DOC ranger on a monitoring transect to measure deer impact in mountain beech forest north eastern Ruahine. *Photo: Lara Wilcox*

Wild animal monitoring - Ruahine Forest Park

Indicators of wild animals and impact on the forest understory

DOC monitored Ruahine Forest Park in the 2023 field season as part of its wild animal management programme.

Ungulates (including deer and goats) were monitored with the faecal pellet index (FPI), which is based on counting the number of ungulate faecal pellets in plots on a 150 m transect (details in the Glossary at the end of this report). Pellet counts give a coarse index of ungulate relative abundance (Forsyth et al. 2022).

The Seedling Ratio Index (SRI) compares plant occurrence in two height tiers to determine if seedling growth is restricted by browsing. Ungulates mostly browse plants between 30 cm and 2 m tall. Shorter plants are assumed to represent the potential, natural, forest understory. SRI ranges from -1 (no tall plants) to +1 (only tall plants). It is usually above 0 in forest without ungulates and becomes more negative as animal abundance increases (Sweetapple and Nugent 2004).

Observers recorded plant species present in two height tiers in plots on transects from 180 to 400 m long. From this, we calculated SRI for species groups of similar palatability. The group that ungulates prefer to eat is more likely to have restricted growth than the group that ungulates avoid eating. Observers also recorded ungulate browse (details in Glossary).

DOC monitored 20 SRI and FPI transects (Figure 1). It would have been ideal to sample more, to fully represent this range.

Key findings

SRI monitoring found that taller, palatable, plants were very rare, but avoided plants were quite common, indicating ungulates may have affected forest composition. There was a significant difference between palatability groups overall sites.

Across 342 plots on 20 transects, preferred seedlings were recorded 113 times and only 32 were over 30cm tall.

Faecal pellet counts indicated relatively high numbers of ungulates.

Department of Conservation
Te Papa Atawhai

Te Kāwanatanga o Aotearoa
New Zealand Government

About this site

Transects were in forested areas of the Ruahine Forest Park (Figure 1). This is a diverse environment of lowland podocarp-broadleaf forest, mid altitude kamahi and beech forest, and high altitude mountain beech or pahautea forest. Over large areas, the original canopy has collapsed and been replaced by shorter shrubland.

