Understanding and mitigating the impacts of deer in riparian zones

Research Note

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Predicting deer density and impact

Model development

- Deer density and impacts on woody vegetation modelled across the Melbourne Water region.
- Models derived from high resolution climatic and spatial data, together with 50 datasets of deer faecal pellet counts (deer density). Comprised of 1,788 transects collated from across Victoria, and targeted surveys of impacts on over 15,000 woody plants.

Findings

- Distance to waterbodies (>10 ha) and woody vegetation cover within 1 km most influential on deer density.
- Deer densities were greatest in close proximity (<1km) to waterbodies and at intermediate to high (40–80%) levels of cover (Fig. 1).
- At low densities, deer impacts increased with only small increases in deer density. At moderate to high densities, the severity of deer impacts were dependent on environmental and landscape context (Fig. 2).

Considerations for management

- Deer are likely to be abundant in the vicinity of large waterbodies due the availability of lush forage and water, and they prefer locations with access to both open and forested habitats (Fig. 3).
- Conflicts occur where the location of high value resources coincides with locations of high deer density and impact such as adjacent to drinking water storage reservoirs.
- To prevent deer impacts, deer densities would need to be maintained at low levels.

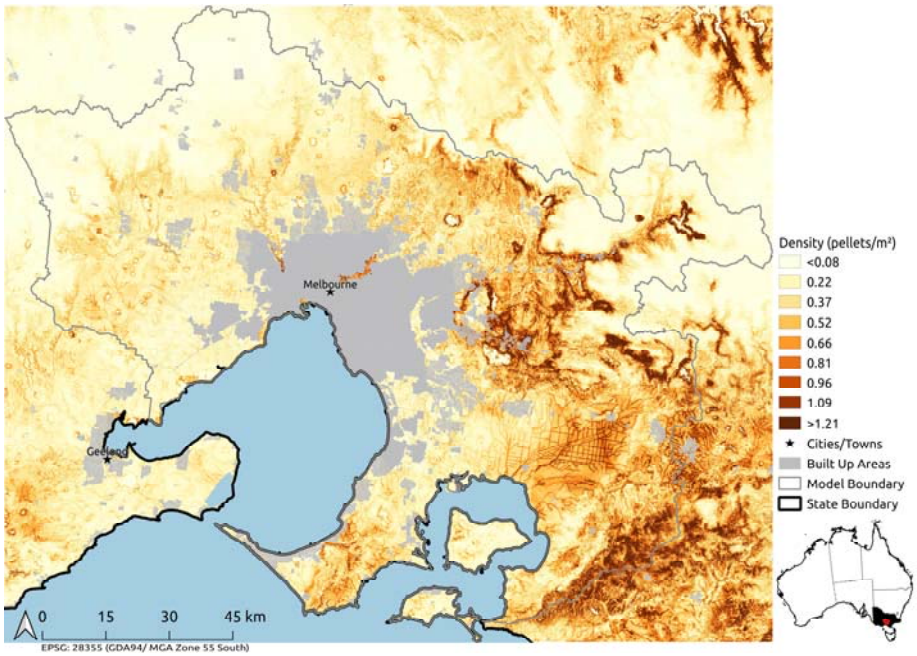

Figure 1: Predicted deer density across the study area.

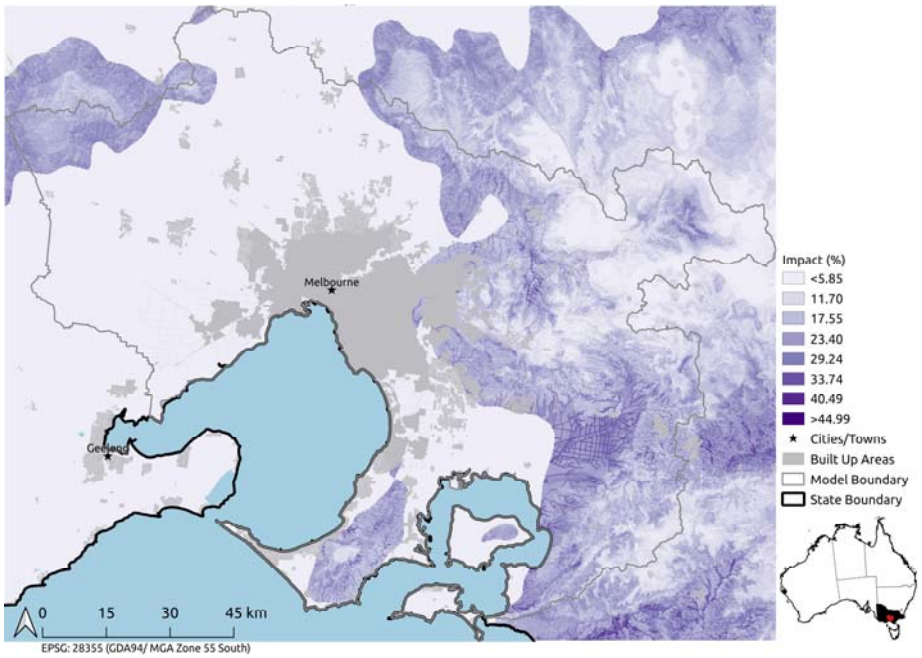

Figure 2: Predicted deer impact (%) to native woody vegetation across the study area, restricted to areas of mean annual precipitation greater than 800 mm.

