

UNGULATE ACTIVITY IN LOWER NORTH ISLAND

Regional Insight

Ungulate activity is increasing

Tier 1 monitoring shows ungulate activity is increasing across the Lower North Island (LNI) and nationally. This report summarises the most up to date information on ungulate activity in LNI, including how activity has changed over time and how the region compares with other parts of Aotearoa New Zealand.

The trends presented in this report should be treated as a broad signal, not a judgement on local management performance; Tier 1 data is designed to show long-term, landscape-scale trends, not whether specific local control work is succeeding or failing. Interpreted in this way, the results provide important context for understanding where ungulate pressure appears to be increasing across different landscapes, and where more local investigation or targeted monitoring may be needed.

Ungulates on conservation land

In New Zealand 'ungulates' refers to introduced wild animals, including seven species of deer, goats, tahr, chamois, and pigs. Ungulates have been monitored by various state and trend monitoring programmes across public conservation land (PCL) since the 1950s. Currently, deer, goats, chamois and tahr activity is monitored by the Tier 1 monitoring programme through faecal pellet index (FPI)¹. FPI is an indicator of ungulate activity, based on counts of faecal pellets (droppings) found during monitoring. It is not a direct measure of animal numbers, because pellet counts are influenced by many things, including: species, animal behaviour, diet, climatic conditions and how quickly pellets decay.

The Tier 1 Monitoring Programme was designed as a national-scale monitoring system to measure the status and trend of biodiversity indicators over long time periods. By contrast, Tier 2 monitoring is designed to assess the effects of management in specific places where animal control has occurred. Focused Wild Animal Management (WAM) Tier 2 monitoring is underway in selected sites across Aotearoa New Zealand and is reported on separately. Those results will provide the locally focused evidence needed to understand the difference management has made, while Tier 1 FPI monitoring remains most useful for understanding broader, long-term trends across landscapes.

Historical Tier 1 data and earlier monitoring work show a long-term national pattern with ungulate activity decreasing significantly between the 1950s and the 1980s and then increasing again since the early 2000s. This matters because higher ungulate activity can harm native ecosystems by reducing the growth of important tree species that provide food, shelter, and other benefits for native wildlife and the environment. Some fragile ecosystems and threatened species may be impacted by relatively small increases in ungulate activity.

