Characterising deer movement and habitat preferences in the Australian Alps

Eliane McCarthy, PhD student, Supervisors: Dr Thomas Newsome & Associate Professor Catherine Grueber
Cross Tenure Feral Deer Management Project & The University of Sydney

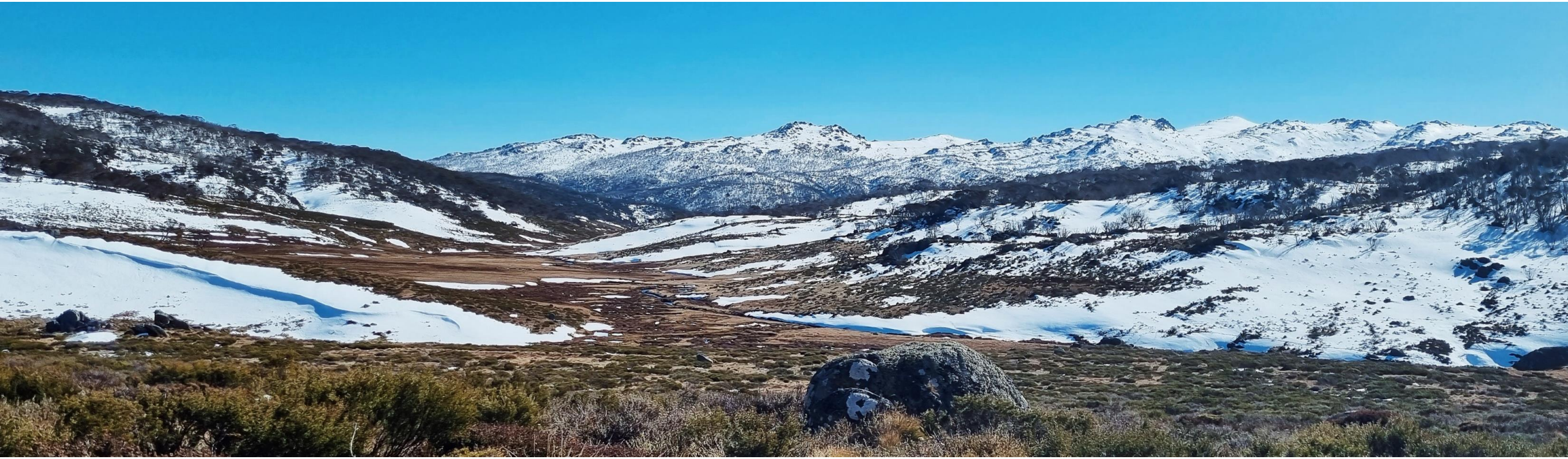
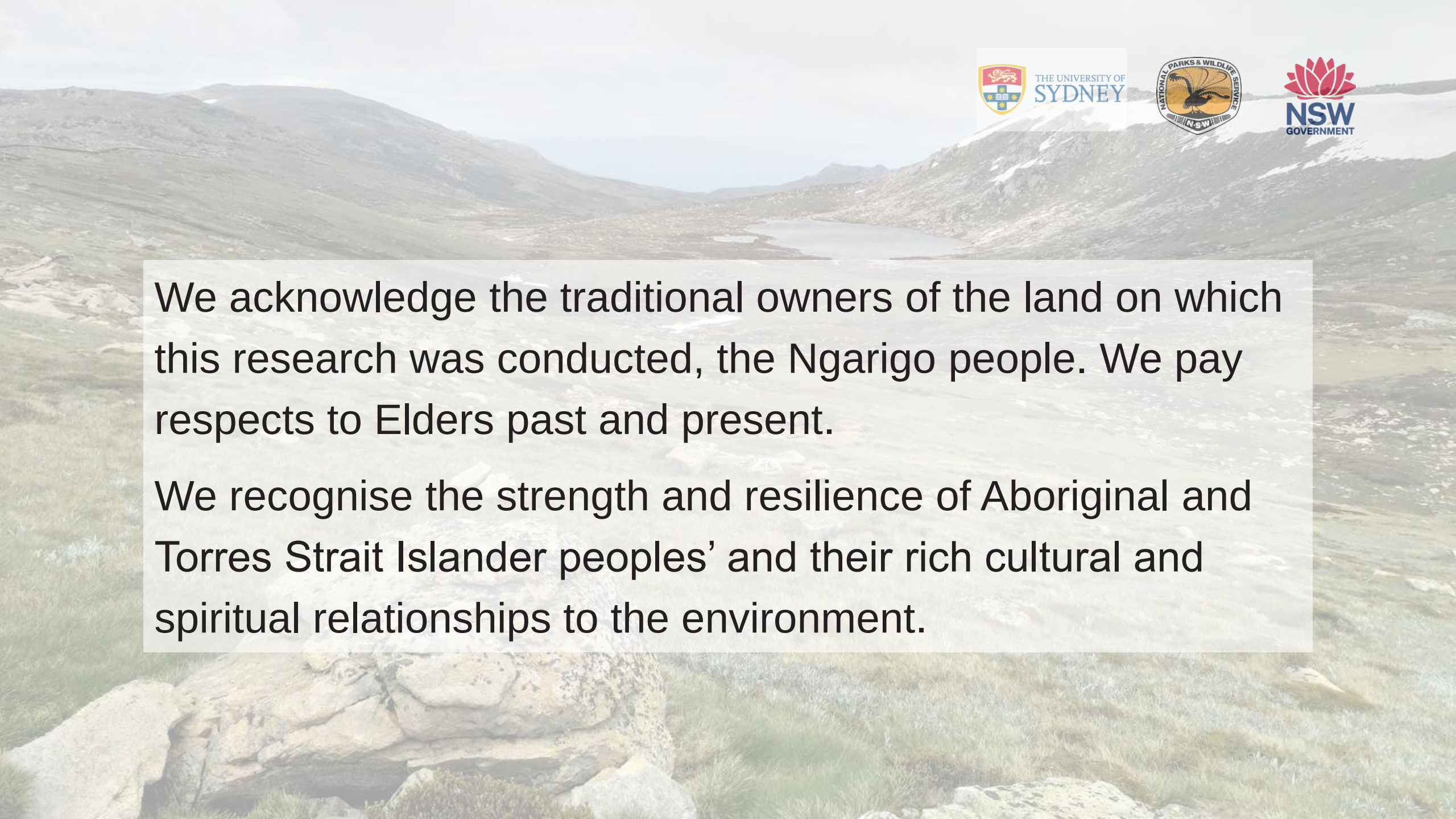


Image credit: Eleanor Tomkins



We acknowledge the traditional owners of the land on which this research was conducted, the Ngarigo people. We pay respects to Elders past and present.

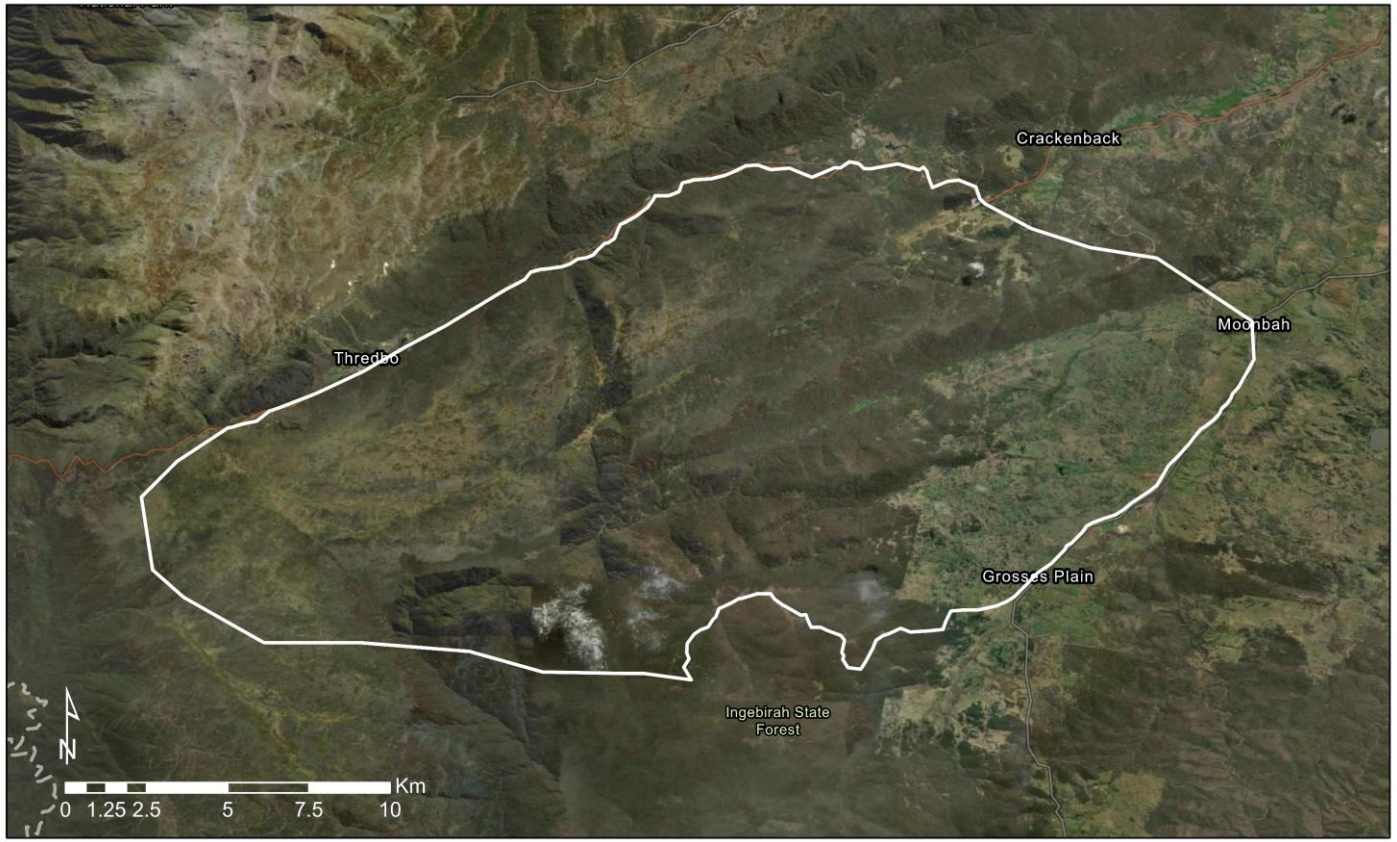
We recognise the strength and resilience of Aboriginal and Torres Strait Islander peoples' and their rich cultural and spiritual relationships to the environment.

