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Himalayan Tahr on Game Estates Outside the Tahr Feral Range

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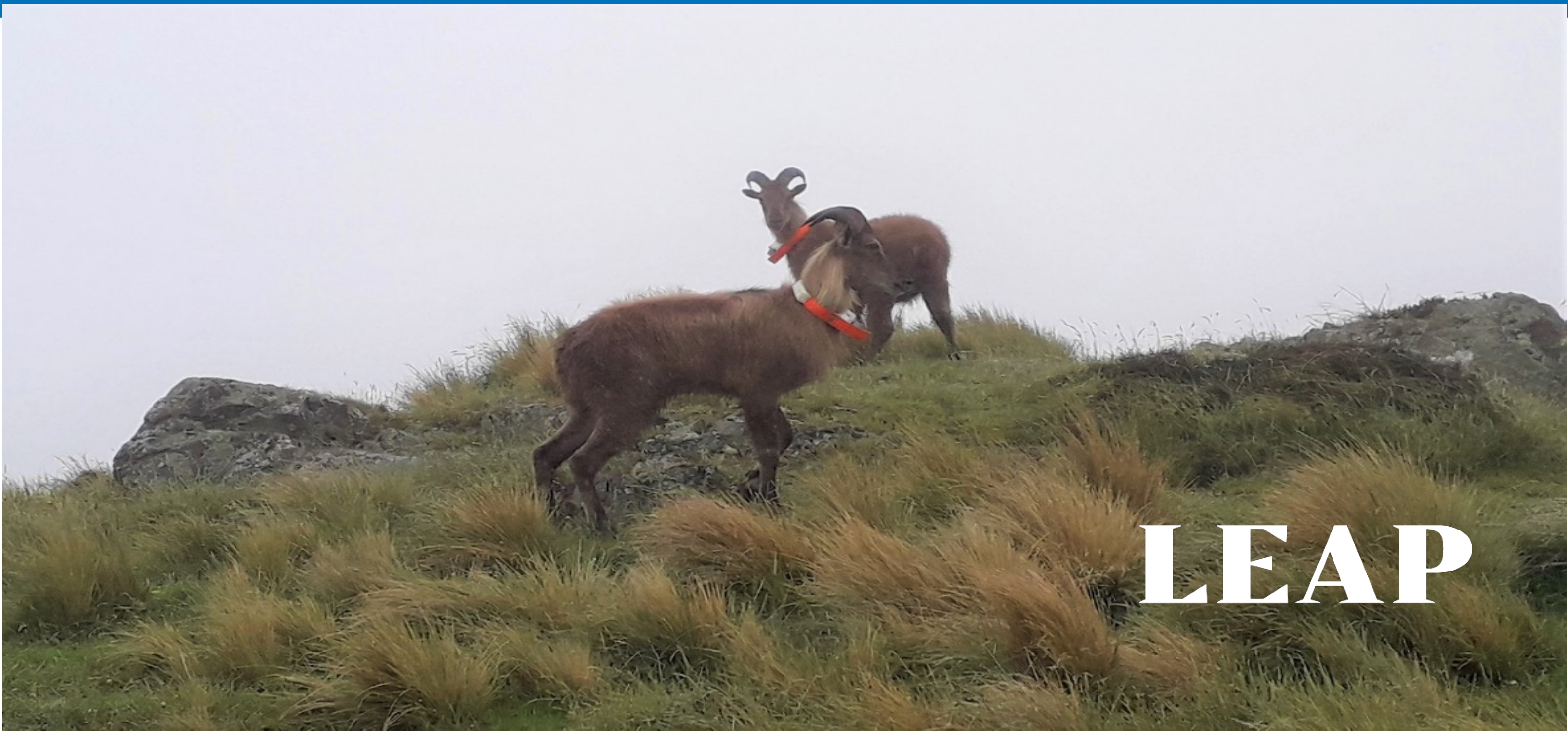
November 2020



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Abstract

Two farm-bred, mature male Himalayan tahr were monitored for one year in a fenced enclosure outside the tahr feral range. GIS tracks and heat maps from GPS records showed how the tahr used the space inside the enclosure. The tahr spent very little time in proximity to the boundary fence, but visited the fence more often during the May-June breeding season. Most of the time spent at the fence was during the day, with few visits at night. The trial showed that it is possible to contain male tahr in captivity outside the feral range.

