# Park level results of Tier 1 monitoring

Design and Evaluation team 2024

## Rakiura National Park

Rakiura National Park is 140,356 ha of public conservation land (PCL), located in the Southern South Island region. It is dominated by indigenous forest and sub alpine shrubland.

Since 2011, DOC has monitored biodiversity at a grid of sites across all PCL, including 23 sites in Rakiura NP. There are also many older monitoring plots in the Park.

Table 1: Dominant landcover in Rakiura National Park

| LCDB5_Name_2018 | area_ha |
|---|---|
| Indigenous Forest | 63,052 |
| Sub Alpine Shrubland | 31,512 |
| Manuka and/or Kanuka | 21,962 |
| Broadleaved Indigenous Hardwoods | 11,963 |
| Tall Tussock Grassland | 5,864 |

Context: https://lris.scinfo.org.nz/layer/104400-lcdb-v50-land-cover-database-version-50-mainland-new-zealand/

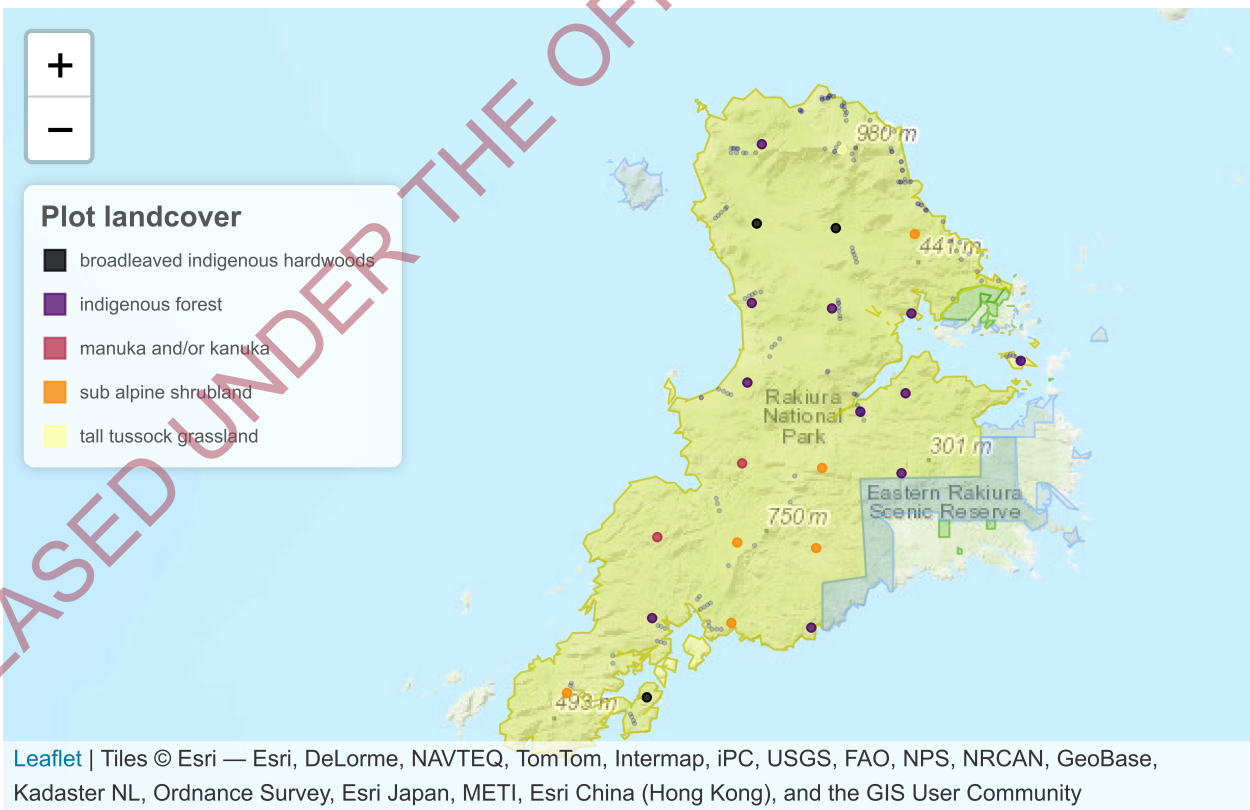



Figure 1: Location of Tier 1 and NVS monitoring plots within Rakiura National Park



Department of Conservation
Te Papa Atawhai

New Zealand Government

# National monitoring of terrestrial biodiversity

The national biodiversity monitoring programme includes nearly 1,400 sites set on an 8km grid. Approximately 280 randomly chosen sites were measured each summer (September - May) so that each site was remeasured on a 5-year rotation.

A lot of data is collected at each site: staff tag and measure tree stems, count saplings and seedlings, and record the cover of every plant species in a 20x20m plot. Ungulate (deer, goat, chamois, thar and sheep) pellets are counted on transect lines radiating from the plot. Bats, birds, and possums are also monitored.