This is an ongoing research project of the MWRPP. The next phase of the project includes: i) use of LIDAR data to assess associations between deer density and changes in vegetation structure; ii) field assessments of deer density and impacts to the west of Melbourne; and iii) using the model to assess effectiveness of control programs.

Non-lethal mitigation of deer

- Extensive review of literature, examining 49 studies (2000–2020) that describe and evaluate non-lethal methods to deter deer from causing impacts to vegetation or deter deer from using specific locations.

Findings

- Non-lethal methods have no effect on deer population density and consequently, impacts will likely be transferred to other locations.
- Lethal control using ground-shooting can effectively reduce population densities and consequently reduce impacts to vegetation if they are sufficiently resourced. Successful control programs require clear objectives and sustained effort generally over long time frames.
- To reduce deer impacts substantial reductions in deer densities may be required.
- Exclusion fencing remains the most effective non-lethal method to prevent impacts by deer. While applicable to most situations, it is costly, and thus usually limited to small and medium-sized projects.
- Most non-lethal strategies reviewed are only effective over the short-term (weeks) and those that are effective (Table 1), generally reduce browsing impacts but do not mitigate these impacts completely.
- Moderately effective methods include plant guards, companion planting and guardian dogs, although their efficacy depends on low herbivore density, scale of the area to be protected and site context.

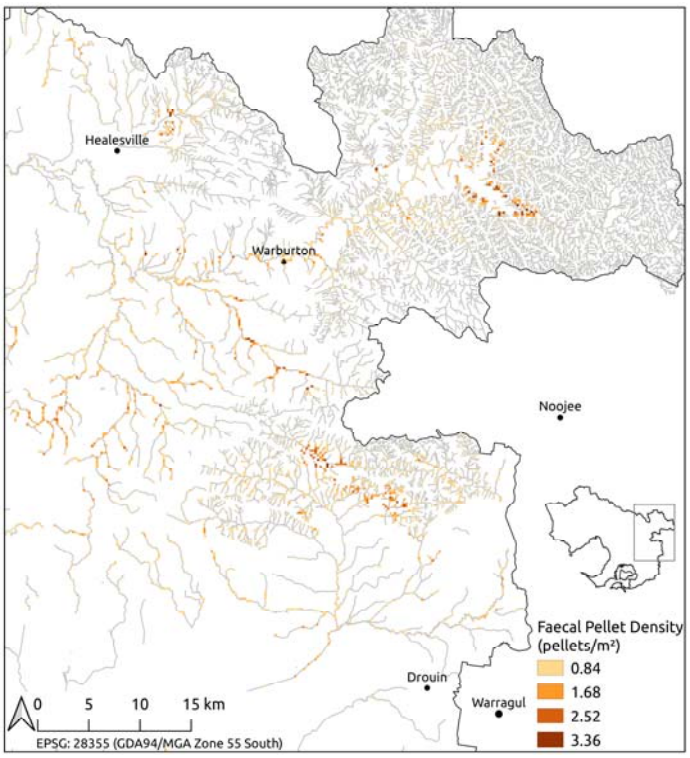

Figure 3: Map of subset of study area with deer density model predictions clipped to Melbourne Water priority waterways (shown in grey) within areas identified as having Strategic Biodiversity Values > 50% by DELWP (waterways shown in colour according to predicted deer density).

All maps can be viewed via Google Earth Engine, contact Joe Greet (greetj@unimelb.edu.au) for details

Table 1. Comparison of method ability to protect vegetation. The density of browsers, available budget, scale and effectiveness at which the method can be expected to perform is categorised relative to other methods, where L=low; M=medium; H=high; VH=very high; Unk=unknown; n/a=not applicable; S=Small; Lg=Large. *applicable in limited circumstances e.g. agricultural settings; **dependent on frequency, intensity and strategy of ground-shooting program. Indicative available budget L=low (<$5000); M=medium ($5000–$10,000); H=high (>$10,000–$100,000); VH=Very high (>$100,000) and scale S=Small (<100 ha); M=medium (100–1000 ha); Lg=large (>1000 ha).

	Efficacy	Deer density	Available budget	Scale	Native herbivore density
Exclusion fencing (high Spec)	H	L-H	H	S-Lg	L-H
Exclusion fencing (low Spec)	M	L	M	S	M-L
Plant Guards	L-M	L	L-M	S-M	M
Companion Planting	L-M	L-M	L	S	M-L
Guardian Dogs	M*	Unk	H	S	Unk
Lethal Control	L-H**	L-H	VH	S-Lg	n/a