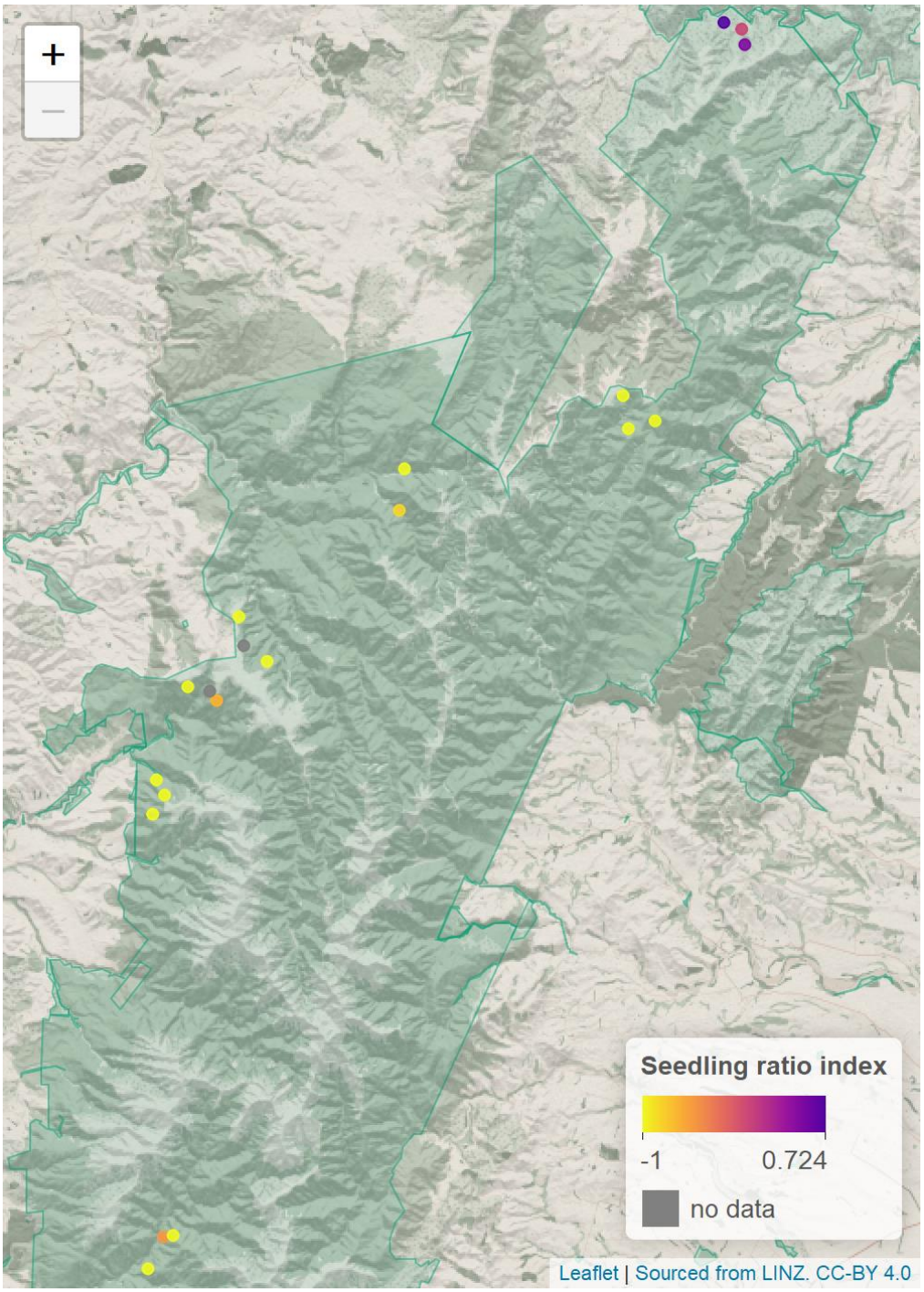

Figure 1: Location of transect start points coloured by preferred species Seedling Ratio Index. FPI transects started at the same point. A more negative value indicates fewer tall plants. No data means that no preferred plants were recorded

Results

Faecal pellet index

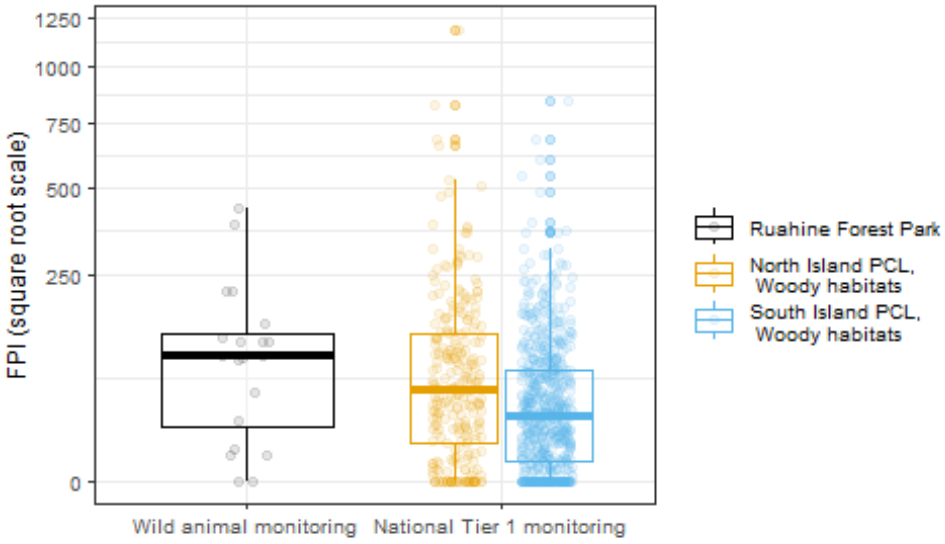

Figure 2: Faecal pellet indices from Ruahine FP relative to indices from the most recent measurement of Tier 1 sites, which represent all public conservation land in Aotearoa NZ. This scale is non-linear, to help show the differences in medians (thick lines)

FPI scores were high relative to results from DOC's national Tier 1 monitoring programme (Figure 2) and there was a clear impact on understory vegetation.