Keywords

Himalayan tahr, *Hemitragus jemlahicus*, game estate, Himalayan Thar Control Plan, feral range

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Chapter 1
Introduction

Himalayan tahr (*Hemitragus jemlahicus*) were introduced to New Zealand in 1904 for the purpose of sport hunting (Donne, 1924; Wodzicki, 1950). Since then, there have been dramatic fluctuations in wild tahr populations, and concerns about their environmental impacts and their future as a recreational and commercial resource (e.g. Bradstock, 2018; Sage, 2018; Seitzer, 1994). Tahr are highly valued for recreational (Kerr, 2019) and commercially guided hunting (Lovelock et al., 2012; NZAGE, 2020; NZPHGA 2020; Tustin 2011). In addition, commercial hunters sometimes harvest tahr for their meat and/or skins. Total annual commercial harvests between zero and 421 tahr in the seven year period 2013-2020 (Parkes 2020) are notably less than historic commercial harvests, with commercial helicopter harvests of 1,850 tahr from Aoraki Mount Cook National Park alone in 1973 (Parkes 1988).

The Himalayan Thar (*sic*) Control Plan (DOC, 1993: HTCP) identifies objectives and rules for managing Himalayan tahr, with a total allowed population of about 10,000 tahr within seven defined management units. Hughey & Parkes (1996) report the genesis of the HTCP. Recent tahr populations have significantly exceeded management unit limits defined in the HTCP (Ramsey & Forsyth, 2019), prompting significantly increased tahr control activity by the Department of Conservation (DOC, 2020). The HTCP identifies a defined feral range, which sets boundaries within which the tahr population must be constrained (Figure 1) and permits tahr farming only within the feral range. Tahr may be farmed or held in safari parks (game estates), subject to a permit issued under Section 12 of the Wild Animal Control Act 1977, but Section 12(4A) prohibits issuing such permits outside the feral range. Both the HTCP and the Wild Animal Control Act preclude holding tahr in game estates outside the feral range for commercial hunting.

In 2014, a working group of the Game Animal Council reviewed the Code of Practice for Aerially Assisted Trophy Hunting. In its report to the then Associate Minister of Conservation, Hon. Peter Dunne, the Game Animal Council recommended an alternative option for guided hunters to take trophy tahr (GAC, 2014). They saw an opportunity to reduce demand on the wild tahr resource by allowing registered and accredited game estates outside the feral range to hold tahr bred in captivity inside the feral range. They estimated this could reduce demand on the wild resource by up to thirty percent, significantly reducing conflicts.

This proposal raised the question of whether male tahr could be contained successfully within game estates outside the feral range. This study is an initial investigation of the hypothesis that such containment would be successful, by releasing several GPS tracked tahr into a registered game estate outside the defined tahr feral range (High Peak Game Estate in the upper reaches of the Selwyn River catchment – see Figure 1) and monitoring their movements over a twelve-month period.

Game estates are high-fenced areas that contain game animals for hunting, typically for trophies. They assure the presence of the target animals, because either they are released into the property, or they are bred there and are prevented from escape by the fences. The game estate manager can control hunting conditions, such as the presence of other hunters, the quality of lodging, game availability, and access, so can tailor the product to the market. This situation is appealing to many hunters, particularly those visiting from abroad, who pay substantial amounts to hunt game on estates. Alternatives, such as hunting on public land or on private land that is not a game estate, are often too difficult for hunters, or offer much lower chances of success. Recent and ongoing significant reductions in the wild tahr population will reduce opportunities to take trophy tahr in the wild, and will increase the costs of doing so, which will enhance the potential benefits of guided trophy hunting in game estates outside the feral range.

Various laws and regulations govern the operation of all game estates (e.g. Animal Products Act 1999, Animal Welfare Act 1999, Wild Animal Control Act 1977, and Regional Pest Management Strategies/Plans). In addition, the New Zealand Association of Game Estates imposes strict conditions on its members in its *Industry Agreed Standards*, which seek “To provide the client with a befitting trophy and hunting experience whilst ensuring the welfare of the animal, the safety of the client and the protection of the environment” (NZAGE 2015: p.2).

