



# Cardinia Deer Management Coalition

## Final Report

### Aerial thermal helicopter survey of feral deer in the Cardinia Creek Catchment area.

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## INTRODUCTION

In response to the rapidly growing deer population and evidence of increasing and widespread damage to our native flora and fauna, in 2019 the Cardinia Deer Management Coalition (CDMC) successfully applied for a \$20,000 grant from the Federal Government's Community Environment Program. The grant allowed the CDMC to commission an Aerial Helicopter Survey of deer in the Cardinia Creek Catchment to gain a better understanding about the numbers, species, and location of deer within the landscape.

The survey identified the scope of the problem and enabled appropriate planning and resourcing of control methods. CDMC members believed this would assist its aim to protect the local environment and ecosystems. In addition, private and primary production properties would benefit from survey results and land care rehabilitation works could be better supported and disruption and damage to our roads should decrease.

This CDMC research project is a 'first' in Victoria, possibly Australia, in that it is a community-managed thermal imaging deer survey, over a large-scale peri-urban, multi-tenure landscape, using high-definition thermal camera, which has been scientifically analysed.

## METHOD

A helicopter using a high-definition thermal imaging camera with a normal video camera mounted above was to fly along straight line transects over a land footprint roughly approximating the Upper Cardinia Creek catchment. The transects were chosen to reflect and capture representative sections of the various habitat types found throughout the area. A total of 35 transects were flown in batches of between 2 to 8, with parallel transects 500 m apart.

The helicopter travelled at variable speed (30-35 knots over dense and 35-40 knots over sparse or open habitat) at an altitude of 220 feet. The flying times of early morning and evening were chosen to maximise the thermal contrast between the heat signature of the deer and the cooler background.

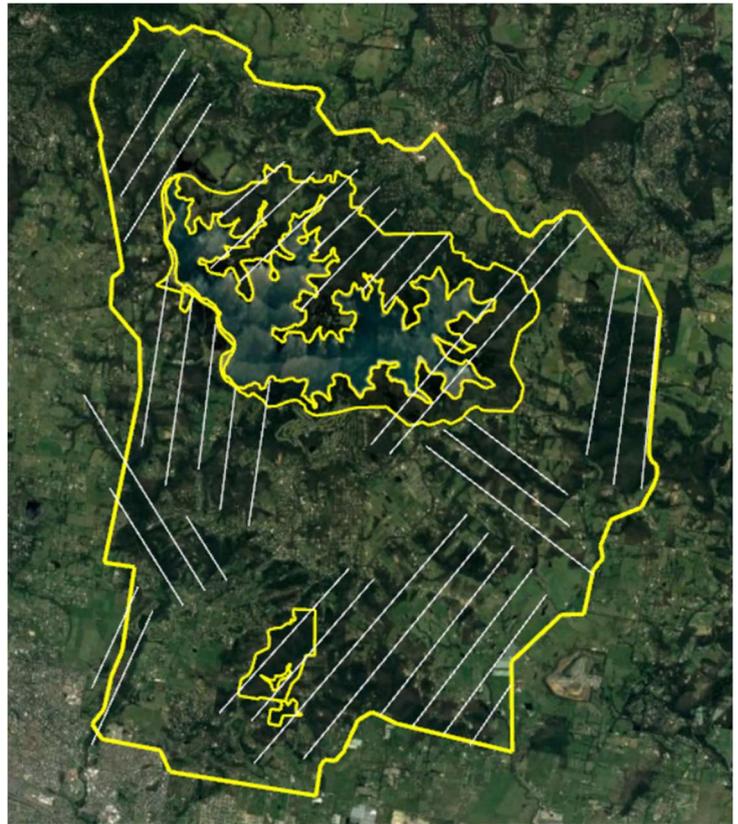
The video results of the survey were then analysed, allowing the precise location of each sighting to be charted and the results interpreted using a distance sampling technique.

## AREA FOR SURVEY TRANSECTS AND MAPPING

Despite COVID 19 delays, the Aerial Helicopter Survey took place in July, 2021. The Heli Surveys crew flew a Robinson 44 helicopter along 35 parallel transects in batches of between 2 and 8, on average 3.5 kilometers long, totaling 115 km of transects.

The transects were 500 metres apart and covered 110 square km<sup>2</sup> from Emerald in the north to Harkaway / Berwick in the south, from Menzies Creek / Belgrave South in the west to Upper Beaconsfield / Officer in the east. This included two water reservoirs, Cardinia Reservoir, and the old Beaconsfield water reservoir, now Beaconsfield Nature Conservation Reserve. See map 1.

The helicopter was equipped with a high-quality thermal imager of high sensitivity, which produced high-definition images. This allowed the mapping of, and differentiation between deer, horses, kangaroos and even a few wild pigs. A video camera mounted on top of the thermal imager provided additional visual footage, enabling further verification of the thermal images.



Map 1: This picture shows flight patterns across the survey area.