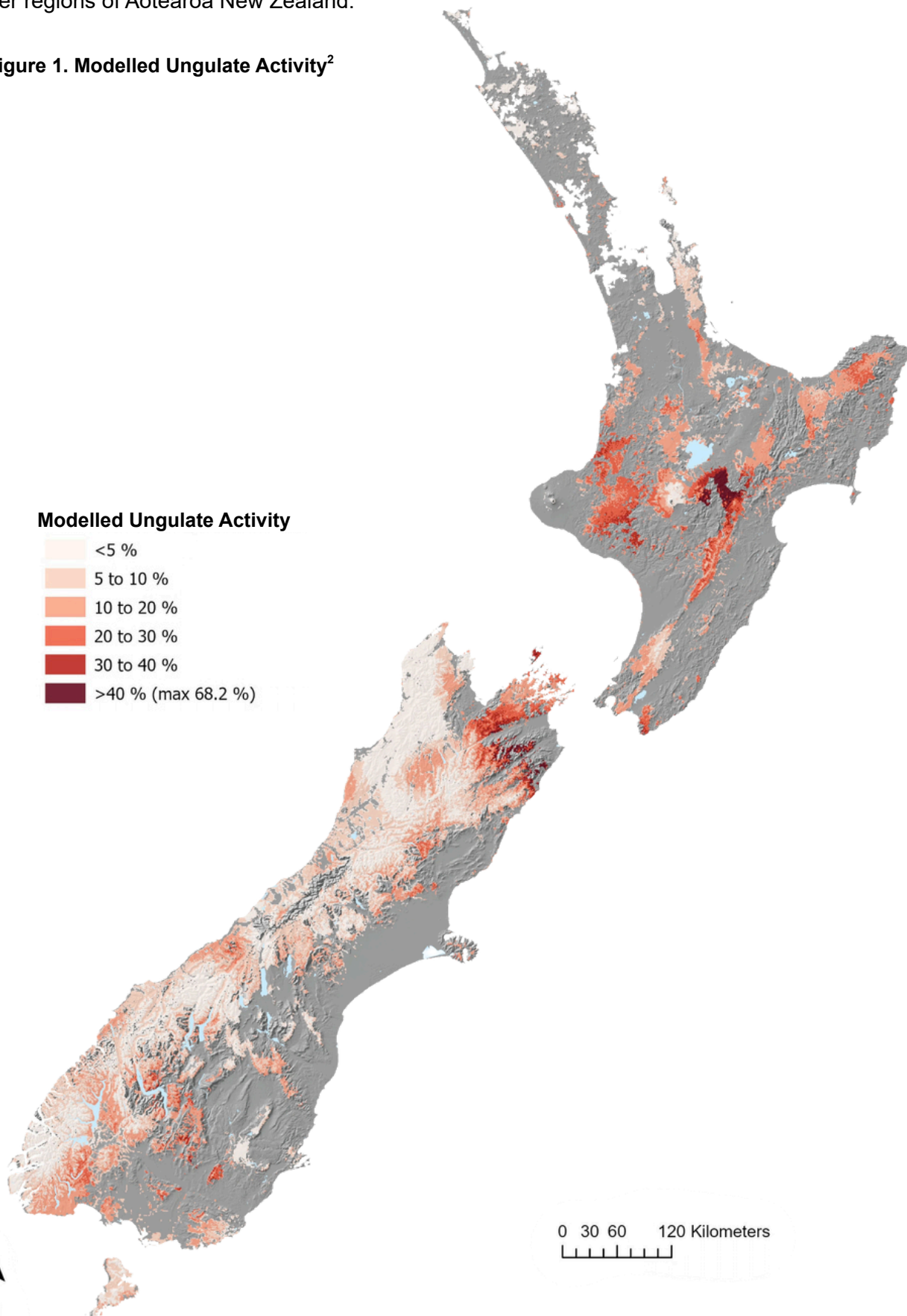
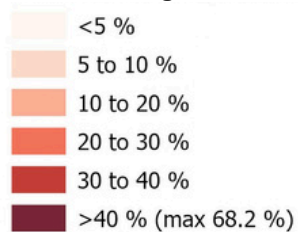
¹ Pigs are monitored separately.

Current state of ungulate activity nationwide

Figure 1 displays current relative ungulate activity nationwide, modelled at the most recent year in the Tier 1 time series (~2025). This provides useful context for understanding how ungulate activity in LNI compares with other regions of Aotearoa New Zealand.