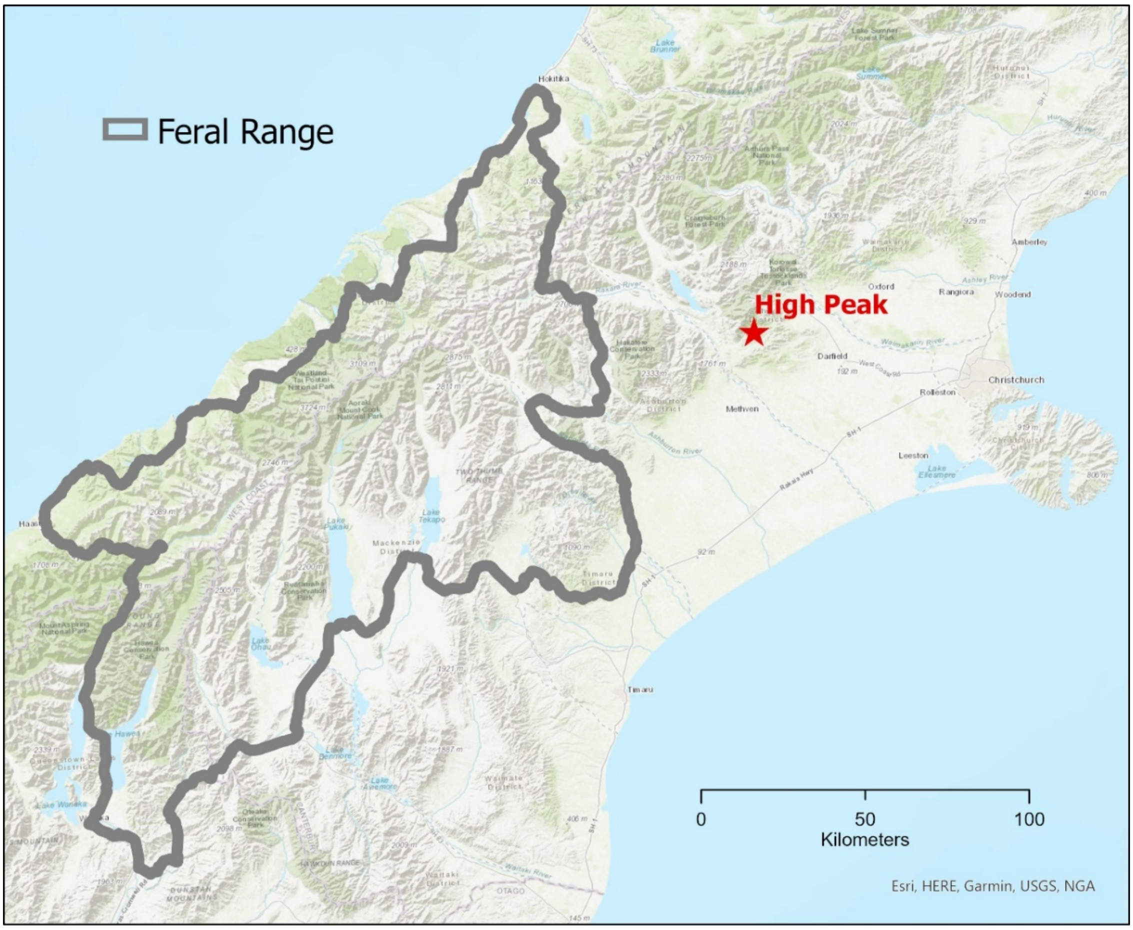

Figure 1: Tahr range, South Island, New Zealand 2014 and location of High Peak Game Estate.

1.1 Methods

Three mature captive-bred male tahr were released into High Peak Game Estate on 19th December 2018 (Figures 1 & 2). High Peak is an NZAGE-certified game estate located outside the current feral range in the headwaters of the Selwyn River. High Peak contains a mix of game species (Red deer, Fallow deer, Wapiti, wild sheep, feral pigs, and feral goats) and, at times, domestic sheep and cattle.

The area in which the tahr were released (approximately 1,124 ha) is fully-contained by standard 1.8 metre high deer fencing. The integrity of the whole 15.9 km boundary fence was inspected on foot prior to release of the tahr. The New Zealand Game Animal Council funded the study, which received the required approval from the Department of Conservation (Permit 53706-WAR, 31 May 2017).

Photo provided by Geoffrey N. Kerr

Figure 2: Release of GPS-collared tahr.

Each of the tahr was fitted with a Sirtrack Iridium GPS tracking collar, which transmitted each animal's location every hour. The GPS collars served two purposes. First, they would enable location of escaped animals so they could be destroyed, thereby preventing any potential environmental harm or establishment of new breeding populations. Second, location data enabled tracking of the individual animals within the game estate, providing the opportunity to describe how the tahr used the space inside the game estate, and whether they spent significant time at the boundaries "testing" the fence.

One tahr died of unknown causes in 12th February 2019. Consequently, full data are available for only two tahr. Between 14th and 24th June 2019 the tahr had access to an adjoining fully-fenced area of the game estate. The statistical models account for visits to this area, which is visible in the GIS plot. An attempt to live-capture the tahr at the end of the study was unsuccessful. The two remaining tahr were euthanised on 22nd and 24th December 2019.

The presence of the tahr within the game estate at the conclusion of the study is the primary outcome of interest. However, the hourly data enable a much richer description of tahr behaviour during the trial. GIS hotspot maps visually describe spatial use patterns for the two tahr present for the duration of the study. Dummy variables indicate whether each data point was within 5m, 10m, and 50m of the fence. Bar graphs display the amount of time, duration of stay and longest visits within the three different distances from the fence, by month. Time spent at the fence is analysed with binary dependent variable logit models that assess the frequency and duration of fence visits by both season, month and time of day.

Twelve dummy variables defined each month.

Four dummy variables defined season:

- Summer: December – February
- Autumn: March – May
- Winter: June – August
- Spring: September – November

Eight dummy variables developed from sunrise, sunset and length of day data from https://www.timeanddate.com/sun/@2186223 defined time of day.

