



**Date:** 17<sup>th</sup>, August 2015

**To:** Rod Smillie

**From:** Amy Hawcroft

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## Deer in Ruahine Forest Park

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This memo summarises available pellet count data from:

- New Zealand Forest Service survey lines established in the late 1970s and 1980s
- National Monitoring System 'Tier 1' terrestrial sampling stations established from 2010 to the present

To describe trends in deer abundance and current abundance relative to (i) similar North island conservation lands and (ii) the national range of feral ungulates.

### Background

This extract from a 2009 report (Hawcroft 2009) summarises the history of deer numbers in Ruahine Forest Park:

Red deer have occupied the Ruahines since about 1900, and numbers were high by the 1920s (Cunningham 1979). Deer appear to have reached higher densities in the northern part of the range and spread south more slowly. By 1935 deer were seen along the tops from Kereru to the Ngamoko Range (Elder 1965). In the early 1960s, the vegetation of the Pohangina catchment showed evidence of severe animal damage in the early 1960s (Cunningham 1971). Goats were common in the southwestern Ruahines in the 1950s and 1960s but were only occasionally observed in surveys in 1971, 1976 and 1983 (James and Beaumont 1971, Cuddihy 1977, Oaks 1983). There is an ongoing goat control operation to maintain current very low densities of goats in the area (DOC PestLink Database accessed June 2009). There have been occasional reports of other deer species in the area but there are not thought to be permanent populations of any species other than red deer.

Deer control began in 1938 and numbers dropped rapidly, especially in the northern part of the range where food was scarce. By the 1950s there was some evidence of vegetation recovery in this area. However, numbers were still increasing in the Southern Ruahine (Elder 1965). The Forest Service undertook widespread (all catchments from Whakarekau south) shooting from helicopters in 1972–1978, which further reduced deer numbers (Oaks 1983). For example, in the Tukituki catchment, kills per hunter day dropped from 1.28 in 1959-60 to 0.42 in 1973-74 (Austin 1975). Commercial helicopter hunting began in 1975 and also contributed to the decline (Oaks 1983). Since 1981, helicopter hunting has not been permitted in the Pourangaki, Mangawhakariki and Oroua catchments, and all catchments to the south of Takapari Rd (ibid).

This summary fits the trend in deer abundance reported by Forsyth et al (2011): peaks in the 1950s and 1960s, declining to the 1980s. Forsyth et al show that nationally counts remained low in the 1990s, with some evidence of an increase in the 2000s.

## Methods

The New Zealand Forest Service surveyed river- ridge transects across the entire Ruahine Range in 1982/1983. Ten to twenty of the 1983 pellet transects have been measured annually since 2000, in sets selected randomly within the catchment boundaries mapped in 1983 (Appendix 1). The start and end points of each line were marked with permolat and line locations were recorded in a diagram and with grid references. Plots are located at 20m intervals along transects. Observers recorded the presence/absence of animal pellets in a plot with radius of 1.14m (at least 1 deer pellet, meeting certain intactness criteria, other animal pellets - goat, sheep, hare, possum and pig - may be recorded in any condition). Information about habitat: slope; altitude; aspect; vegetation type and physiography were also recorded.