Figure 1. Modelled Ungulate Activity²

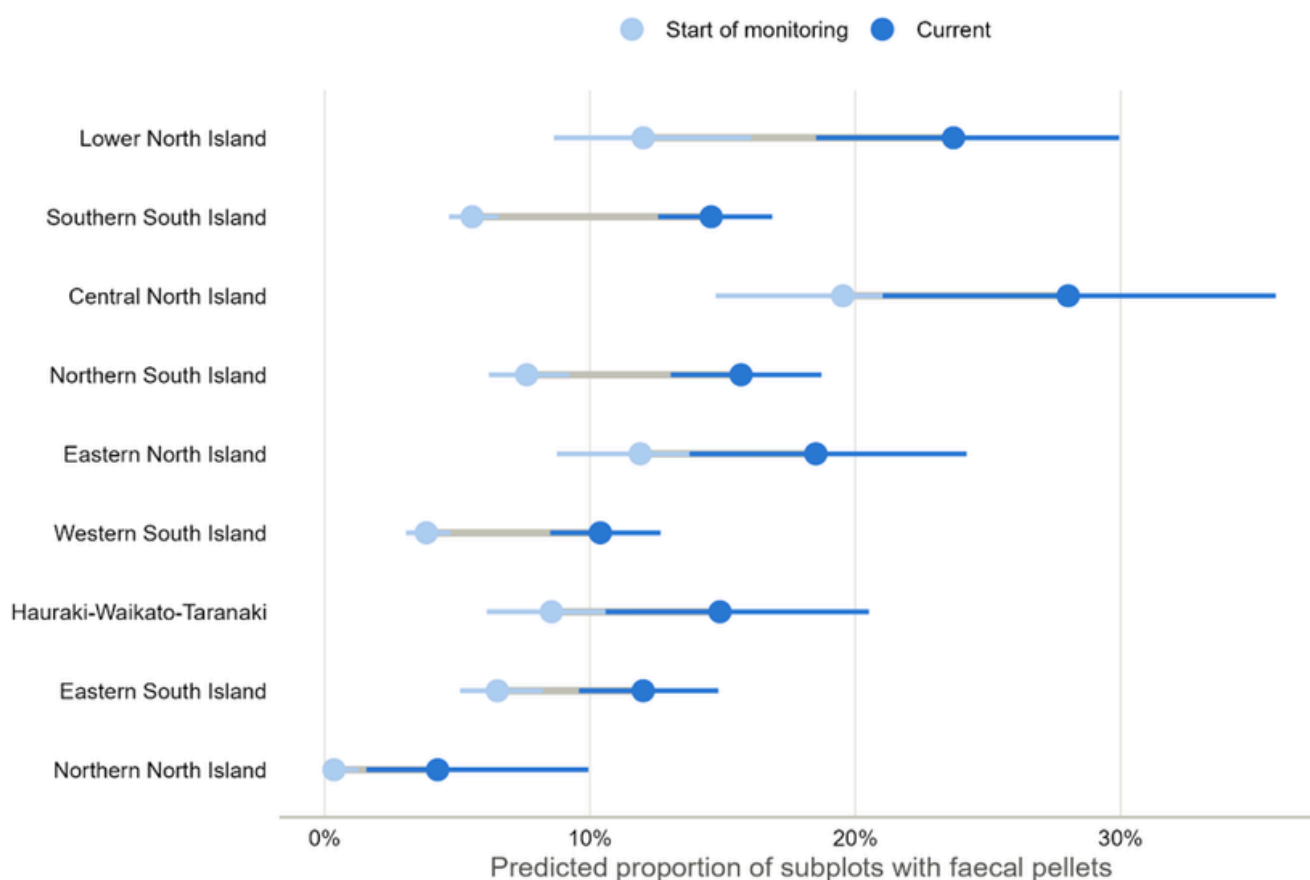
Modelled Ungulate Activity



² Modelled until 2025 as the predicted proportion of subplots with faecal pellets based on all Tier 1 site FPI data. This gives an indication of higher / lower animal activity..

Figure 2 looks at trends in ungulate activity nationwide and shows that ungulate activity is increasing across all regions. For the LNI, the trend is clearly upward, and estimated ungulate activity started from a relatively high base compared to other regions. Since then, the rate of increase has also been high and LNI remains at the higher range for modelled ungulate activity relative to other regions. However, differences between regions should be interpreted cautiously, as monitoring sites vary in their habitats, vegetation, and environmental conditions. As a result, the data are most useful for showing how ungulate activity is changing over time within each region rather than providing a definitive ranking of regions.

Figure 2. Change in Modelled Ungulate activity by DOC region³.



History of ungulate activity in Lower North Island

Within the national pattern, historical monitoring suggests some variation across LNI⁴. A 2011 analysis of historic FPI shows that ungulate activity in LNI was relatively low-medium compared to other regions and was declining slowly until 2000s. After 2000, data are missing.

³ Modelled until 2025.