The Project

Fallow deer
(*Dama dama*)

Red deer
(*Cervus elaphus*)

Sambar deer
(*Rusa unicolor*)



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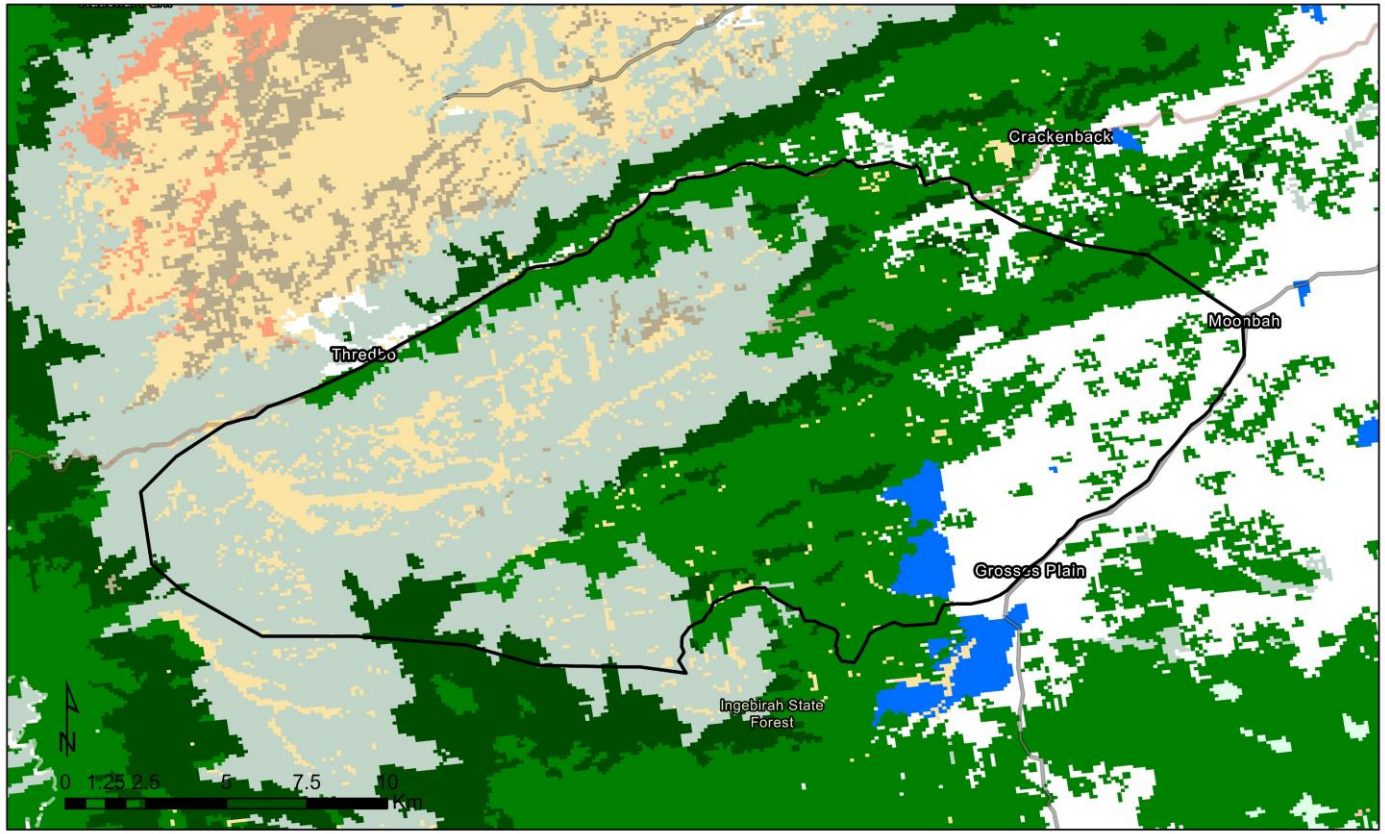


Movement monitoring

- Define the scale of management required (home range and movement rates).
- Determine where animals are more likely to be found (habitat selection analyses).
- Identify at-risk areas where control should be prioritised.

Collaring

- Clover trapping (fallow deer) and aerial net gunning.
- 14 sambar deer, 5 red deer and 14 fallow deer collared.


Video credit: Rob Hunt

CSIRO PUBLISHING

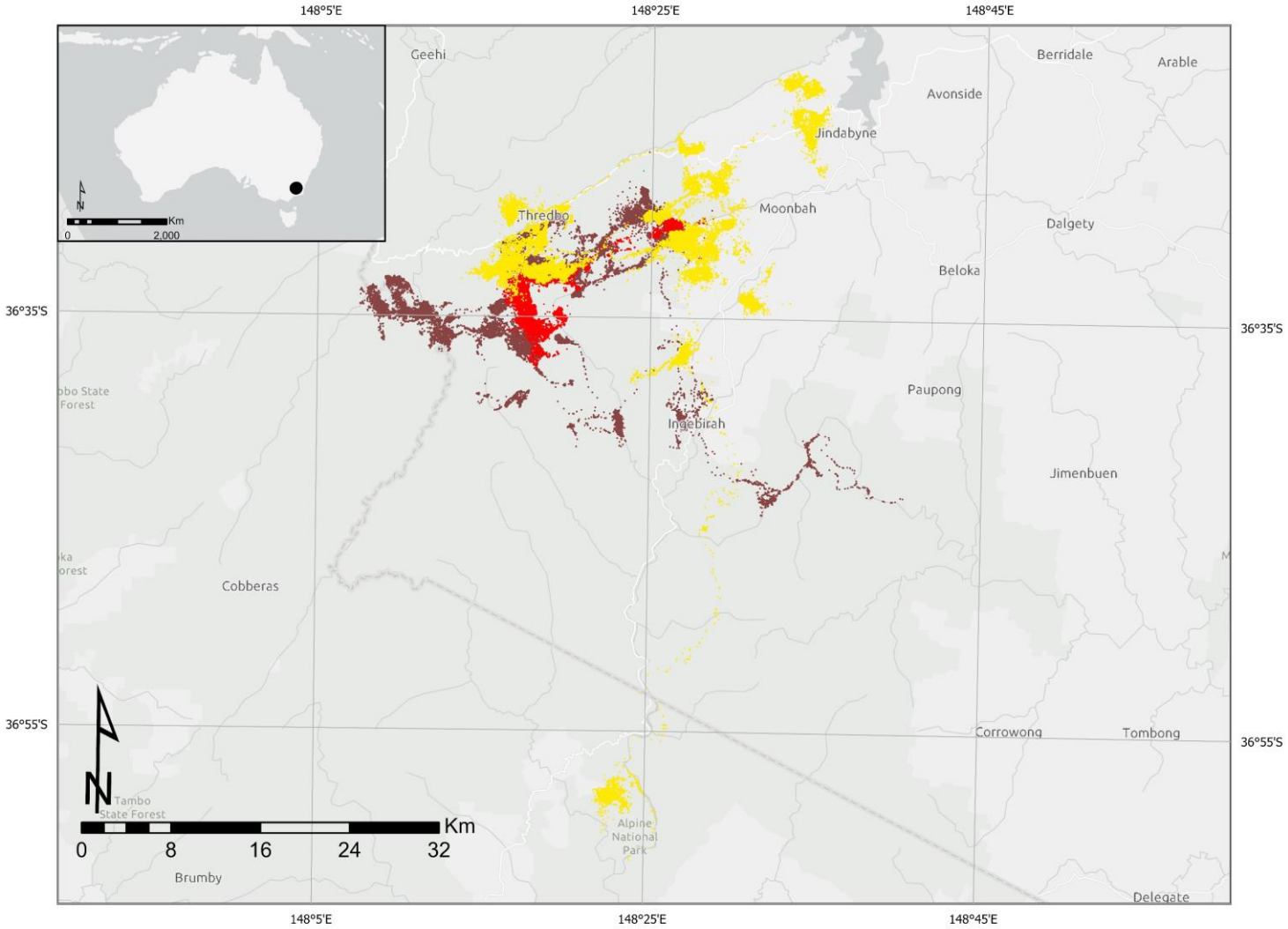
RESEARCH PAPER
https://doi.org/10.1071/WR23028

WILDLIFE RESEARCH

Evaluating aerial net gunning and chemical immobilisation for capture of invasive sambar deer (*Rusa unicolor*) and red deer (*Cervus elaphus*) in alpine Australia

Eliane D. McCarthy[A,*], Jordan O. Hampton[B,C], Rob Hunt[D], Stuart Williams[E], Grant Eccles[D] and Thomas M. Newsome[A]

