



Costs and Effectiveness of Aerial Shooting Operations

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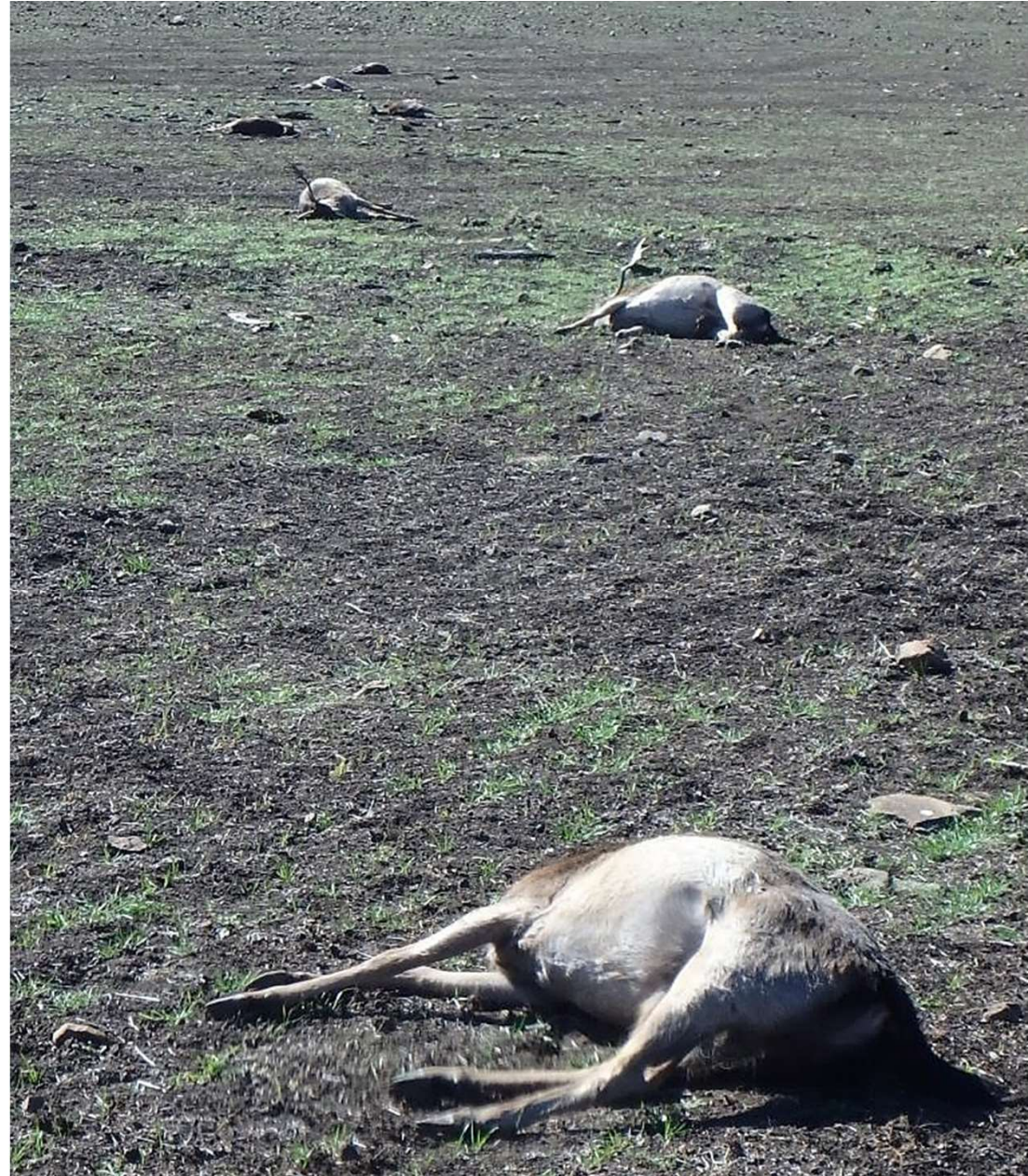


Department of
Primary Industries



Aerial shooting can be a good control tool

- Remove many animals quickly
- Search and kill over large areas



Aerial shooting can also be:

- Expensive
- Logistically demanding
- Highly scrutinised

Local Land services Aerial Pest Control

BUDGET ESTIMATES 2020-2021 Supplementary Questions

93. What is the total number of hours flying time by Local Land Services to undertake vertebrate pest control in 2018, 2019, 2020 and 2021 (to 1 March)?
94. For the calendar years 2018, 2019, 2020 and 2021 (to 1 March) what was the total cost for aerial shooting undertaken by Local Land Services?
95. For the calendar years 2018, 2019, 2020 and 2021 (to 1 March):
 - a) What was the cost per hour for operating the helicopters?
 - b) What was the total fuel cost?
 - c) What was the total labour cost?
 - d) What were the total travel and accommodation costs?
 - e) What was the total cost of ammunition?
96. What were the vertebrate species targeted?
97. How many animals of each targeted species were shot in calendar years 2018, 2019, 2020 and 2021 (to 1 March)?
 - a) What became of the animals that were shot – were they utilised or disposed of in any way?
98. Were any other pest species targeted?

AUSTRALIAN DEER ASSOCIATION

Report into Victorian aerial shooting raises more questions than it gives answers

 ADA EDITOR

How can we optimise our chances of *doing something useful*?*

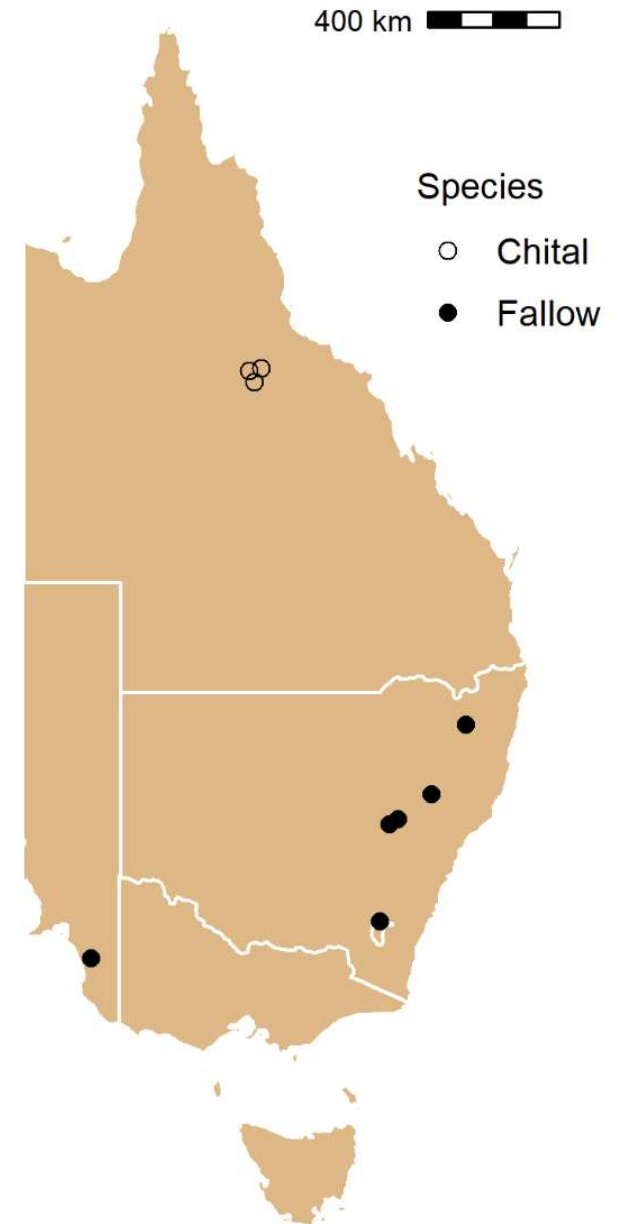
* and defensible

Methods: survey and shoot

- 12 operations, 9 sites, 49 days: fallow and chital
- Aerial survey before shoot