However, this programme was not designed to monitor individual parks. We may be able to detect strong, consistent patterns, but the small number of sites could be misleading. To accurately report on local areas requires more monitoring, designed at the right scale.

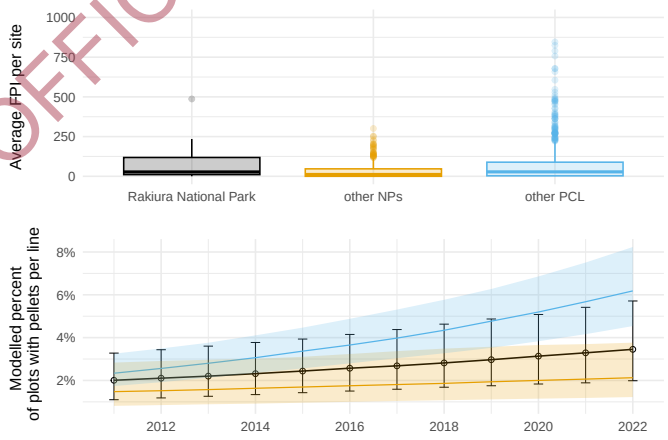
This report uses two types of graph to show results. *Box and whisker* graphs compare different groups of sites. For each group, the median (horizontal line) is shown inside the middle 50% of observations (box) and range (vertical lines), as well as outliers (dots). *Line* graphs show results from models to estimate trend in Rakiura National Park, considering national context.

# Spread and dominance of exotic species

## Ungulates

Deer and other ungulates were measured by counting faecal pellets in 30 plots along 150m-long lines. There are four lines at each site. The number of pellets per line is an index of relative abundance which has been correlated to deer density (Forsyth et al. 2007) and helicopter counts of goats (Forsyth, MacKenzie, and Wright 2014).

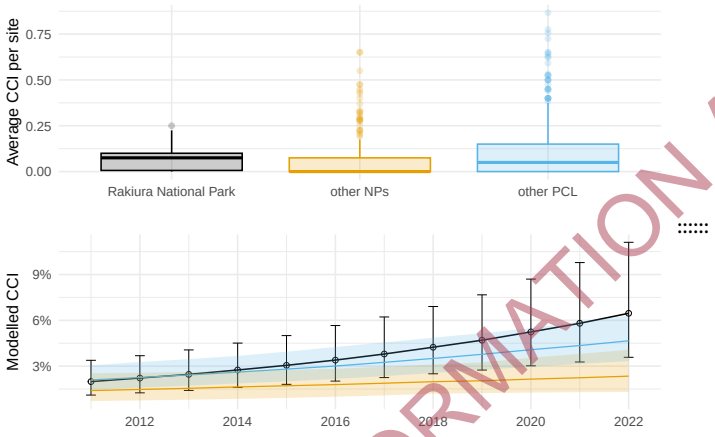
The top graph to the right shows average FPI for the lines at 23 sites in Rakiura National Park as well as the range of scores recorded elsewhere (over 1000 pellets were counted at 2 sites, these are not shown). The lower graph shows estimated trend in FPI at Rakiura NP as well as nationally.



## Possums

Possums were measured by checking for chew or scratch marks on 10 baited cards left overnight on 200m-long transect lines. There are four lines at each site. The percent of marked cards is an index of relative abundance, which is correlated to trap catch (Gormley et al. 2015).

The upper graph to the right shows average chew card index (CCI) per line at 22 sites in woody vegetation Rakiura National Park as well as the range of scores recorded elsewhere. The lower graph shows estimated trend in CCI at Rakiura NP as well as nationally.

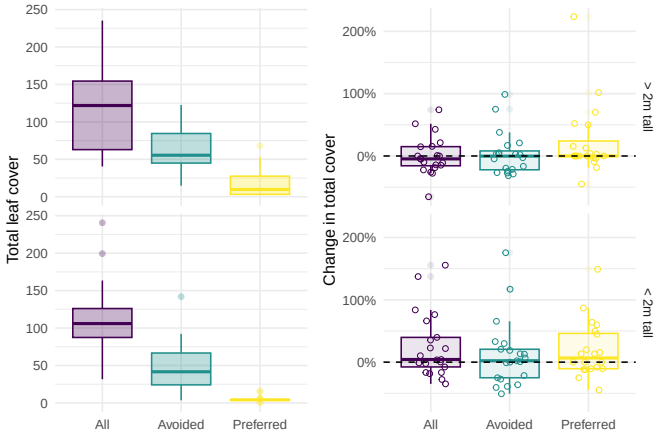



# Maintaining native ecosystems

Browsing mammals like possums and deer choose to eat some plants over others, which can change forest composition and structure. The effect of deer and other ungulates is strongest in the layers of vegetation which they can easily reach, but - over time - selective browsing can affect plants' growth into taller tiers of forest. The data shown here is grouped according to whether the plant species is a preferred, not selected or avoided food for ungulates (Forsyth et al. 2002). Palatability is not known for all species.