Two years of movement



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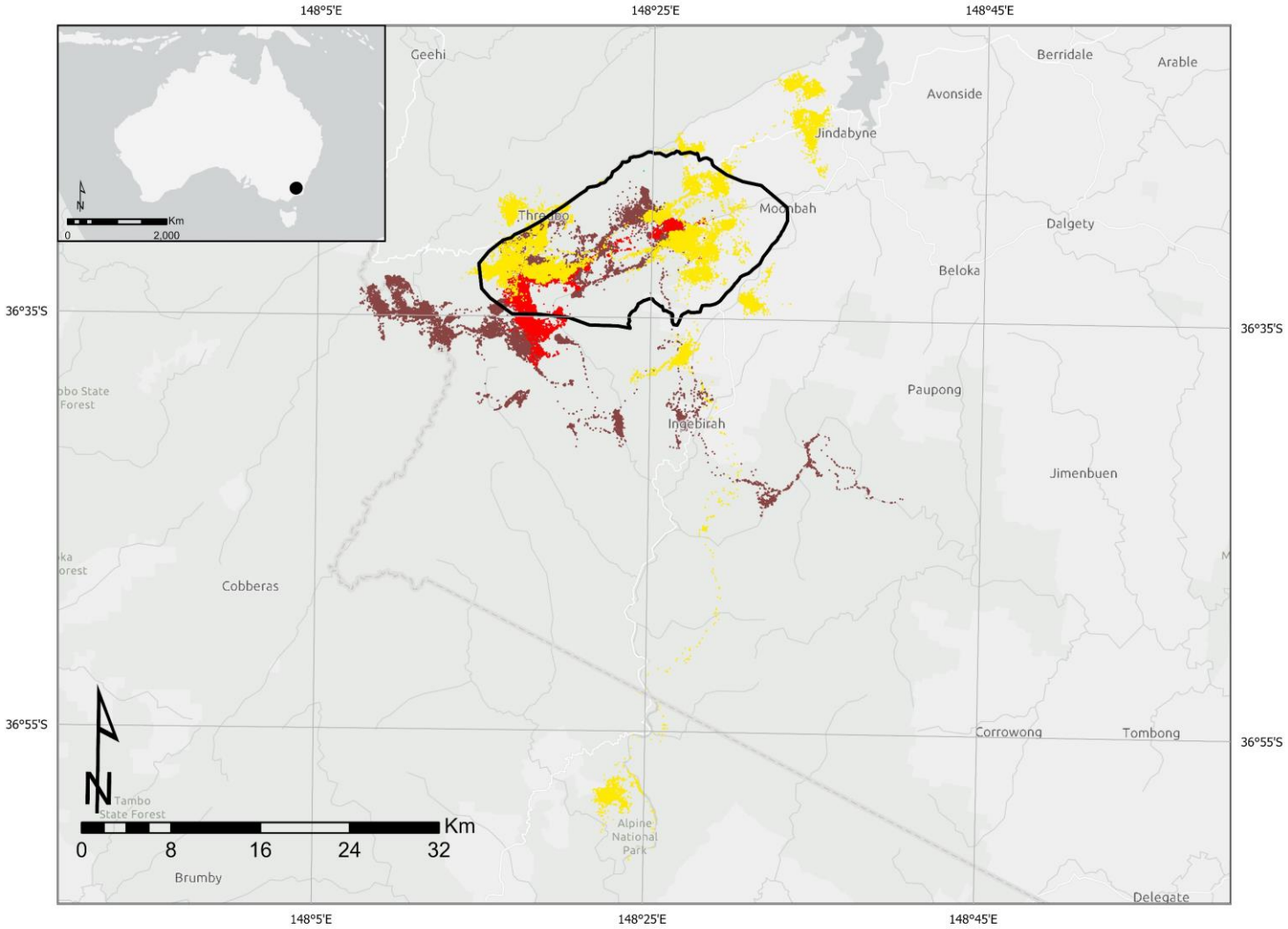
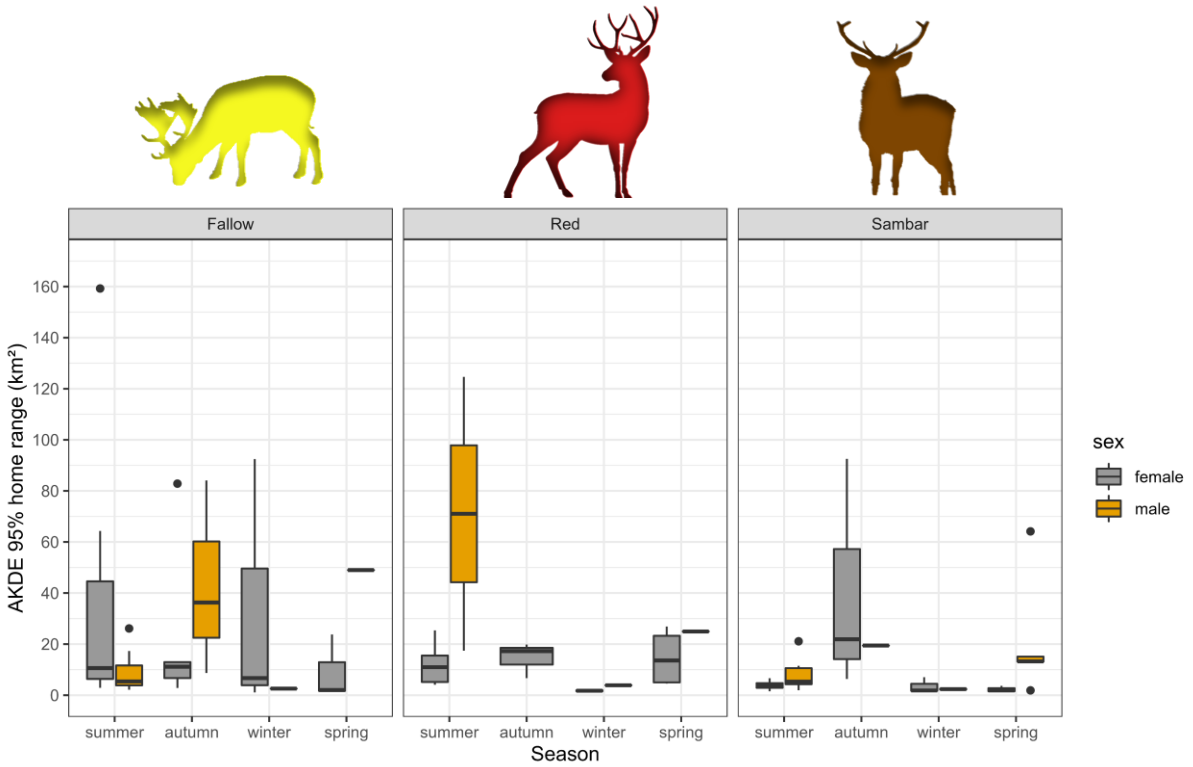


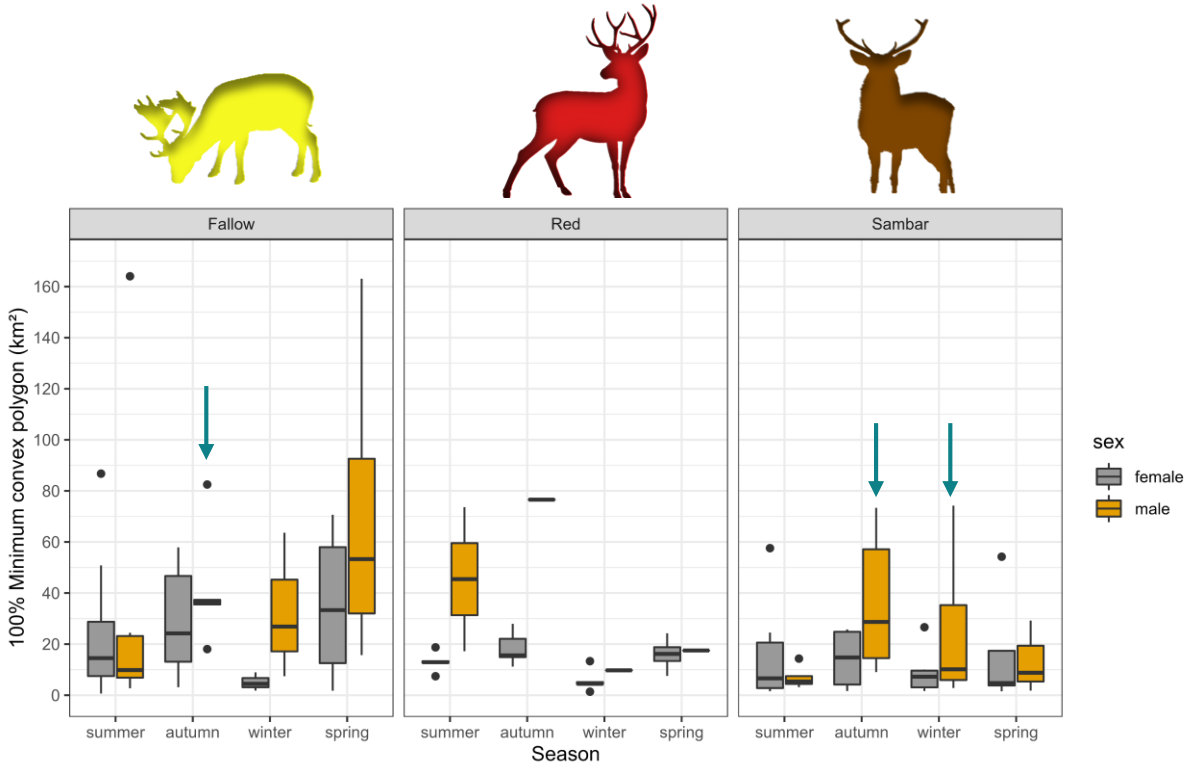
Movement ranges

- Seasonal home range calculated for range resident individuals:
  - Autocorrelated kernel density estimation (95% kernel).
- Seasonal distribution extent calculated for all individuals:
  - 100% minimum convex polygons.