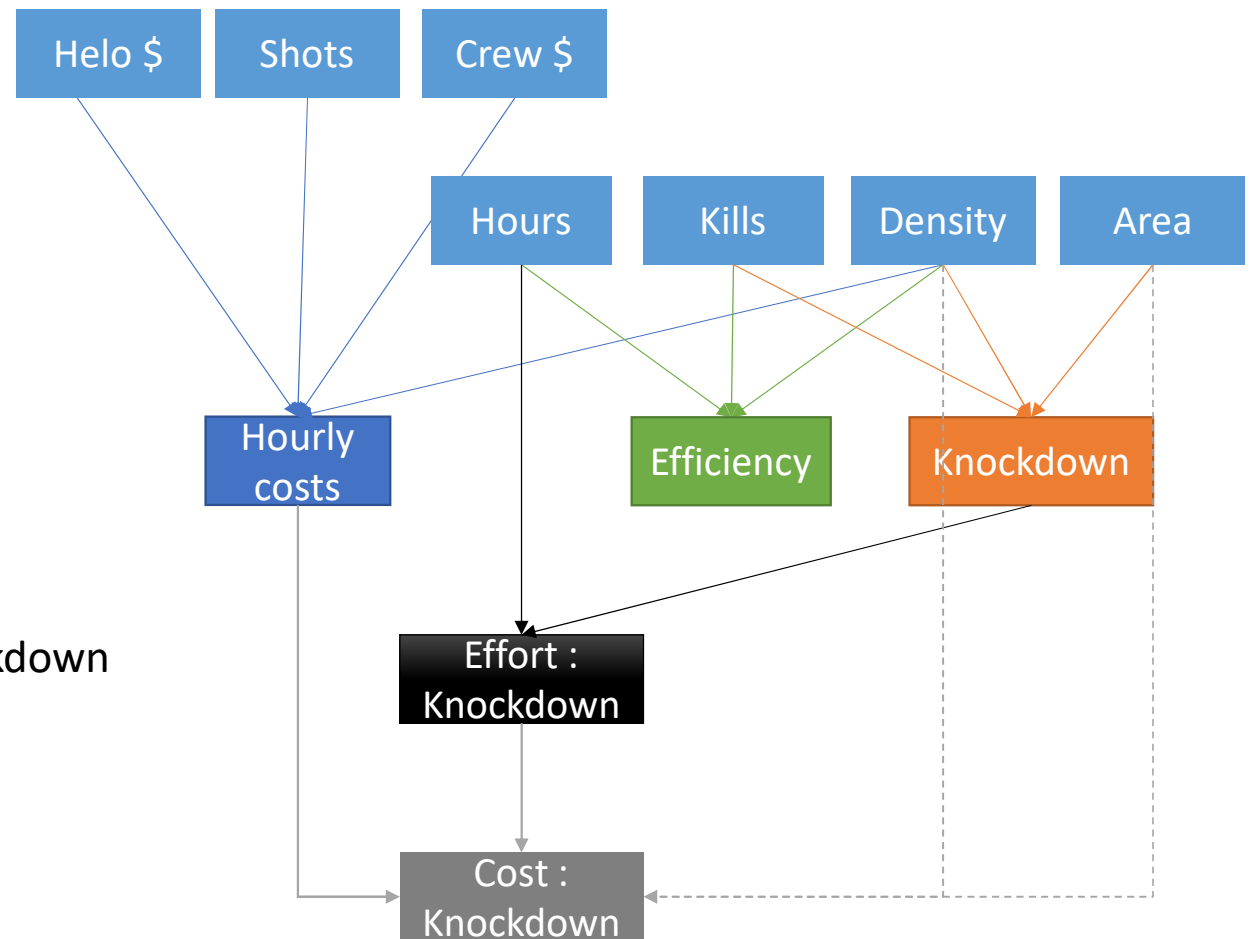


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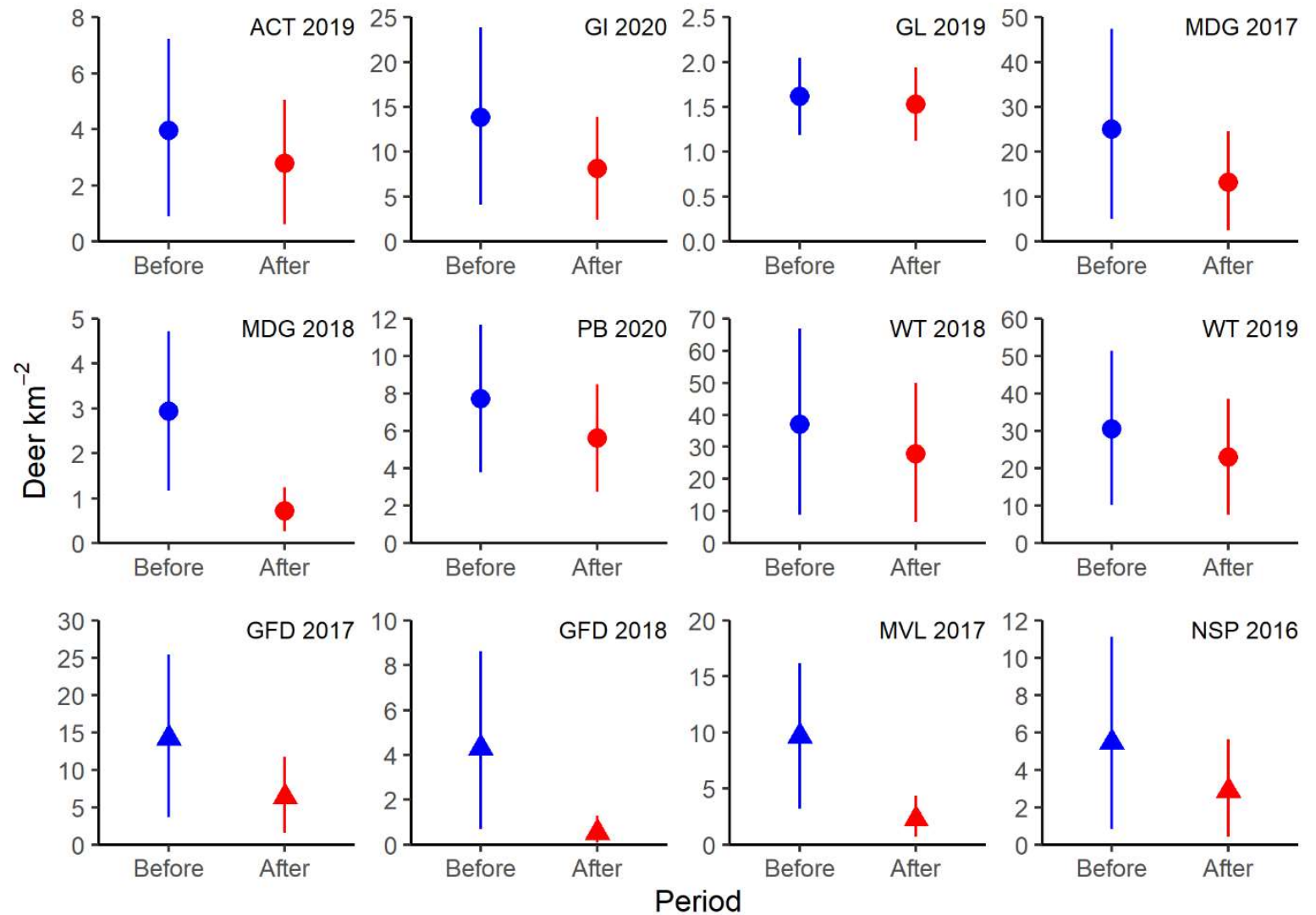
Methods: analysis

- Collect input data, then estimate:
 - Knockdowns
 - Efficiency
 - Hourly costs
 - Effort : Knockdown
- Predict total costs from density and knockdown
- Account for uncertainty