## RESULTS

Dr Tarnya Cox, from the Vertebrate Pest Research Unit in the Department of Primary Industries in NSW, a research scientist with many years of experience in deer and deer impact surveys undertook the data analysis. Dr Cox used the internationally established distance sampling method to analyse the numbers. This method is a widely used technique for estimating the density and abundance of biological populations. This research combined the aerial thermal imaging and scientific data analysis to provide an estimate of the deer population size. The estimate helped gauge the level of impact deer have in the catchment, as well as providing the first step towards successful deer management in the region.

Cool weather on the weekend of the flight helped the thermal imager better detect deer. The difference between cold ground and the warm body temperature of the deer helped to identify deer more clearly. The picture below shows the deer as “white” outlines.

The results are quite disturbing with a significantly higher number of deer than the CDMC anticipated. The survey recorded deer on 28 of the 35 transects and there were 79 observations of deer, ranging from 1 to 7 deer with an average group size of 2, which totaled 157 deer identified during the survey. What is extremely worrying, is that the survey identified 15 (+/- 2.3) deer per km<sup>2</sup>, with an abundance of 1653 (+/- 257) deer in the 110 km<sup>2</sup> surveyed area.

## DISCUSSION

This abundance demonstrates the highly detrimental effect deer will have on the biodiversity within the Catchment and the enormous risk for quality of drinking water in the Cardinia reservoir. Also, the results confirm anecdotal evidence from residents living in the Cardinia Creek Catchment that far too many deer exist in the area.



*This picture shows the white outlines of the deer within the catchment*

As Dr Cox, wrote in her report, "The impact of high deer numbers on the area, particularly within the reserve and the water catchment can be expected to be substantial."

Following a suggestion from Dr Ami Bennett, designer of the vegetation survey method we are using (see Vegetation survey article) and who is working with MW to monitor deer and vegetation damage in the Cardinia Reservoir, the CDMC asked Dr Tarnya Cox to separate out the two reservoirs (Cardinia and the old Beaconsfield Reservoir) and to recalculate the figures separately from the total Catchment. The results were again quite disturbing, showing density in those two reservoirs is much higher than the rest of the 110 square kilometres, indicating a density of 29.6 per km<sup>2</sup> (+/- 10.5) and 29.5 per km<sup>2</sup> (+/- 23.4) respectively!

The findings of the CDMC Aerial Survey provide a solid baseline against which to measure the impact of future control programs. Dr Cox suggested "an intensive control program is required to bring this deer population under control and to reduce their impacts on the catchment".

The CDMC has shared these important aerial survey findings with Melbourne Water, Parks Victoria, the Department of Environment, Land, Water and Planning, Cardinia, Casey and Yarra Ranges Councils, and the recently established Peri-Urban Melbourne Regional Partnership Group tasked to develop the deer control plan as part of the Victorian Deer Control Program. The deployment of professional hunters is currently considered by MW to be the best and safest option for large scale deer culling on their land. Private landowners have several options available, including the use of volunteer controllers, and are encouraged to discuss these options with CDMC &/or council.

Melbourne Water has sent briefing notes to agencies and organisations affected and also a 'Community bulletin' to residents around the Cardinia reservoir with explanations of their planned culling program.

The CDMC is very pleased that Melbourne Water has informed us that they are changing their strategy from one of control and management to making the eradication of feral deer within the reservoir their goal. This will be a difficult task, and MW are to be applauded for lifting their sights and aspirations, hopefully becoming leaders in the field of deer control and an inspiration to other authorities to lift their game.

The CDMC Aerial Survey was extremely valuable and came in slightly under budget. With the remaining grant surplus and further financial support from the Cardinia Shire we were able to follow up the helicopter survey with a further thermal imaging *drone* survey of the Beaconsfield Nature Conservation Reserve (using Field Master Systems) which confirmed the high density of deer. This provided an interesting learning experience and comparison of deer numbers. The aerial helicopter survey method involved flying straight line transects at a constant speed, with no allowance for turning back or hovering to verify suspected sightings. The drone however, does not necessarily fly just a straight line, it can slow down, manoeuvre up or down or even double back to verify sightings in thick canopy, allowing a better view of hidden deer.

Thanks to another grant, from Melbourne Water, the CDMC is about to embark on a ground survey to count deer scat and assess damage to vegetation very soon (when COVID allows) using citizen science, allowing the comparison of the different survey methods. This will inform future decision making, whether to deploy a drone or a helicopter which have different advantages and disadvantages, especially in the peri-urban environment.

## CONCLUSION

The CDMC looks forward to collaborating with the development of an appropriate, integrated deer control program across the different authorities and with landowners affected by and who are responsible for the control of deer.

The CDMC is looking for volunteers for ground survey – so any budding or proficient citizen scientists, please contact us at [info@cardiniadeer.org.au](mailto:info@cardiniadeer.org.au) or contact me on 0418 346 895.

For further reading and information please find the two reports attached below.

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