Seasonal changes in movement ranges

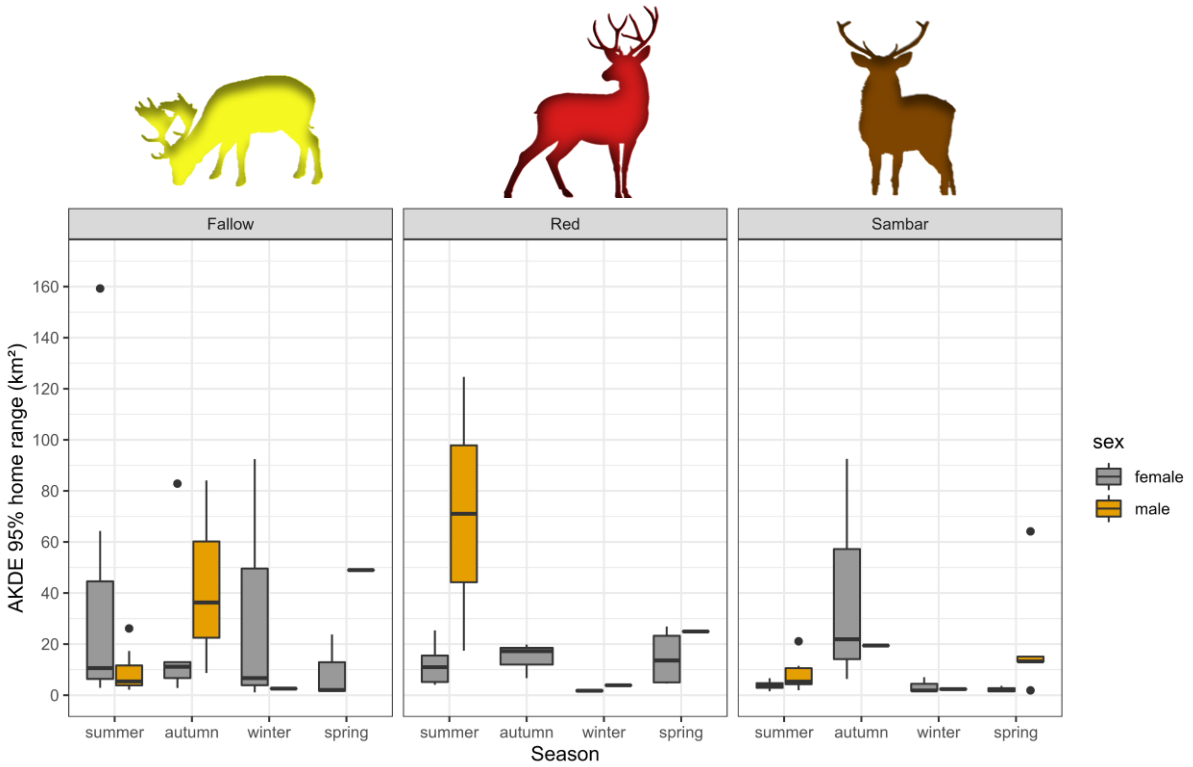


95% AKDE home range for range residents



100% minimum convex polygon for distribution extents of all animals

Seasonal changes in movement ranges



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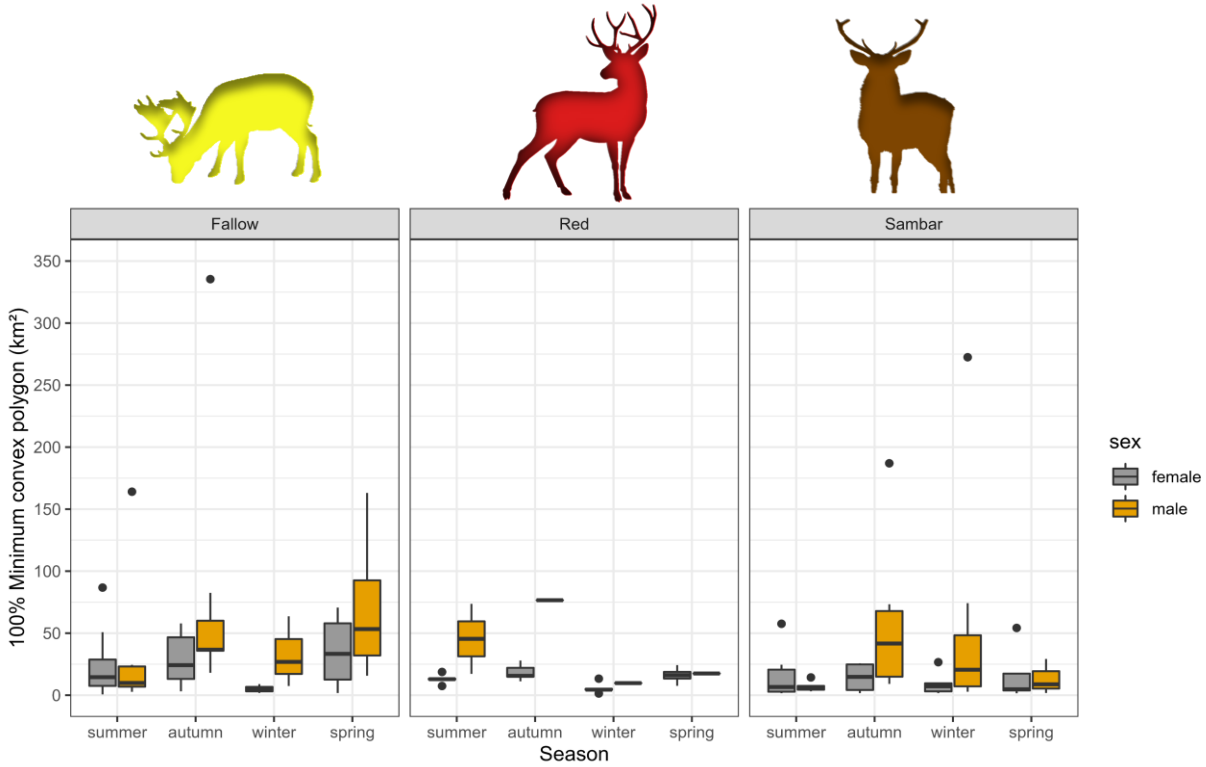


100% minimum convex polygon for distribution extents of all animals

Take-home message

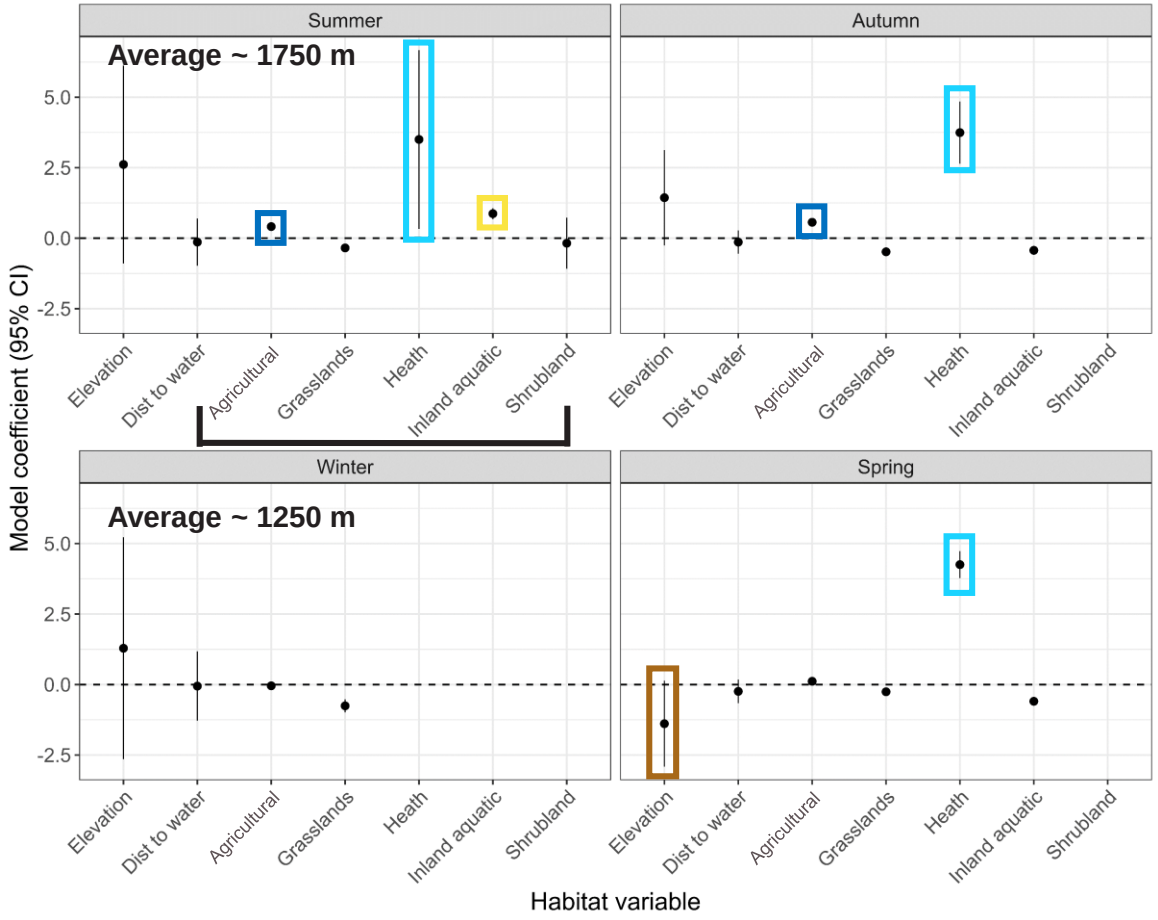
- The three species have distinct movement patterns, governed by their life histories, which should be accounted for in management programs.