Results: knockdown

- 1.6 : 39.3 deer km⁻²
- 5 : 88% knockdown
- 7 achieved ≥ 35%

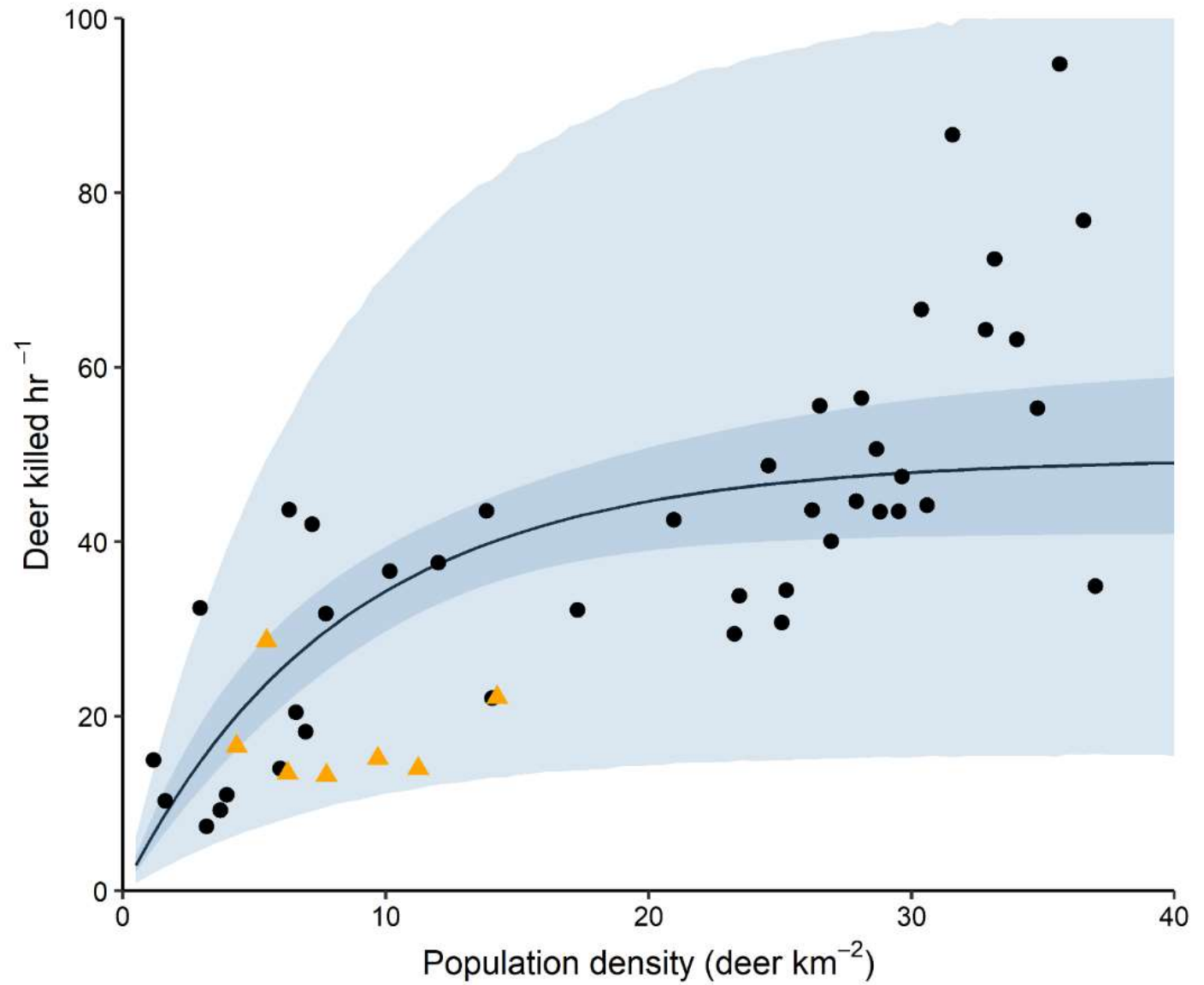


Fallow deer

Chital deer

Results: efficiency

- Max expected kill rate = 50 deer hr^{-1}
- No refuge



Species

- ▲ Chital
- Fallow