Seedling ratio index and browse score

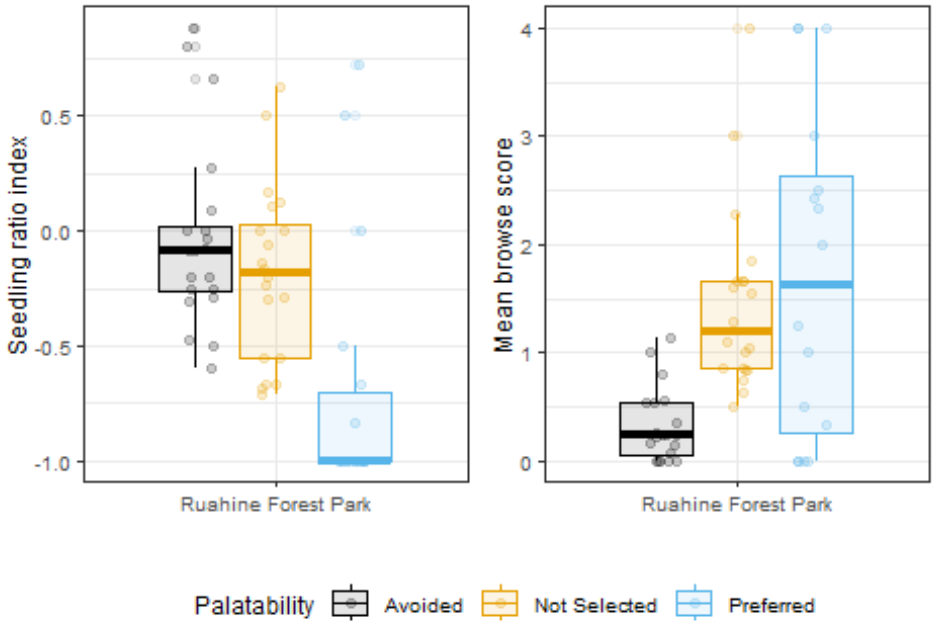

Figure 3: Range of SRI and browse scores at monitored sites. A higher SRI indicates more tall plants in the understory; a hig her browse score indicates more damage.

SRI was nearly always -1 and there were 2 transects where it could not be calculated for the preferred group, because no plants of any height were recorded.

Higher browse scores were recorded for preferred and not selected (eaten but not sought out) plant species, and lower scores on avoided species (Figure 3). A score of 1 means that up to 25% of shoots were browsed, a score of 2 means 25-50% of shoots were browsed.

Relationships between indicators

In addition to comparing results between sites, we checked if the different indicators of wild animal impact (pellets, browse and seedlings) show the same patterns, as more evidence that understory plants were affected by wild animals. Unexpectedly, there was:

- No correlation between SRI and browse scores.
- No correlation between browse scores and FPI.
- No correlation between SRI and FPI.

More information

Glossary

Browse scores are the average of scores recorded for every species with live foliage from 15 cm to 2 m at each plot on an SRI transect (see below). Scores are recorded on a scale from 0 (none) to 4 (severe browse). This report uses the transect average for for plants grouped by palatability to ungulates.

Faecal pellet index (FPI) is derived by counting the number of faecal pellets in 30 1m radius plots along a 150 m-long transect. The total number of pellets counted per transect is an index of relative abundance. Pellet counts are often used to monitor ungulate abundance and have been shown to be correlated to known population size (Forsyth et al. 2007).

Seedling Ratio Index (SRI) is derived from records of plants present in two height tiers (short: less than 30 cm, or tall: 30 cm to 2 m) in 20 plots on a 400 m transect. It is the ratio of the difference between the number of tall and short plant records to the total number of both tall and short plant records:

$$SRI = \frac{\sum_{tall} - \sum_{short}}{\sum_{tall} + \sum_{short}}$$

Ungulate is the collective term for a group of browsing mammals including deer, goats, tahr, chamois and sheep. Faecal pellets from these mammals cannot be easily told apart and so are aggregated into the group ‘ungulates’. Pigs are also ungulates, but counted separately because their dung is easily identified.

References

Forsyth, David M, Richard J Barker, Grant Morriss, and Michael P Scroggie. 2007. “Modeling the Relationship Between Fecal Pellet Indices and Deer Density.” *The Journal of Wildlife Management* 71 (3): 964–70.

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Sweetapple, Peter J, and Graham Nugent. 2004. “Seedling Ratios: A Simple Method for Assessing Ungulate Impacts on Forest Understories.” *Wildlife Society Bulletin* 32 (1): 137–47.