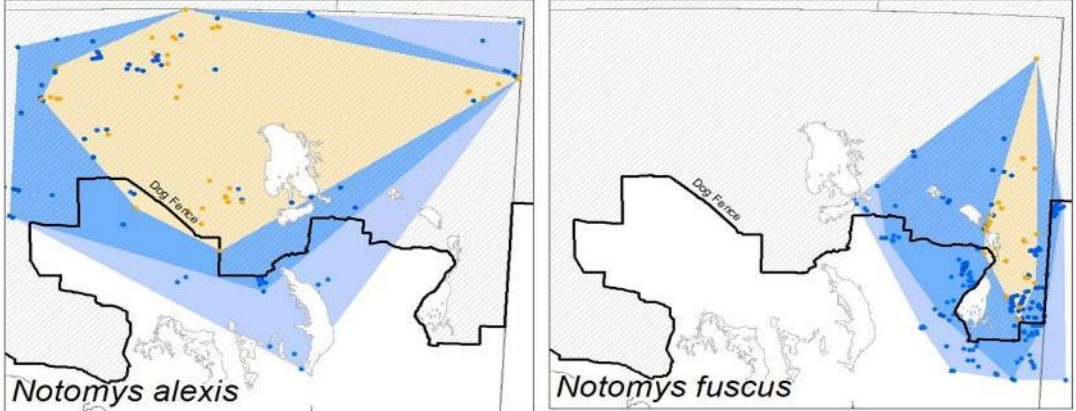
- Controlling rabbits should have a net benefit for quolls and other wildlife



Rabbit densities in arid areas can reach 600 per square km

Rabbit Density at Roxby Downs



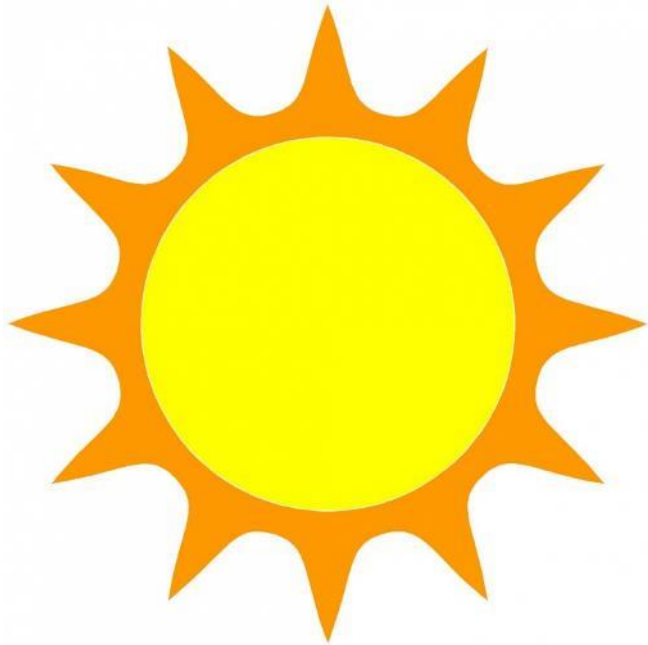


Largest increase in threatened species distribution ever recorded in Australia



Next steps?