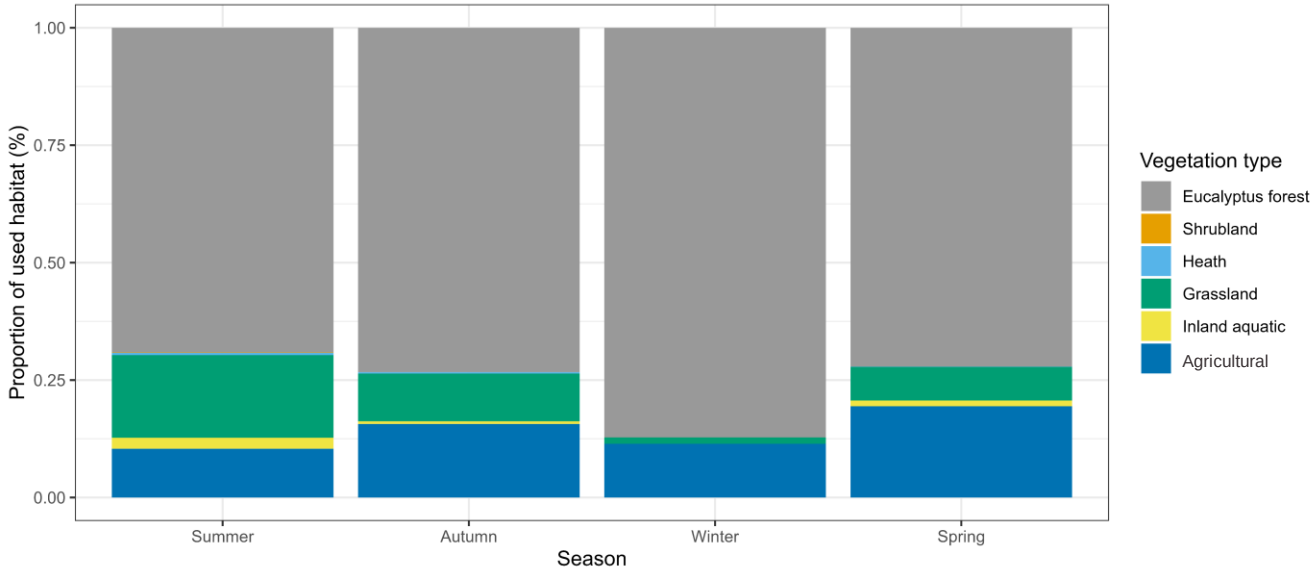
Habitat selection

- Resource selection functions (RSFs) to examine each species preferences for elevation, vegetation, distance to water, slope, aspect & burnt area (for sambar deer) seasonally.

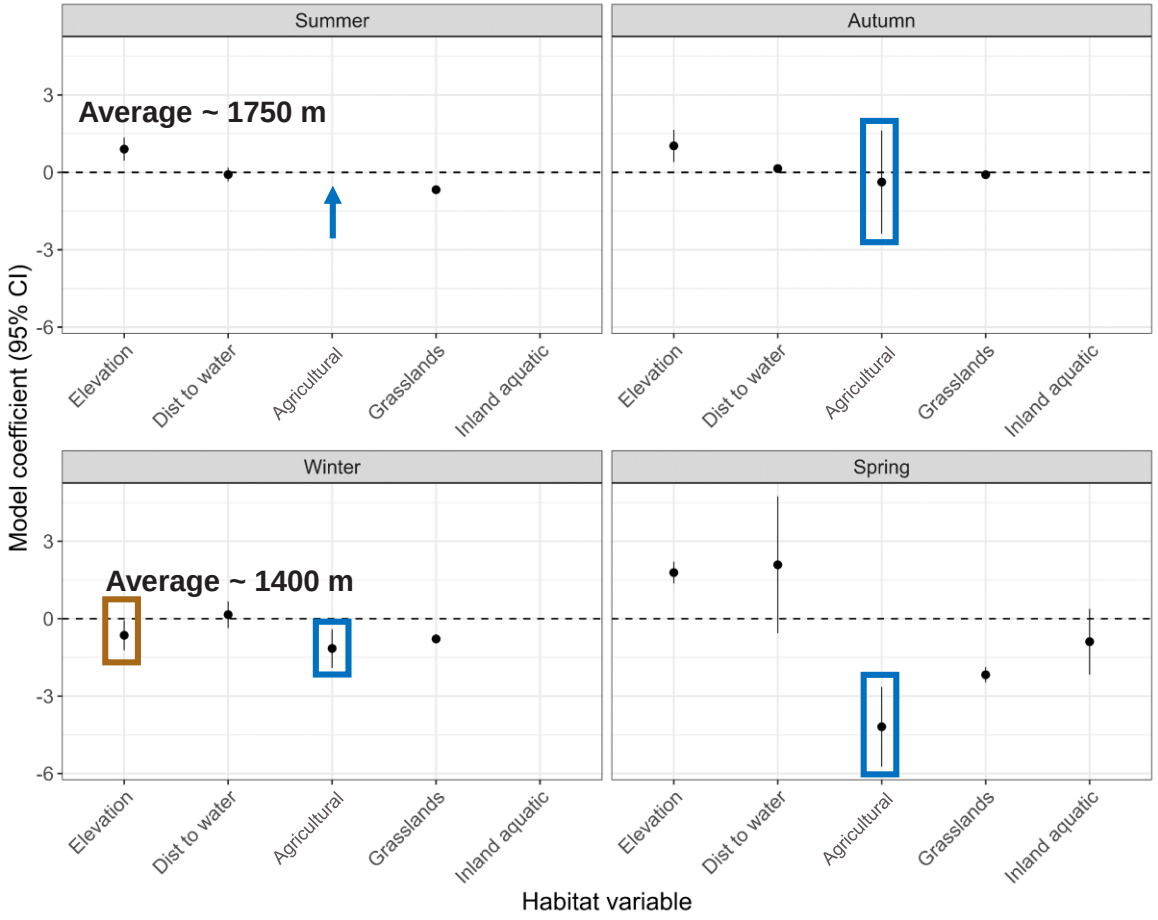
- Sexes were combined.

