



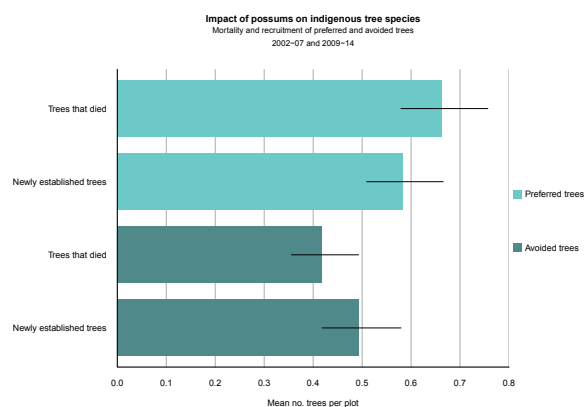
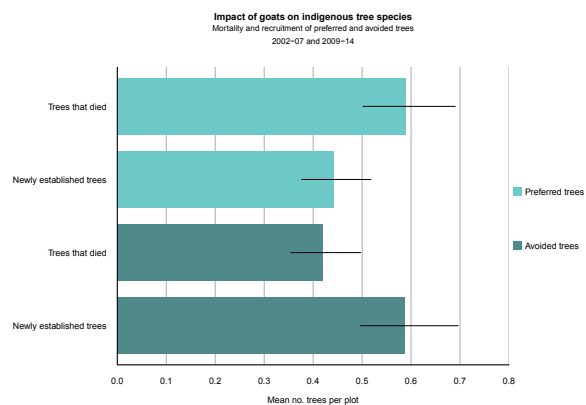
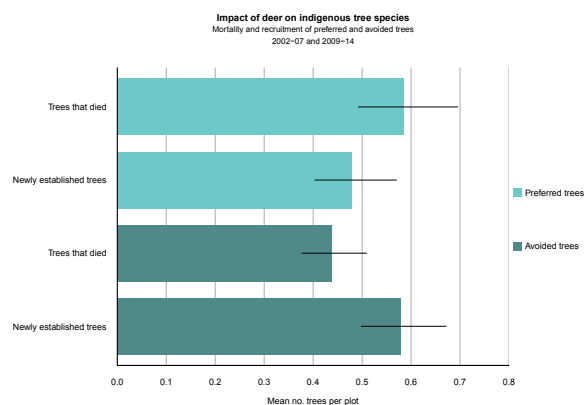
Are populations of tree species consumed by mammalian herbivores in balance across forests on public conservation land?

Summary

Over the last decade, native tree species that are palatable to possums and goats clearly show an imbalance in their populations, with more trees dying than are being replaced. This highlights a national imperative to reduce abundances of possums and goats on public conservation land.

Main findings

- Between two surveys across forests on public conservation land (taking place between 2002 and 2014), goats and possums had a strong effect on the mortality rates of their preferred trees and deer had a moderate effect on the mortality rates of their preferred trees.
- For native tree species that goats and possums prefer to eat, the number of trees that died exceeded the number of newly-established trees.
- For tree species that goats and possums tend to avoid eating, the number of newly established trees exceeded the number of trees that died.
- For tree species that deer prefer to eat, the number of trees that died was slightly greater than the number of newly established trees.
- For tree species that deer tend to avoid eating, the number of newly established trees exceeded the number of trees that died.



Why is this important?

National trends in tree species that are palatable to possums and goats clearly show an imbalance in their populations, with more trees dying than are being replaced. Since this affects forests from their canopies (vulnerable to possums) to their understoreys (vulnerable to possums and goats), this shows the need to reduce these pests to maintain and enhance populations of the tree species at risk. Since species that are avoided by possums and goats show the opposite trend, not controlling introduced browsing animals can result in unpalatable vegetation dominating in some sites, possibly preventing the restoration of palatable plants. Also, plants that possums, deer and goats avoid often have defensive traits (chemical or high fibre content) that result in them decomposing more slowly than other vegetation, which can alter ecosystem processes, affecting other organisms in the forest, from microbes to birds and other plants.

Definitions and methodologies

- This uses information from Measure 5.1.3 (“Representation of plant functional types – palatable species”) assessed across all forests on public conservation land (Tier One systematic national sampling).
- Information about the impact of introduced herbivorous mammals (in particular, goats, possums, and deer) on indigenous trees is assessed from tree mortality and growth records over time. These are used to assess the difference in mortality and recruitment of tree species that are either preferred or avoided by them in forests across New Zealand.
- This information comes from 586 survey plots (20 m × 20 m) distributed across forests on public conservation land throughout New Zealand. Each of these plots was first surveyed between 2002 and 2007. All trees with trunk diameters greater than or equal to 2.5 cm when measured at 1.35 m height (called ‘diameter at breast height’ or DBH) were tagged and identified. The same plots were resurveyed between 2009 and 2014. Any trees present in the first survey but missing from the second were recorded as dead. Any trees not recorded in the first survey but were recorded in the second as having a trunk greater than or equal to 2.5cm DBH were recorded as newly established trees.
- This indicator does not include information on seedlings and saplings that might have been removed by herbivores before reaching the height and size requirements of a new tree as defined above.
- Bar lengths in figures are mean values, error bars denote 95% confidence intervals.

Where can I find more information (links)

Bellingham PJ, Stewart GH, Allen RB 1999 Tree species richness and turnover throughout New Zealand forests. *Journal of Vegetation Science* 10, 825–832.

Mason NWH, Peltzer DA, Richardson SJ, Bellingham PJ, Allen RB 2010 Stand development moderates effects of ungulate exclusion on foliar traits in the forests of New Zealand. *Journal of Ecology* 98, 1422–1433.

http://www.landcareresearch.co.nz/publications/researchpubs/Department_of_Conservation_biodiversity_indicators_2014_assessment.pdf

http://www.stats.govt.nz/browse_for_stats/environment/environmental-reporting-series/environmental-indicators/Home/Land/pest-impacts-indigenous-trees.aspx