- Effects of extreme heat on rabbits vs native burrowing species



VS



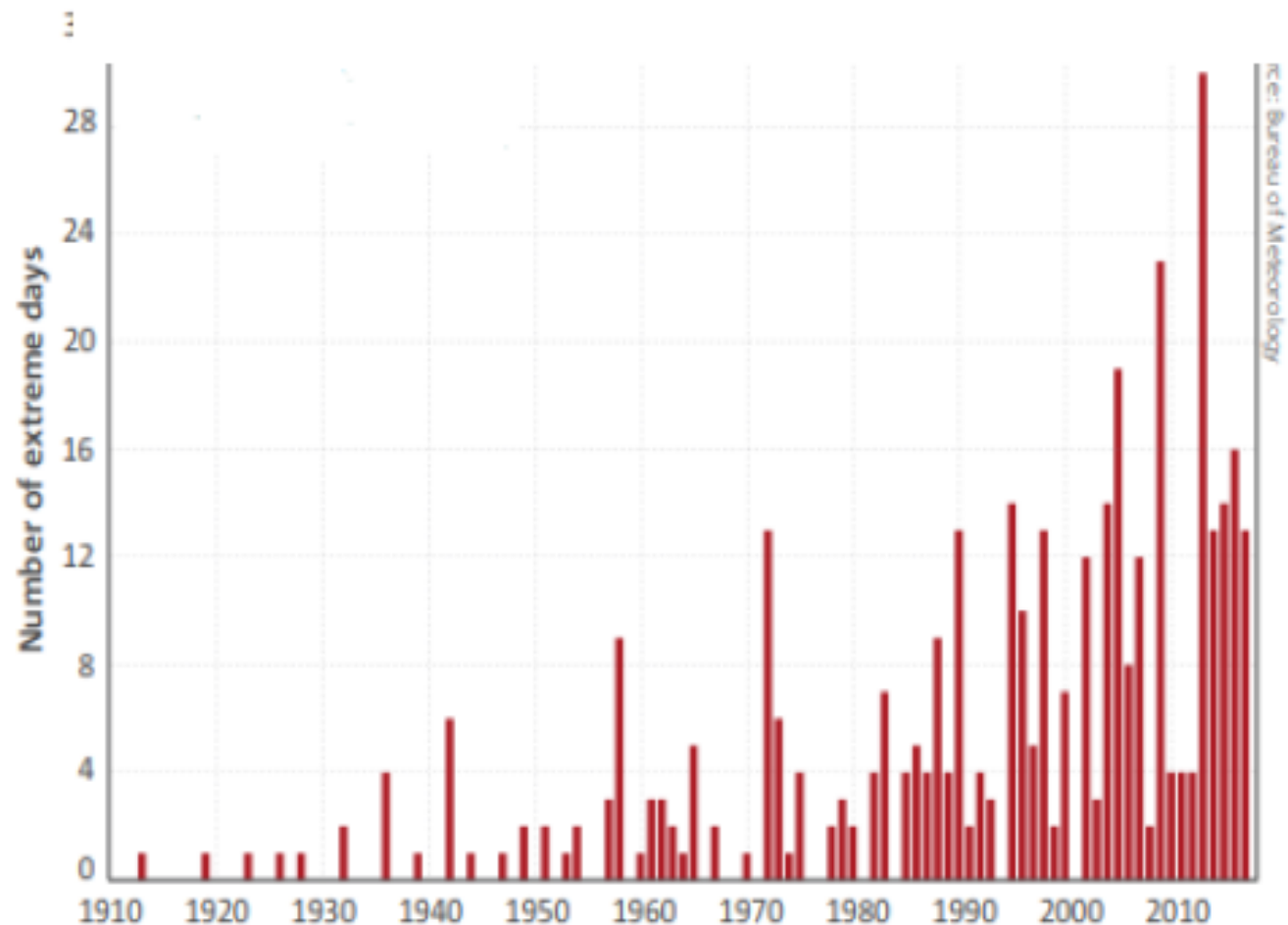
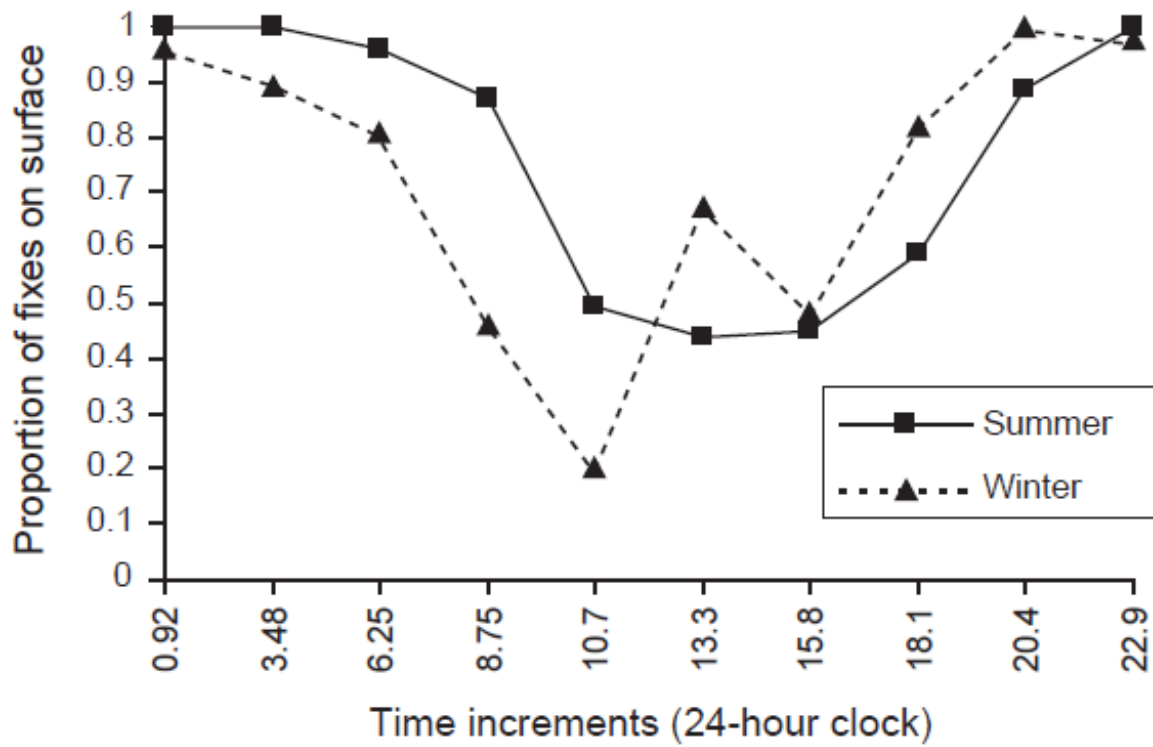


Fig. 1: The frequency of extreme heat events is increasing. Source: BOM State of Climate 2018

Rabbits (but not bilbies) are active on the surface during the day in summer



- Average lethal temp is 43 degrees
- At 40 degrees panting and salivation
- Rabbits cannot regulate their internal temperature above 35 degrees, some start to die
- Higher humidity leads to lower heat tolerance
- High phenotypic plasticity (hotter areas have rabbits with longer core body and long ears)
- Rabbit exposed to high temperature when young can have greater heat tolerance when older.
- Rabbits exposed to heat can lead to lower sperm production in later life