⁴ Forsyth, D. M., Thomson, C., Hartley, L. J., MacKenzie, D. I., Price, R., Wright, E. F., ... & Livingstone, P. (2011). Long-term changes in the relative abundances of introduced deer in New Zealand estimated from faecal pellet frequencies. *New Zealand Journal of Zoology*, 38(3), 237-249.

Current state of ungulate activity in Lower North Island

Figure 3 displays current relative ungulate activity in LNI, modelled from the most recent years in the Tier 1 time series (~2025). The ungulate activity in the creamy pink areas is the lowest, meaning that ungulate pellets were found in less than 5% of the measured subplots. As the colour darkens through towards burgundy red, it signifies higher ungulate activity. For example, the map shows very high ungulate activity in the Kaweka Range, and moderate levels in the Ruahine Range. The Tararua Range show relatively low levels of activity whereas the Aorangi Range and patches close to the Wairarapa Coast show moderate levels.

Figure 3: Modelled Ungulate Activity for Lower North Island

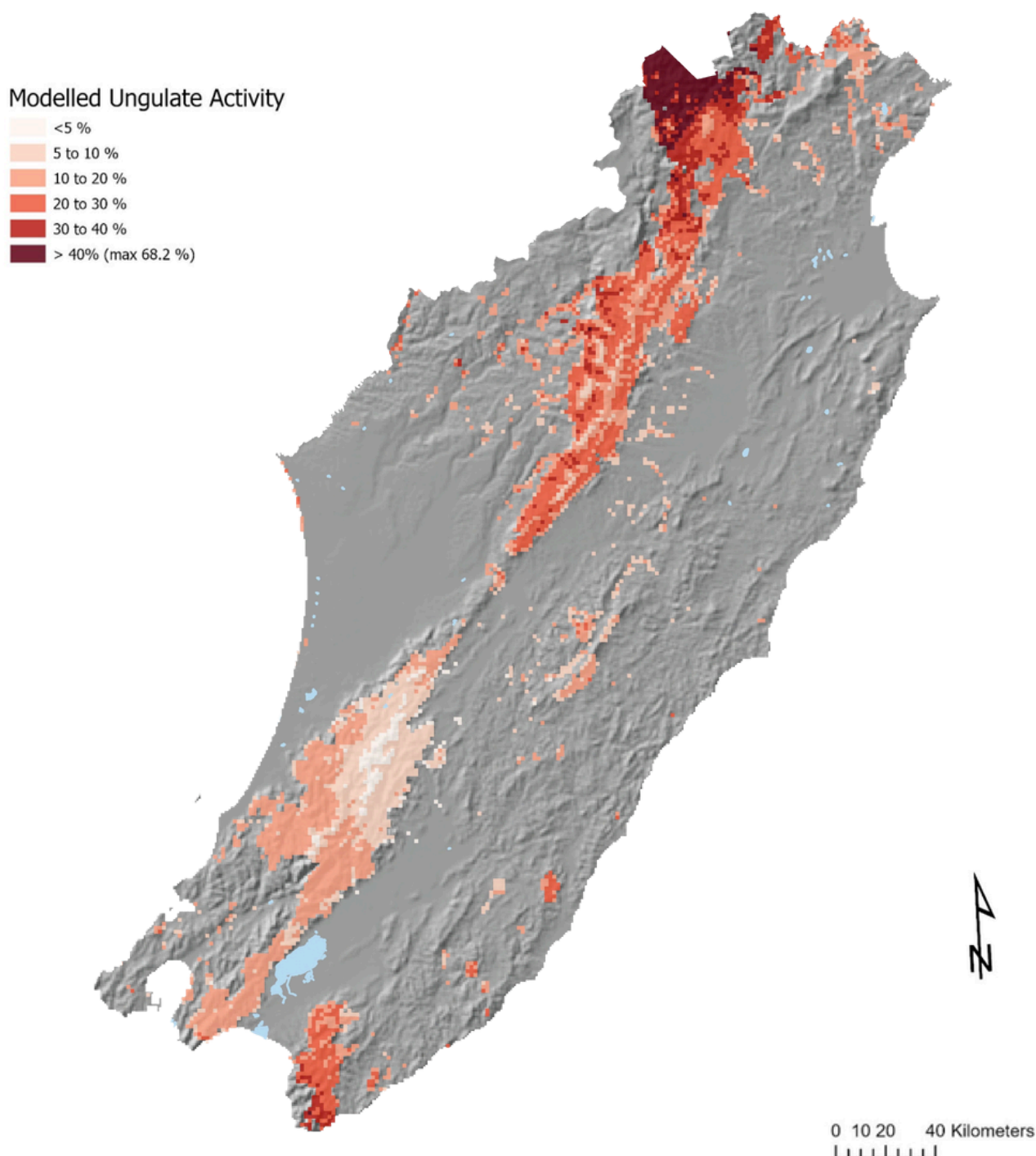
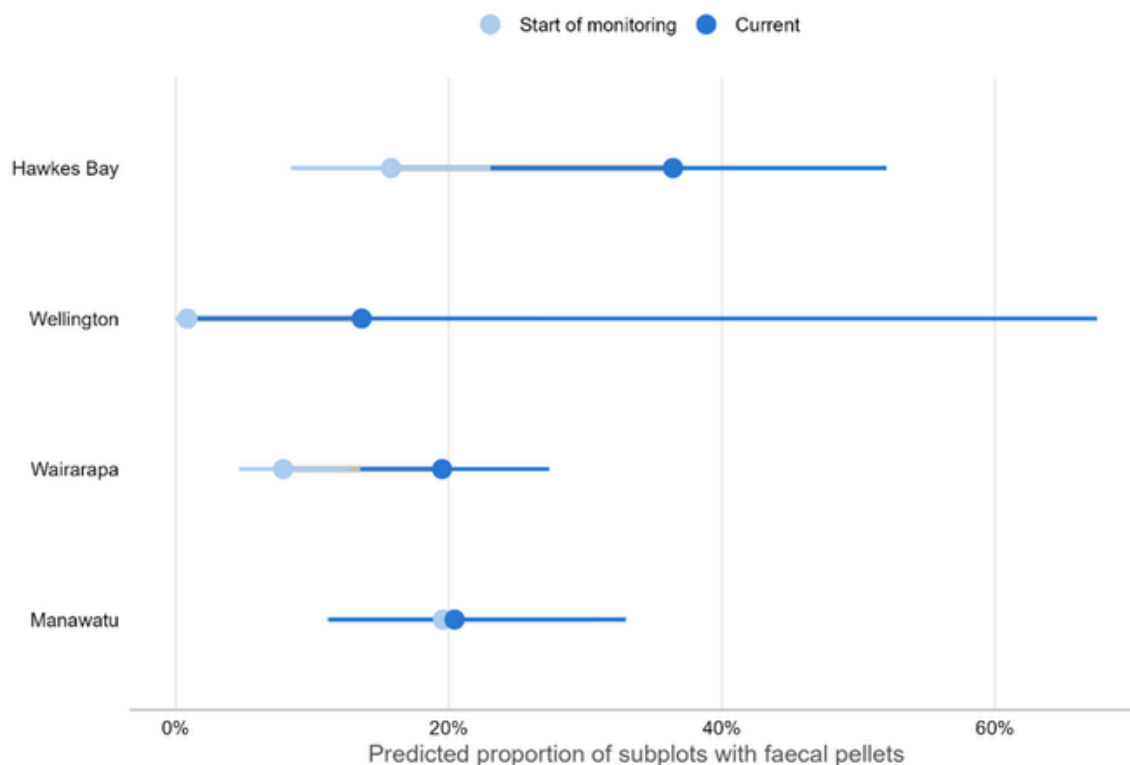


Figure 4 shows the predicted trends in ungulate activity across districts in the LNI region between the early 2010s to the mid-2020s. The points show the median estimate for each district, while the matching-coloured bars show the level of confidence in that estimate. Wider bars indicate greater uncertainty.