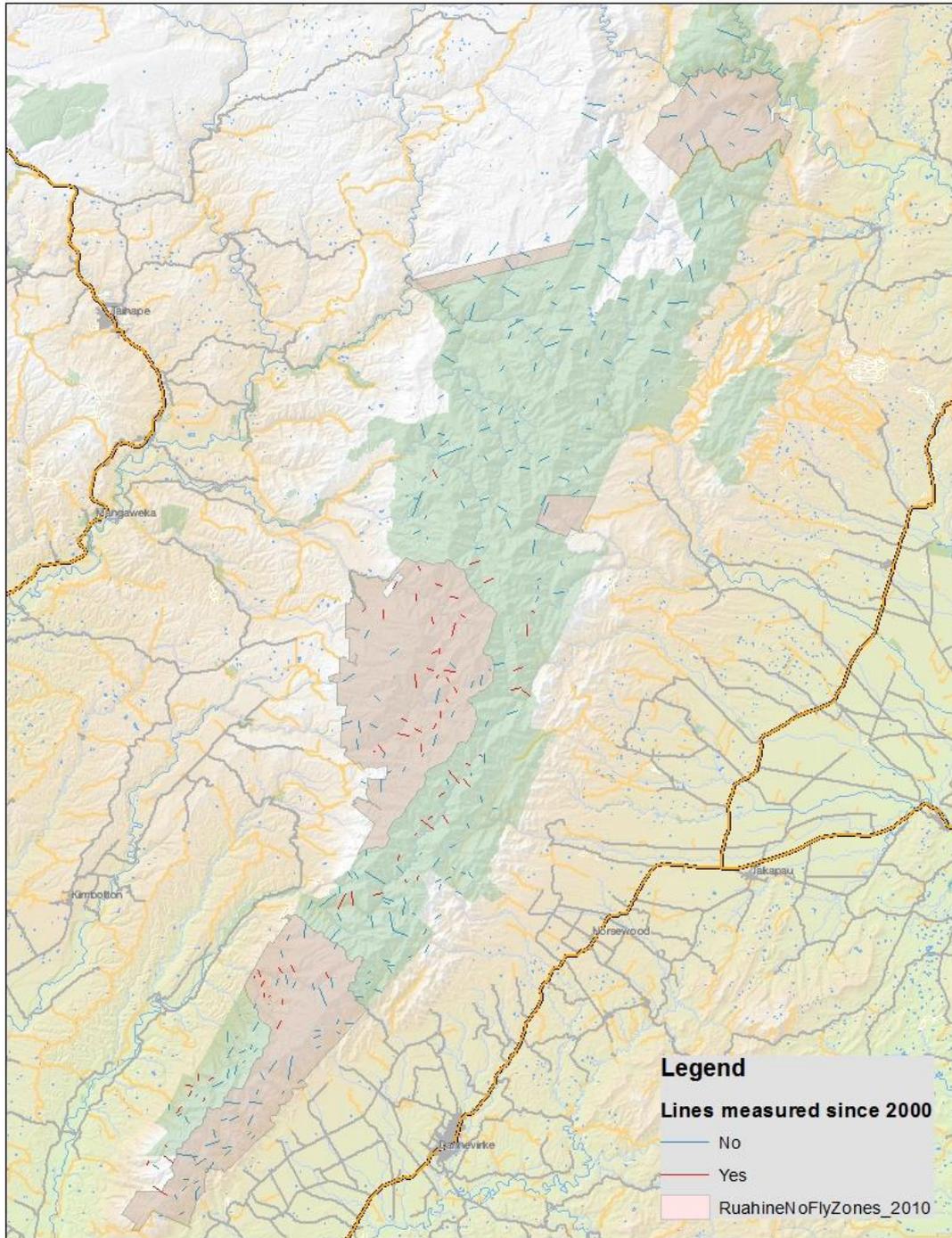
This report uses the presence/absence data to derive frequency (proportion of plots containing pellets) for each line.

Data was available for a subset of lines in catchments remeasured from 2000 and for those lines in the 1983 measure. The long history of earlier measurements is summarised in Appendix 1, but these data are not included in analysis because for the most part it was obtained from reported summaries and raw data is lost or has not been digitally captured. Each line was related to management regime (catchments closed or open to aerial venison recovery) using a spatial data layer recorded by Wanganui Conservancy staff in 2010.