## Forest composition

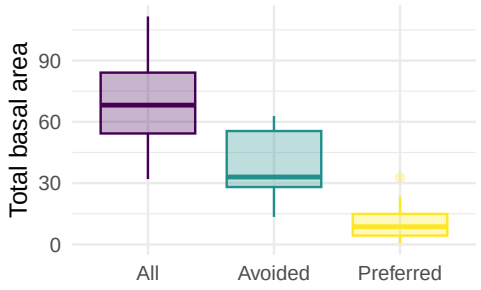
Forest composition was measured by scoring each species' leaf cover in six height tiers. Different plants may overlap within each tier, giving total cover over 100%. Here, scores are combined for the two tiers that are most vulnerable to browse (0 to 2m) and for the four higher tiers (over 2m).
The top graph shows total cover of plants overall and for two palatability groups, from the most recent measurements of 22 plots in Rakiura NP. The lower graph shows how cover changed since the last measurement 4 - 6 years before. Each circle represents a plot: those below the line had less plant cover than before, those above the line had more cover.

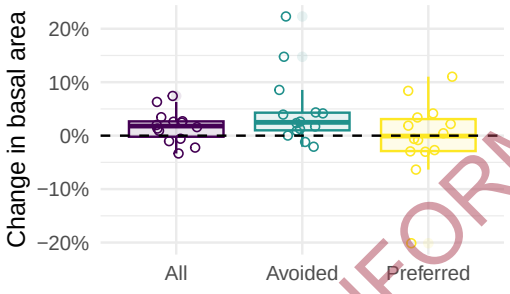


## Dominant trees

The basal area of trees indicates different species or groups' dominance of the canopy tier. The left graph shows overall basal area, and totals for groups of known palatability to ungulates at 14 tall forest plots in Rakiura NP. The right graph shows the percentage change in basal area since the measurement 4 - 6 years before. .

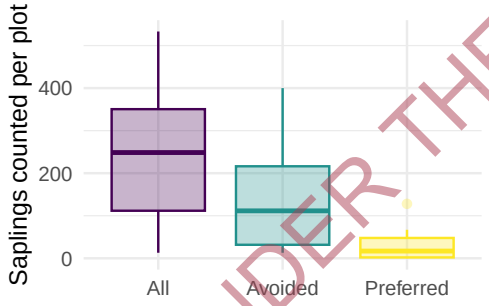
We also modeled annual rates of change after the methods of Duncan, Ruscoe, and Holland (2010), and found no significant rate of change .

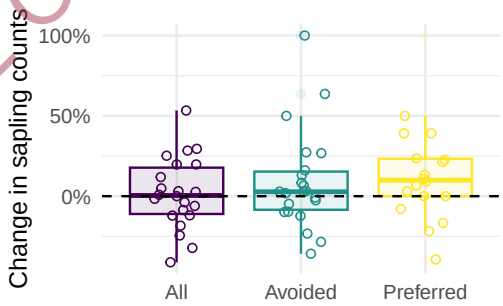


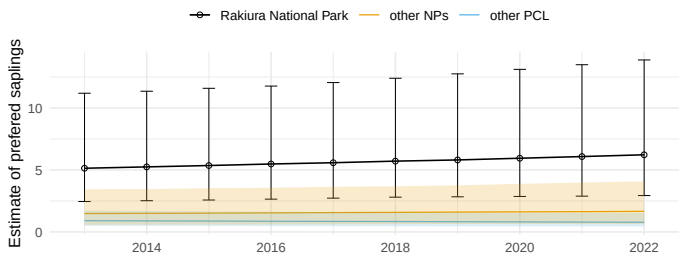

## Sapling counts and trend in palatable saplings

The count of saplings per 20x20m plot shows the density of young trees and smaller woody plants in the forest. Grouping saplings according to palatability can show whether deer browse affects the composition of that tier. The left graph shows total count of saplings in each palatability group, from the most recent measurements of 22 plots in Rakiura NP. The right graph shows how counts changed since the last measurement 4 - 13 years before. .




We also modeled trends in palatable sapling counts after the methods of MacLeod, Mason, and Richardson (2024). As this graph shows, there was an insignificant, increasing trend for counts of preferred saplings at Rakiura National Park.



## More information

Visit https://www.doc.govt.nz/our-work/monitoring-reporting/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Gormley, Andrew M, David M Forsyth, Elaine F Wright, John Lyall, Mike Elliott, Mark Martini, Benno Kappers, Mike Perry, and Meredith McKay. 2015. "Cost-Effective Large-Scale Occupancy–Abundance Monitoring of Invasive Brushtail Possums (*Trichosurus Vulpecula*) on New Zealand's Public Conservation Land." *PloS One* 10 (6): e0127693.

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