Interval

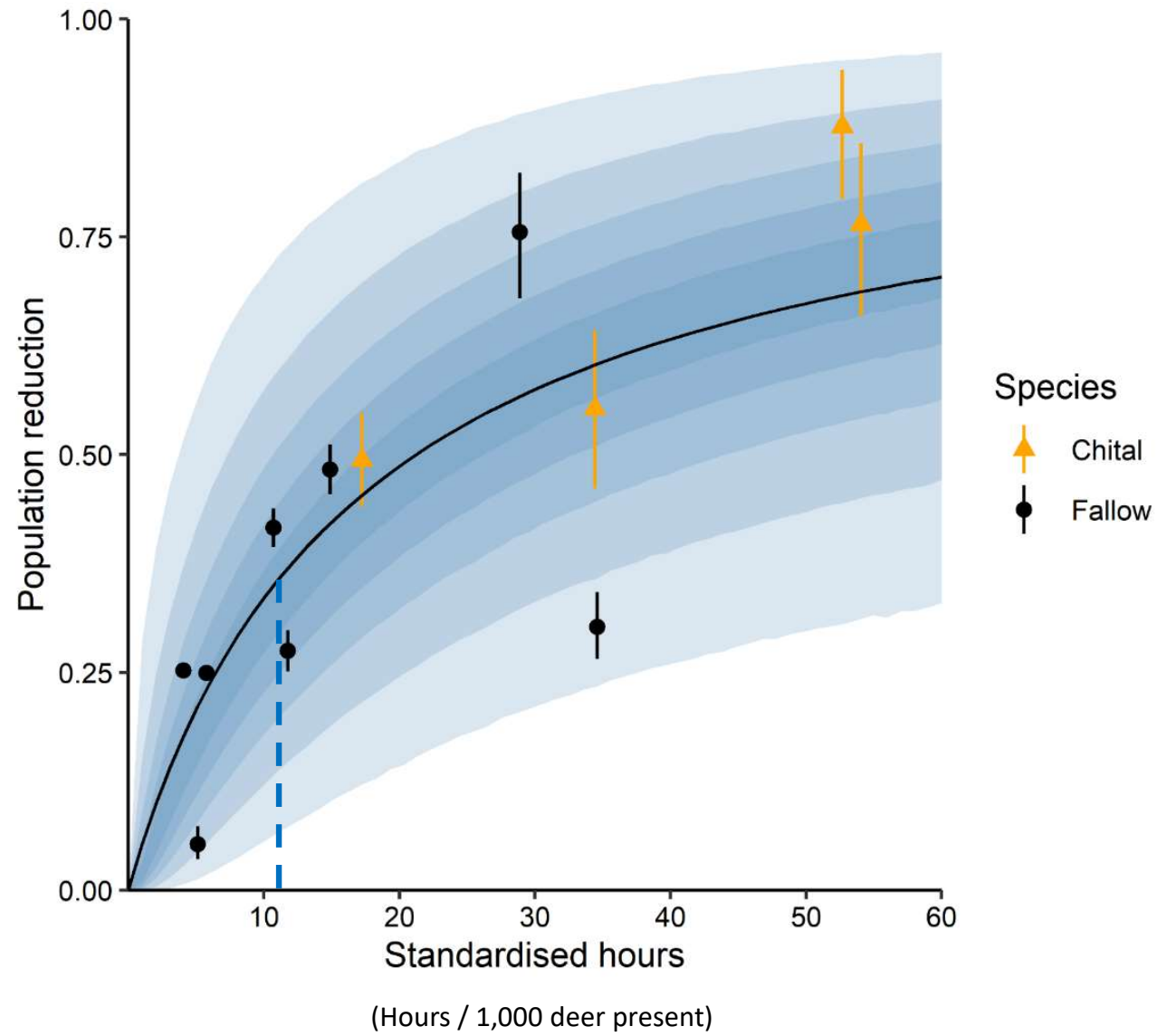
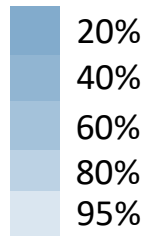
- 95% credible
- 95% prediction

Results: Effort → Knockdown

- Diminishing returns above
 - 18 hrs / 1,000 deer
 - 45% knockdown
- 35% knockdown = 11 hrs / 1,000 deer