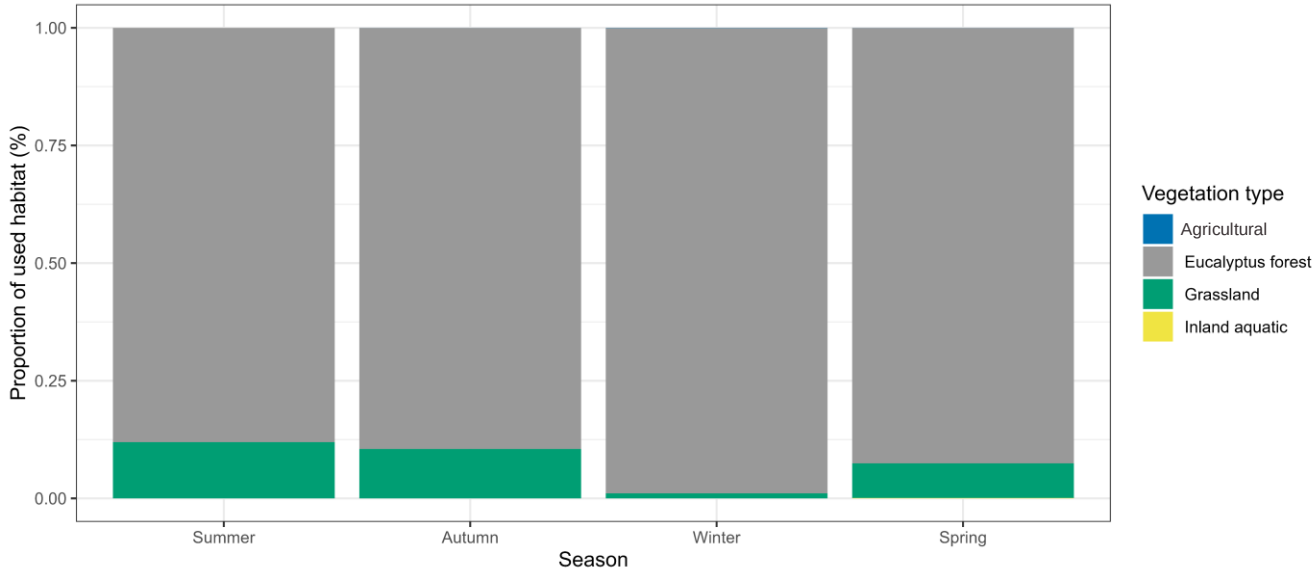
Fallow deer seasonal habitat selection



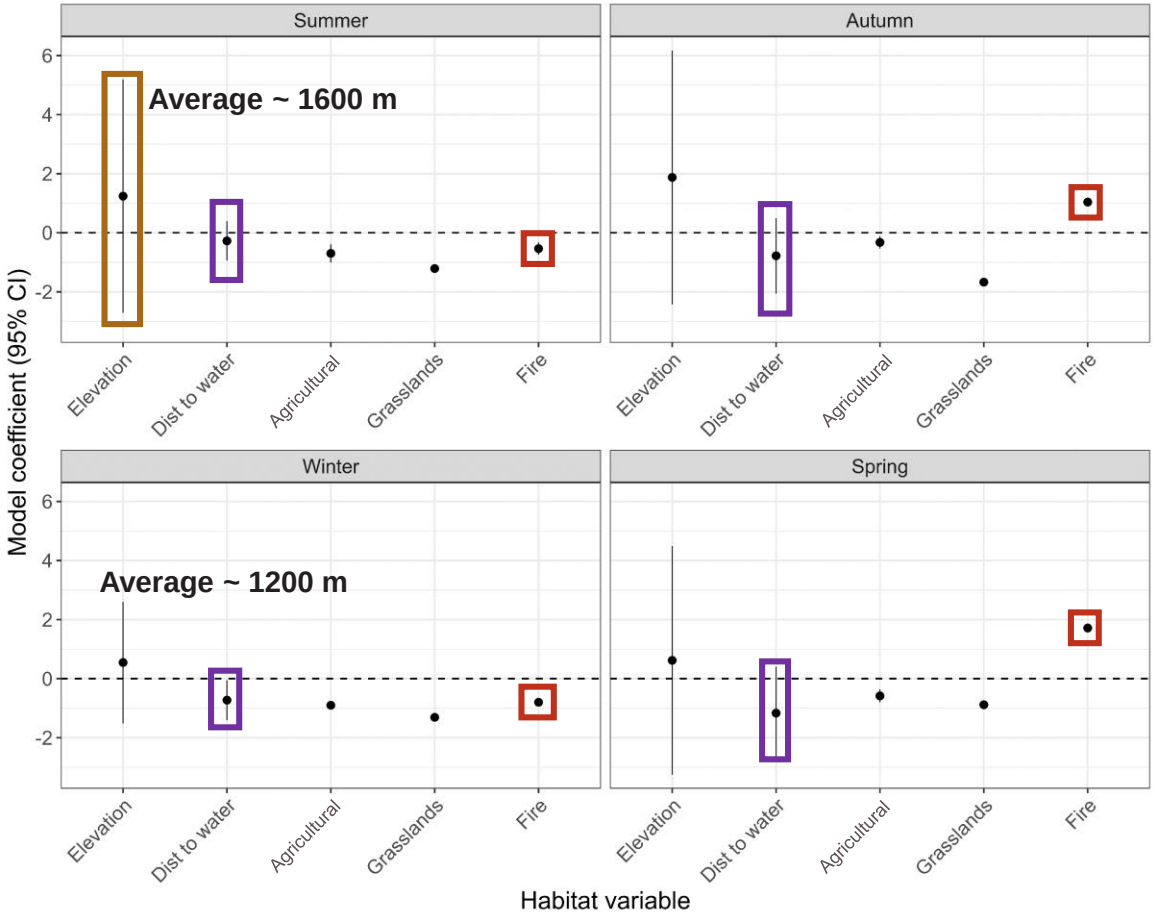


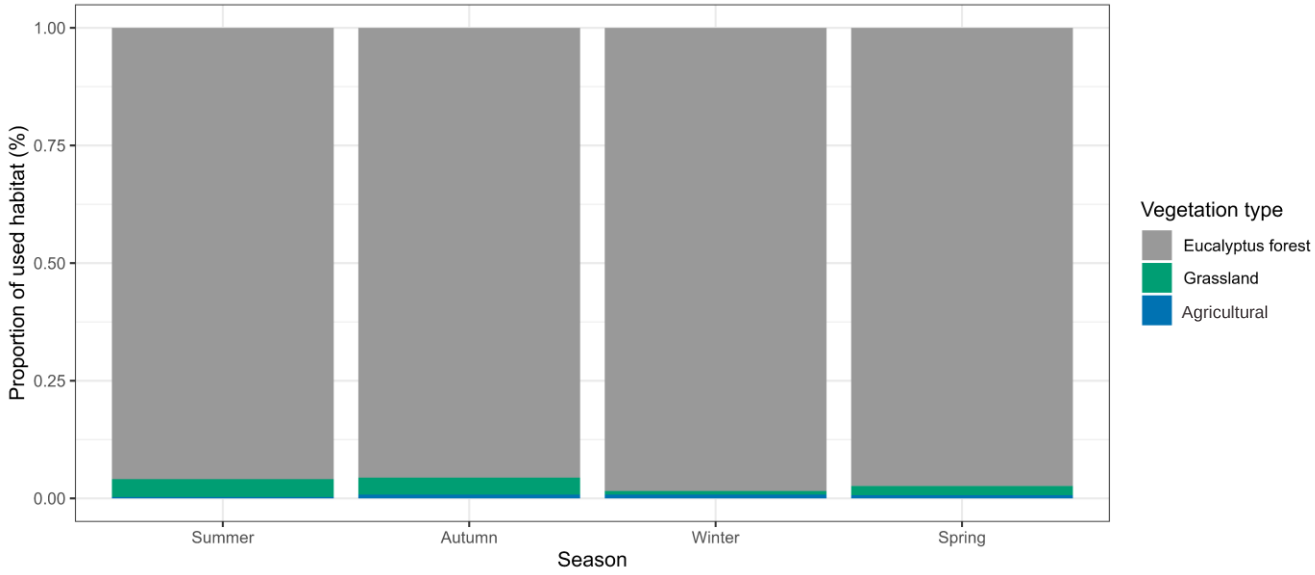
Red deer seasonal habitat selection





Sambar deer seasonal habitat selection





Take-home message

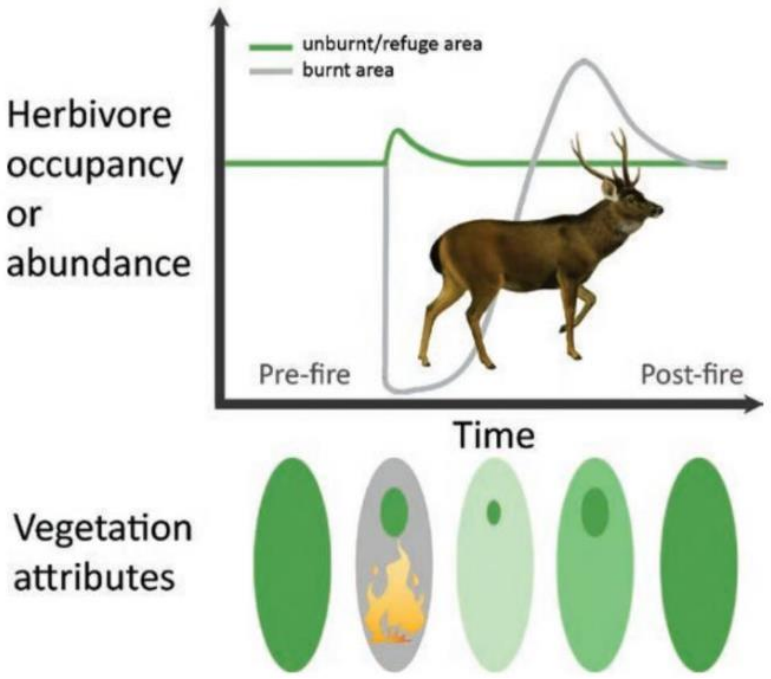
- Habitat selection analyses can be used to determine the best time to control, and which habitat types to target.

Image credits: Stacey Koprdová


27-May-23 5:33:59 PM
03-Jun-23 4:00:00 PM
Albino Lake
Charlotte Pass
Spencers
Thredbo River
Crackenback
Murray Gorge
Thredbo
Thredbo River
Mowamba State Forest
Kosciuszko
Mowamba River
Tommys Lake
Grosses Plain
Cascade Creek
Ingebirah State Forest
Ingebirah
Spring Creek Lake

Sambar deer and fire

- Faecal pellet surveys show that sambar deer are not present immediately post fire, but present 16-24 months after (Forsyth 2012).
- Deer can move invasive plants between burnt and unburnt areas & prevent regeneration.
- Step-selection functions (SSFs) used to examine individual preferences for burn severity in burnt areas.



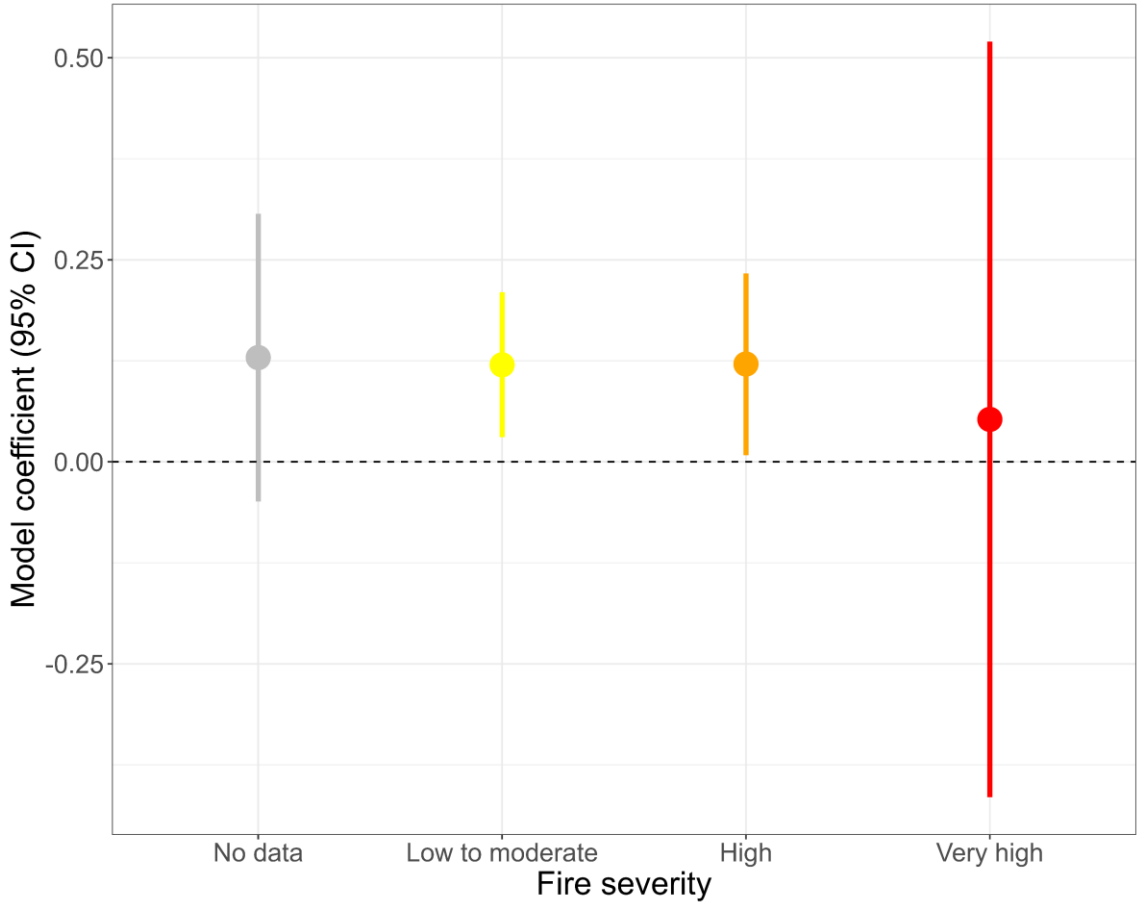
From Legge et al. 2023

References:

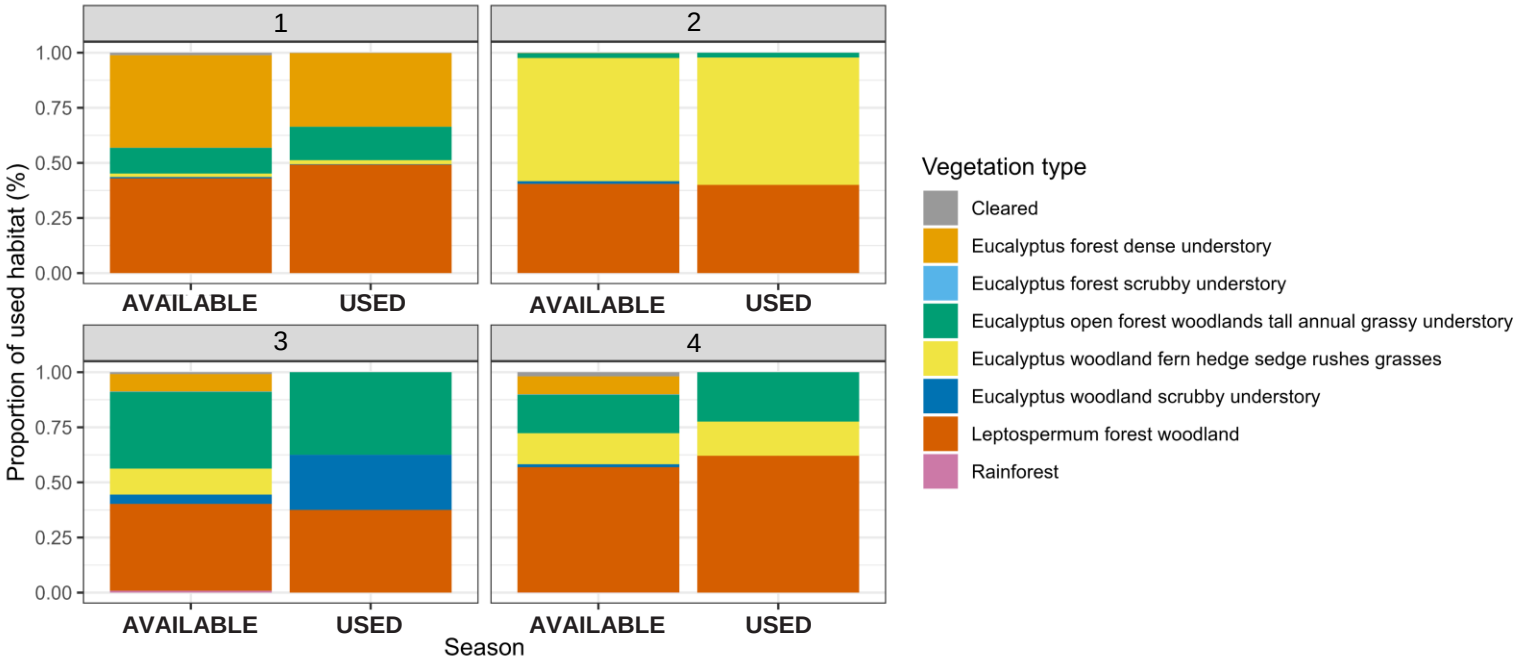
- Forsyth, D. M., Gormley, A. M., Woodford, L., & Fitzgerald, T. (2012). Effects of large-scale high-severity fire on occupancy and abundances of an invasive large mammal in south-eastern Australia. *Wildlife Research*, *39*(**7**), 555-564.
- Legge, S. M., Duncan, D. H., Forsyth, D. M., Giljohann, K., Hogendoorn, K., Hohnen, R., Hradsky. B., & Lintermans, M. (2023). How introduced animals compound the effects of fire on native plants and animals. In S. van Leeuwen (Ed.), *Australia's Megafires: Biodiversity Impacts and Lessons from 2019-2020* (pp. 227 - 242). CSIRO Publishing.

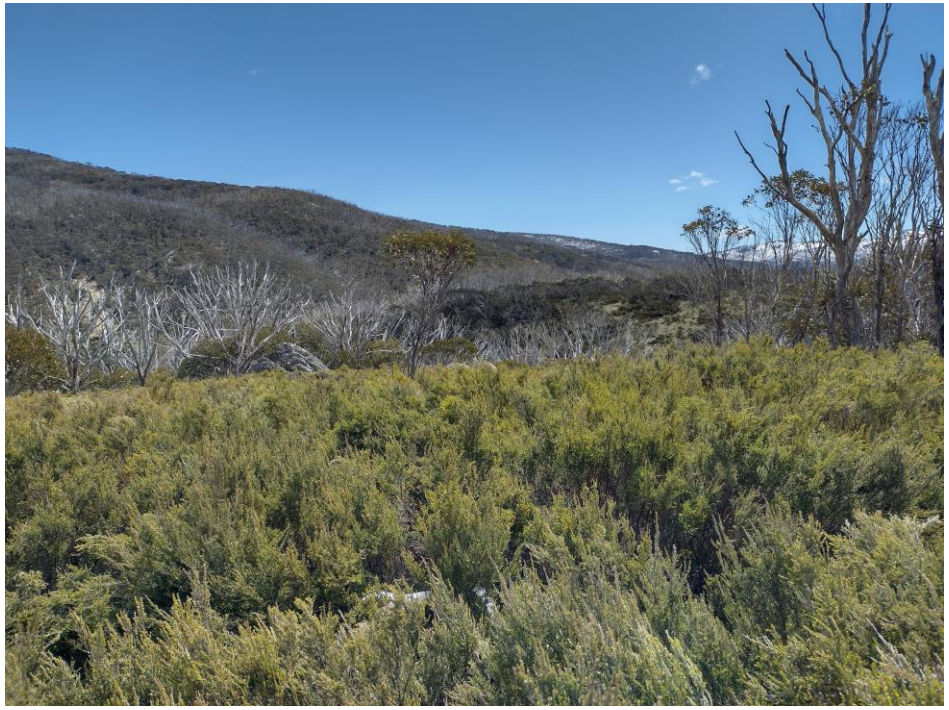
Burn severity preferences

- Sambar deer selected for **low to moderate** and **high severity** burnt areas, compared with unburnt areas.