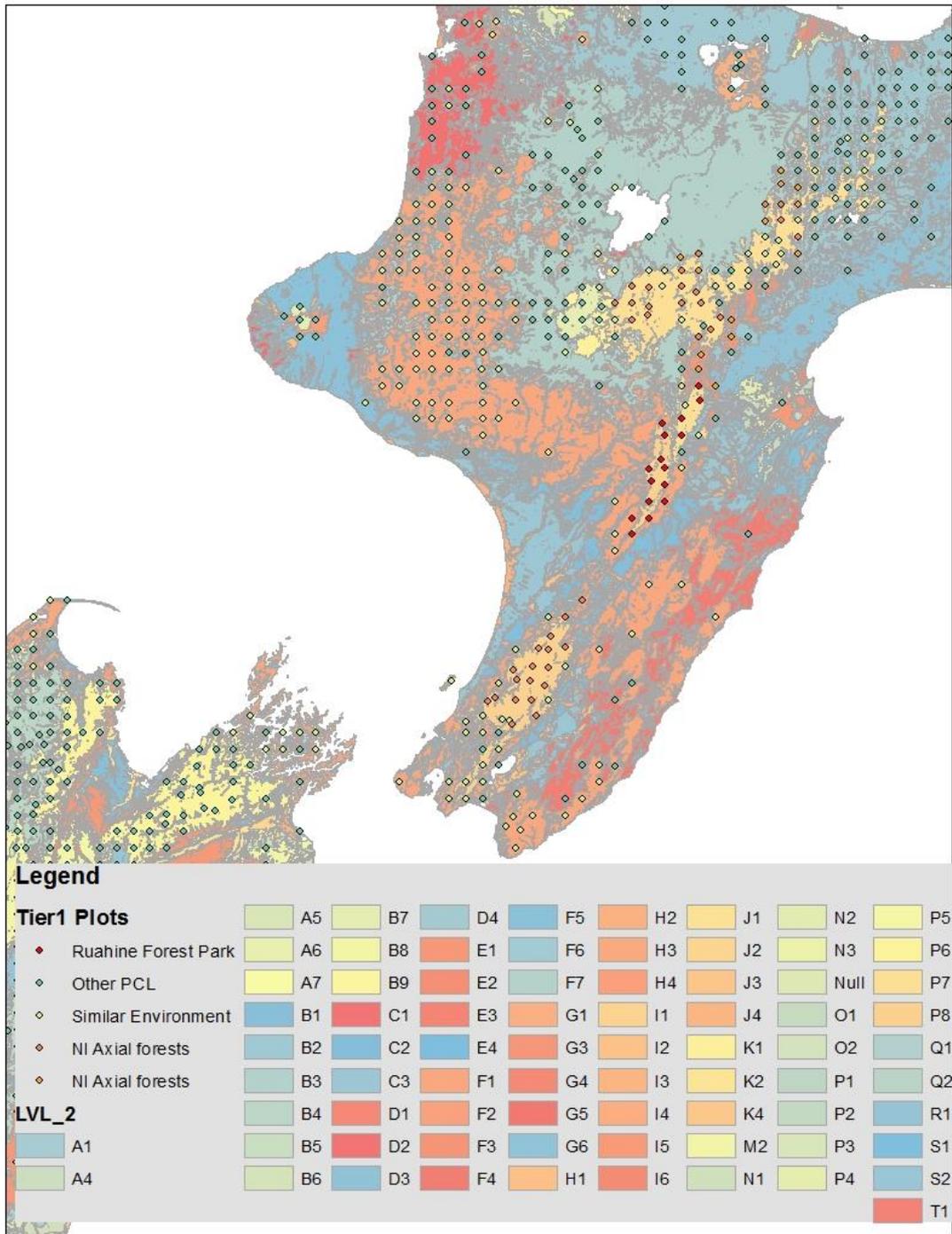
The Department of Conservation's Tier 1 terrestrial sampling framework is an 8-km grid across all public conservation land (excluding only permanent snow and ice, open water and very steep sites). There are more than 1300 possible sampling locations on public conservation land. Sampling locations are permanently marked, allowing repeated sampling. Vegetation measurements are all made within a fixed 20 × 20 m plot (0.04 ha). Data on mammal pests are collected within a much larger area (331 × 331 m; 11 ha), using a design that radiates out from the edges of the central 0.04-ha vegetation plot. This report uses total count of ungulate pellets across the four radiating lines to derive a Faecal Pellet Index (FPI) which is the standard metric reported from this sampling design. FPI has been shown to correlate to known deer densities in a range of habitats across New Zealand (Forsyth et al 2007). Note that this measure does not distinguish deer, goat, sheep or other ungulate species.

Plots for which data is available were related to management regime. Data were also extracted for three sets of comparison plots:

- those in similar forest parks of the central North Island which might be expected to have a similar history of ungulate control and recreational use
- those in similar physical environments as indicated by underlying LENZ (land environments New Zealand) at the 100 level (Figure 2)
- all plots which are inside the expected feral range of ungulates based on a 2007 distribution map distribution collated from DOC pest animal managers and technical staff observations.