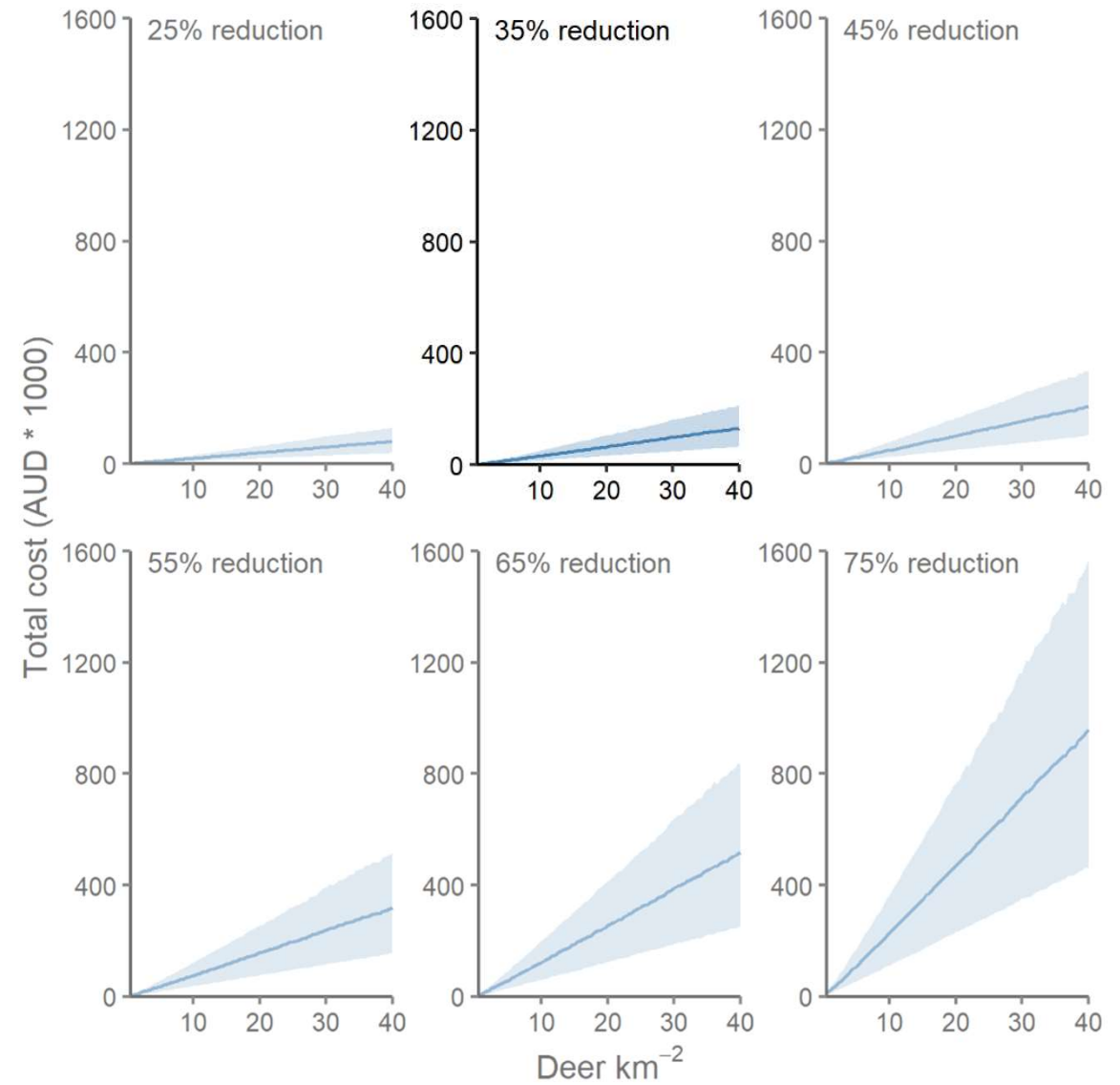


Prediction interval



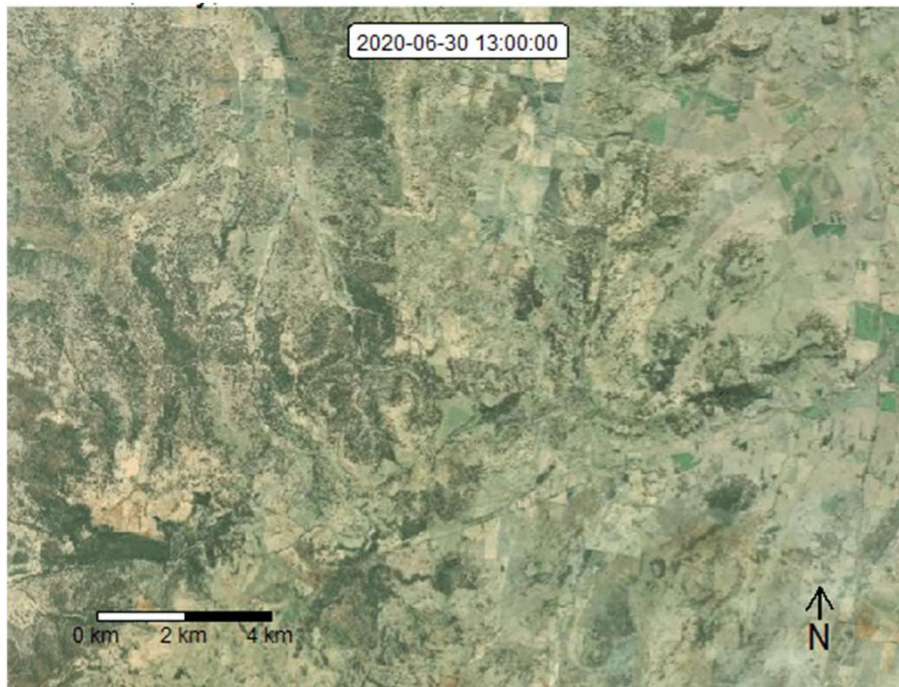
Results: Cost → Knockdown

- Total cost for 135 km² site with Jet Ranger
- Cost increased with deer density
- Slope increased with desired knockdown
- 35% knockdown, 5 to 40 deer km⁻²
= \$15k to \$131k



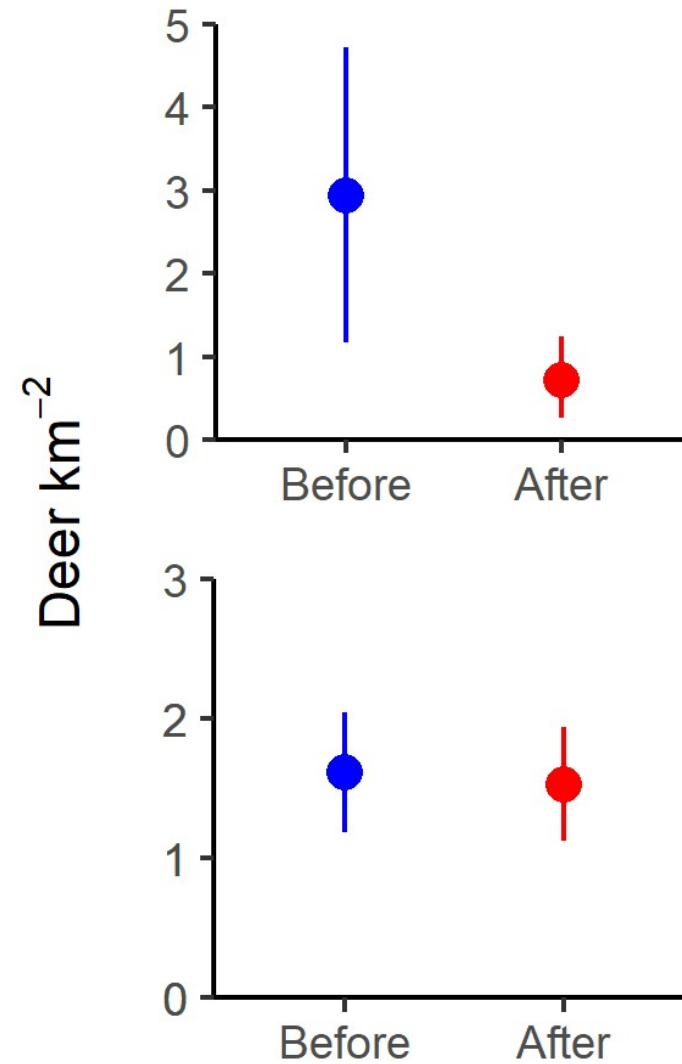
Future work

- 70+ deer collared at 3 sites
- Behavioural response to aerial shooting



Take homes

- Aerial shooting *can* be effective
- Pre-shoot survey to:
 - establish objectives
 - plan for success
 - evaluate results
 - demonstrate best practice



Take homes

- Aerial shooting *can* be effective
- Pre-shoot survey to:
 - establish objectives
 - plan for success
 - evaluate results
 - demonstrate best practice
- Act before density gets too high

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<https://andrewbengsen.github.io/Presentations.html>