At-risk vegetation in burnt areas



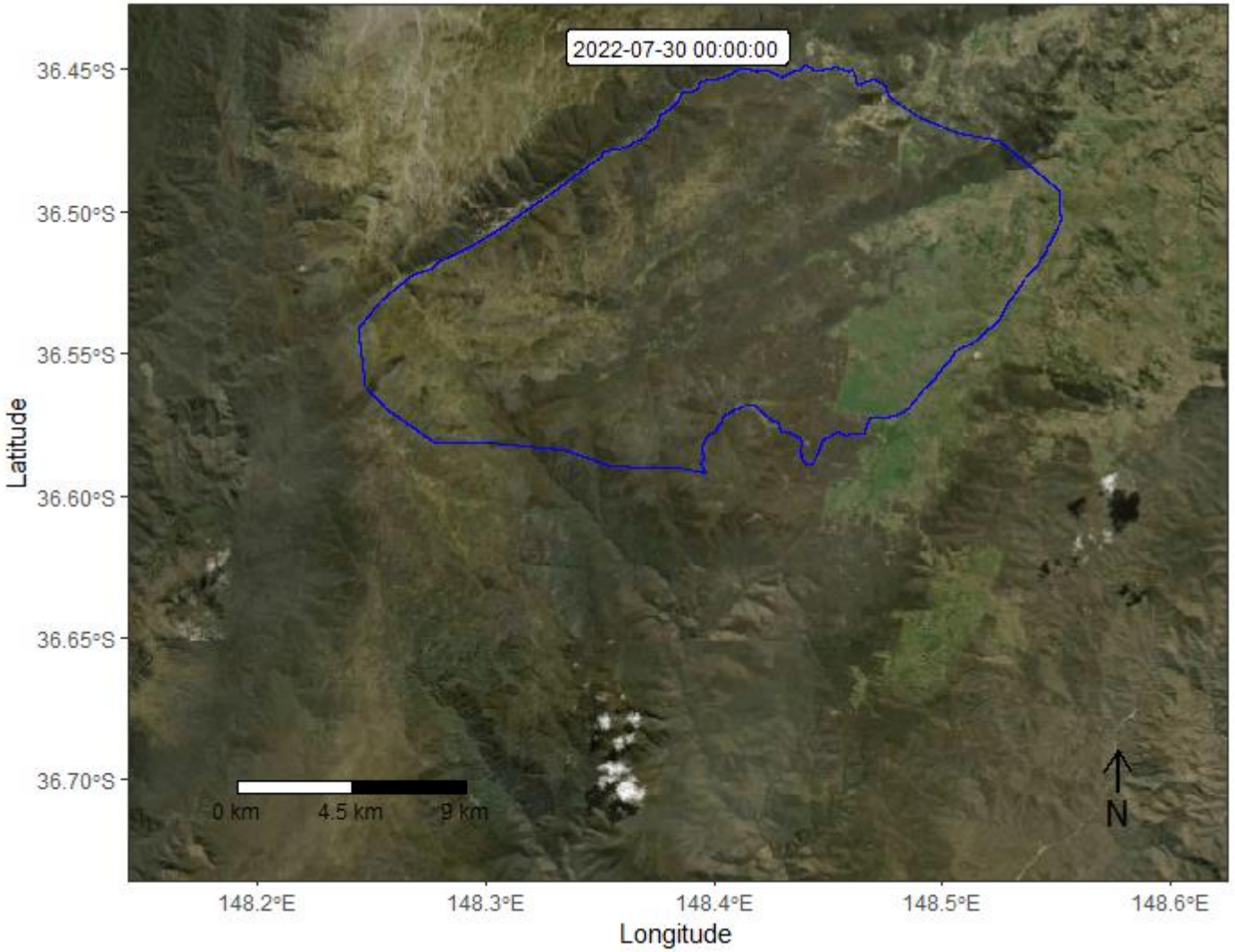


Management Implications

- Control area should be expanded to effectively contain and control deer.
- Control in high elevation sub-alpine national park in summer, control in lower-lying areas in winter.
- We can target specific species by targeting specific habitats and potentially locally eradicate species with small movement ranges (red deer).
- Control should be prioritised in at-risk areas for years after fire.

Acknowledgements

ECOLOGICAL
SOCIETY
OF AUSTRALIA

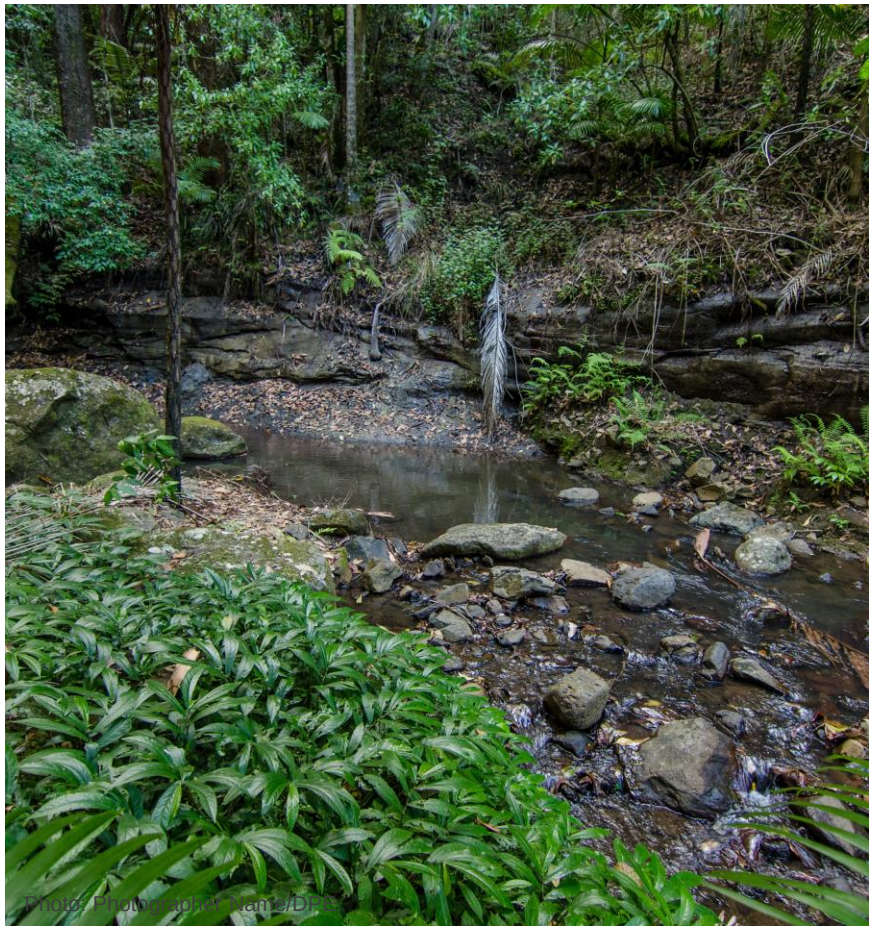

2022-07-30 00:00:00
36.45°S
36.50°S
36.55°S
36.60°S
36.65°S
36.70°S
Latitude
0 km
4.5 km
9 km
N
148.2°E
148.3°E
148.4°E
148.5°E
148.6°E
Longitude

What's next

- Examining drivers of ranging behaviour.
- Deer responses to aerial culling.
- Scavenger responses to aerial culling.
- Examining population genetics of fallow and sambar deer over time.

Photo: Photographer Name/DPE

Alpine bogs



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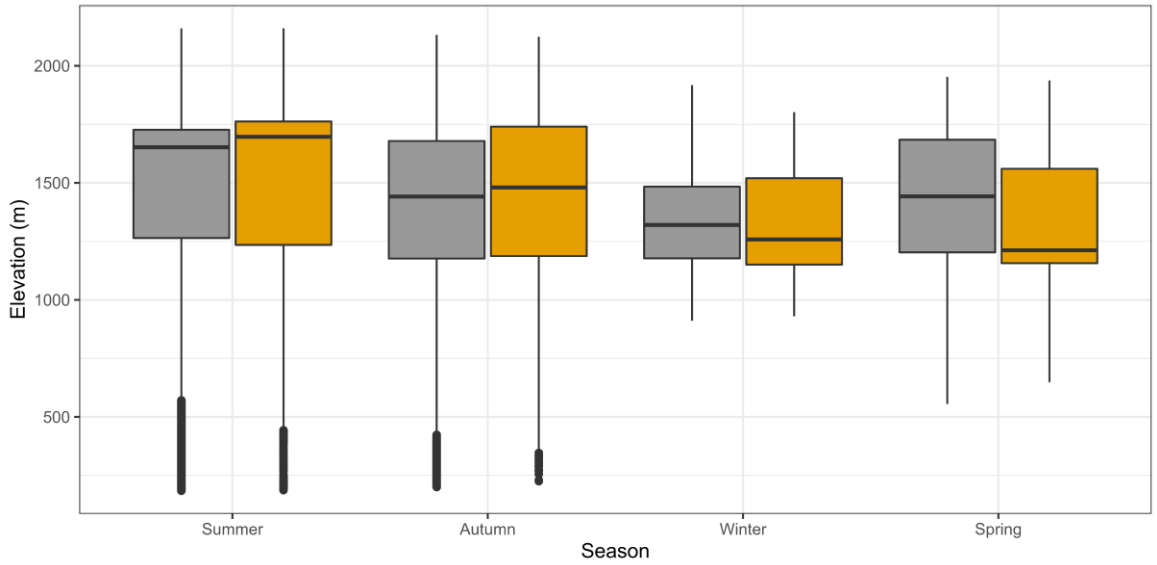
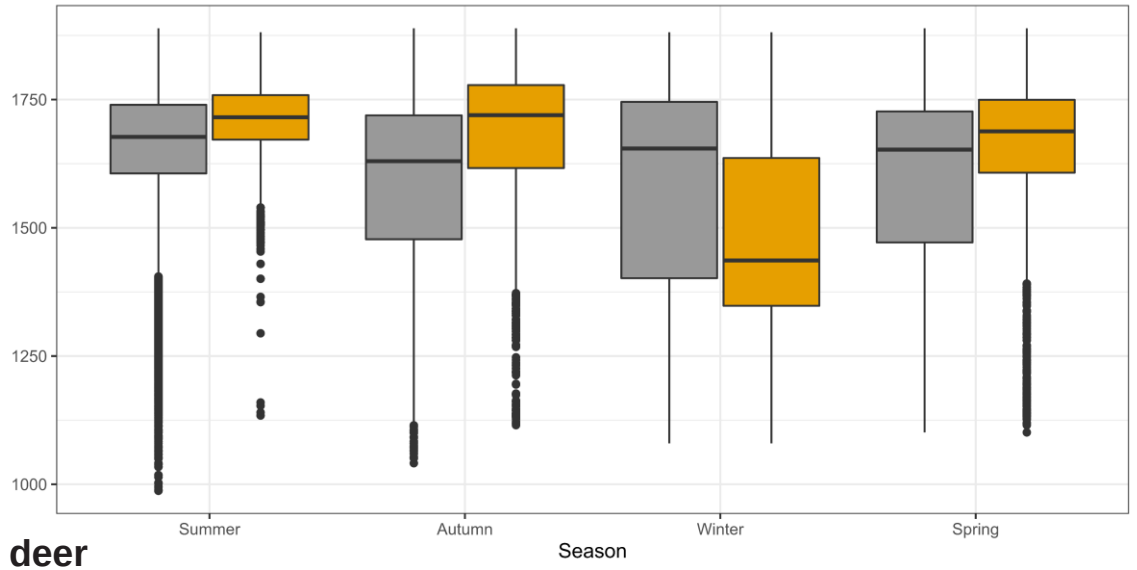
Sika deer (*Cervus nippon*) in New Zealand (Image credit: NZ Safaris)

Pigs (*Sus scofa*) in the USA (Image credit: TX Parks and Wildlife Department)

Fallow deer



Red deer



Sambar deer