Overall, ungulate activity is increasing across all districts, except from Manawatū, where activity remains stable. Hawke's Bay has the largest predicted increase, Wairarapa and Wellington increased similarly to a lesser extent. Wellington has high levels of uncertainty due to having only two Tier 1 monitoring plots, meaning this result should be interpreted with caution.

Figure 4: Change in Modelled Ungulate activity by LNI district⁵



What this means for operational planning

These results indicate that ungulate activity is increasing across LNI despite variation between districts and uncertainty in some estimates. The data does not identify the causes of those increases, and it cannot separate the effects of animal management, hunting pressure, animal movement, habitat, climate or other factors. Its value is therefore in providing a landscape-scale context for local decision making.

For operations directors, this can help identify where teams may need to look more closely at management priorities, ecological risks, and whether more targeted Tier 2 monitoring or local evidence is needed to understand what is happening in specific management areas.

Conclusion

Tier 1 FPI monitoring shows a clear broad-scale increase in ungulate activity across LNI, consistent with the national pattern. While LNI does not currently have the highest level of activity nationally, activity is increasing and it now sits at one of the higher levels of ungulate activity compared to other regions. These results should be read as a landscape-scale signal, not as evidence of whether specific local animal control operations have worked.

⁵ Modelled until 2025

Technical information

a) Current ungulate abundance model (maps)

In simple terms, this model answers: “What does the habitat here predict, given the national trend?” The maps show the abundance predicted from the habitat in each 1 km² grid cell. Predictions are not shown outside Public Conservation Land (PCL) or where the surrounding habitat differs too much from the conditions used to train the model for a confident prediction⁶. Ungulate relative abundance was modelled from faecal pellet data using a binomial spatial regression model in the R packages INLA⁷ and inlabru⁸. Pellet abundance was measured as the proportion of subplots at each site where pellets were present. For each 1 km² grid cell, the model predicts abundance using environmental conditions (terrain, vegetation and climate), spatial similarity between nearby sites, and a prediction of how activity has changed over time at the national scale. We held out data to test the models’ performance.

Predictions are shown only for areas with environmental conditions in the range of those used to train the model, avoiding extrapolation into environments outside of the model’s scope.

b) Regional and district level trends (graphs)

District- and region-level trends were estimated from plot-level monitoring data using two separate statistical models in the R package INLA, rather than the habitat-based spatial model described above. Both models treat pellet occupancy as a beta binomial outcome, allowing for more variation between plots than a simple binomial outcome. They also include vegetation cover type (woody or non-woody) and a plot-level term to account for repeated surveys of the same plots over time. The models differ in whether Region or District is included as a factor. This allows each region’s or district’s current state and trend to be estimated directly from the plots recorded within it, rather than from habitat similarity to other areas, as in the map, or by combining smaller geographic units. Region-level results are taken from the region model, and district-level results from the district model. Regions or districts with very little data, such as Auckland, are excluded because there is not enough information to estimate a reliable trend⁶.

Number of Tier 1 monitoring plots in LNI

Hawkes Bay	14
Manawatū	18
Wairarapa	27
Wellington	2

⁶ Each Tier 1 plot has 4 x 150 m lines, each with 30 x 1m² samples. For example, if 60/120 samples had pellets, this would represent 50% occupancy.

⁷ [INLA Project](#)

⁸ Fabian E. Bächli, Finn Lindgren, David L. Borchers, and Janine B. Illian (2019), inlabru: an R package for Bayesian spatial modelling from ecological survey data, *Methods in Ecology and Evolution*, British Ecological Society, 10, 760–766, doi:10.1111/2041-210X.13168

Technical information

Locations of Tier 1 monitoring plots in LNI

- Tier 1 Plots
- Public Conservation Land
- NZ Lake Polygons (Topo, 1:50k)



0 5 10 20 Kilometers