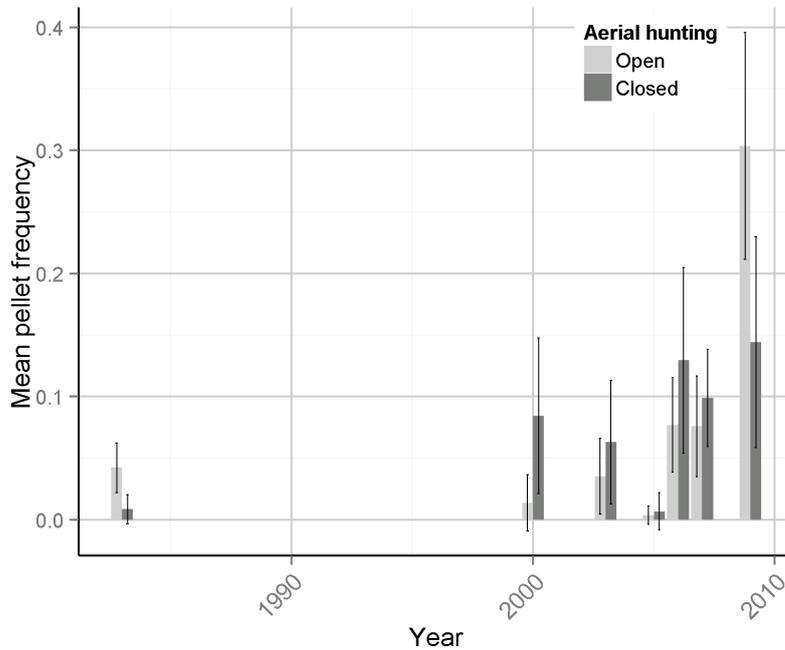
**Figure 1** Location of NZFS pellet lines in Ruahine Forest Park and of catchments where aerial venison recovery is currently restricted



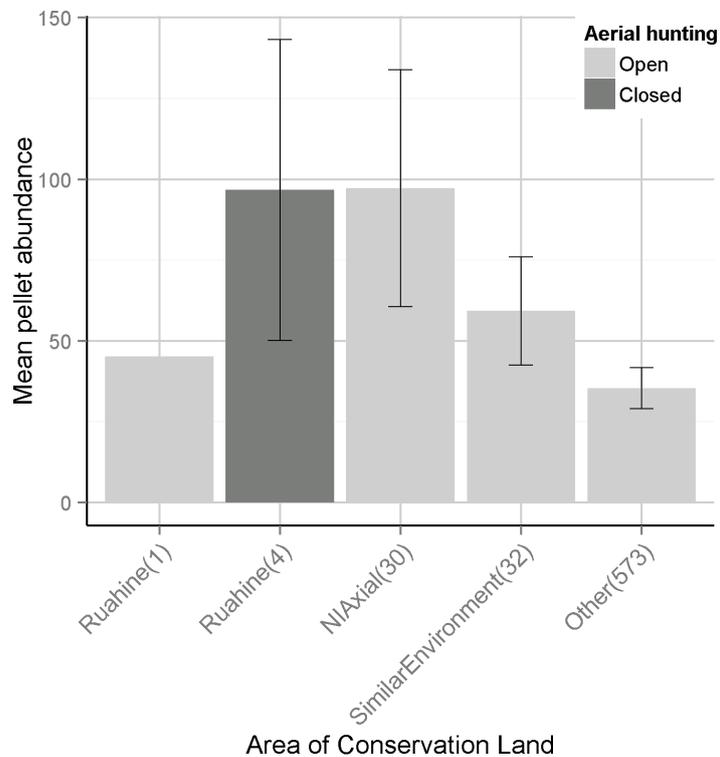
**Figure 2** Location of National Monitoring System plots in Ruahine Forest Park and nearby conservation lands of similar environmental character

## Results

Frequency of pellet counts on pellet lines in Ruahine Forest Park have tended to increase since 1983 (Figure 3). Inspection of this graph gives no indication that sites open to aerial hunting have lower deer numbers.



**Figure 3** mean ( 95% CI) frequency of pellets in plots on transects measured since 1983 (refer Appendix 1 for history of measurement by catchment)



**Figure 4** mean ( 95% CI) frequency of pellets in plots measured since 2010. Sample sizes are small and are shown in brackets for each site.

Data from the Tier 1 plots is very limited, but suggests that deer numbers in the Ruahine Forest Park are very similar to the other North Island forest parks and higher than the national average.

## Conclusion

Deer numbers in Ruahine Forest Park have increased through time and are higher than the national average.

In the course of writing this memo I found data collected from Maropea catchment in 2010 was not entered into a digital format. In addition, data collected from early NZFS surveys has generally not been entered. Records stored in the old Wanganui Conservancy were scanned and saved into DOCDM, so there is still potential to do both these tasks. This would provide a more complete picture, but I estimate would require between 80 and 240 hours data entry.

## References

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