- Dawn 1 hour either side of sunrise time
- Early morning 1-2 hours after Dawn
- Morning 2-3 hours after Dawn
- Day Between Morning and Afternoon
- Afternoon 2-3 hours before Dusk
- Late afternoon 1-2 hours before Dusk
- Dusk 1 hour either side of sunset time
- Night The period between Dusk and Dawn

Subsequently, because of similarities of behaviour at some of these times, we combined several time of day categories to facilitate statistical analysis.

- Daytime Dawn to Afternoon
- Evening Late afternoon and dusk
- Night Night

Chapter 2
Results

Monthly heat maps (Figures 3-15) illustrate changing spatial use patterns over time. The tahr remained within a kilometre of the release point in December 2018, immediately after their release. In the following January and February, they explored the extent of the enclosure, spending a significant amount of time at the eastern extremity. The tahr reverted to spending the great majority of time on an elevated, rocky ridge near the release point in March, but also spent time in the northern part of the enclosure. The months of April through August saw concentrated activity near the southern boundary of the enclosure, with considerable time near the fence in May and June. The tahr took the opportunity to explore the adjacent block when it was available to them briefly in mid-June. September through December saw more dispersed use of the enclosure, with a period spent in the east during September and into the western parts of the block in October-December.

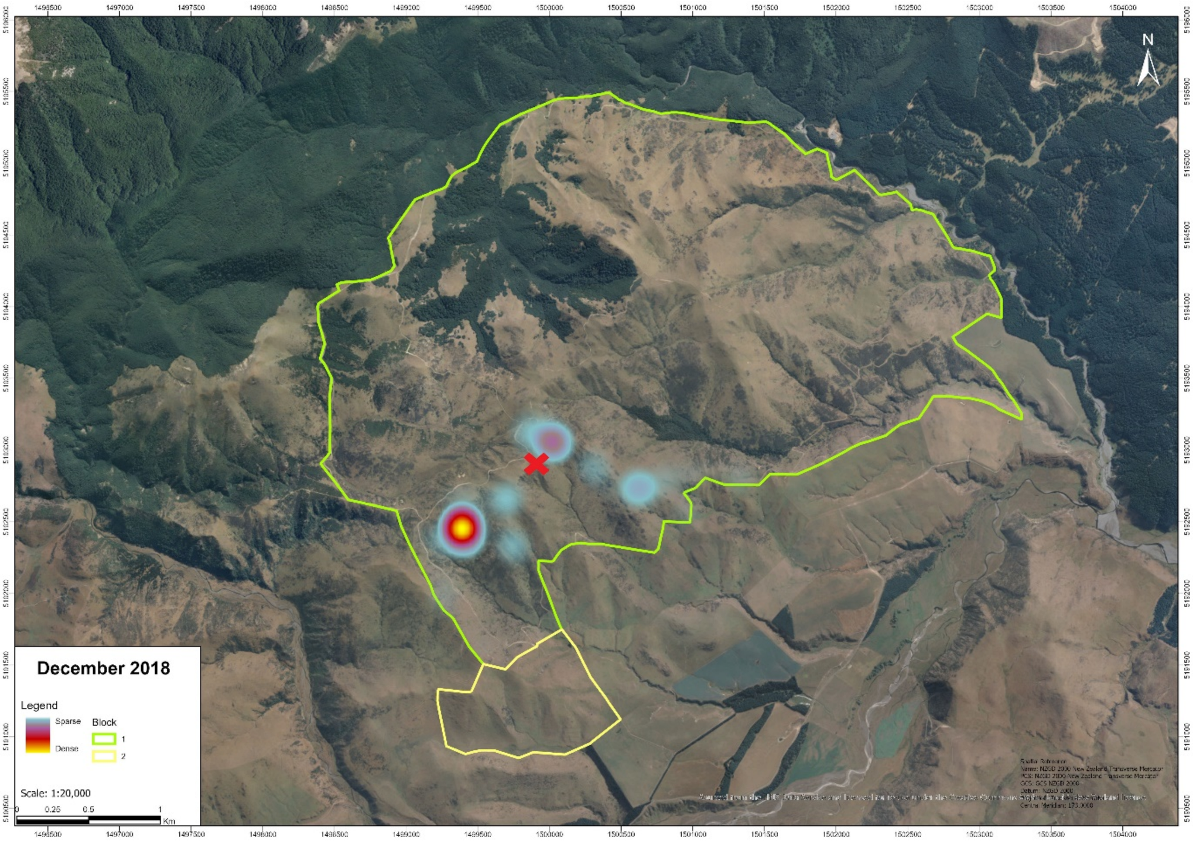

Figure 3: December 2018 heat map
(tahr released at X 19th December 2018)

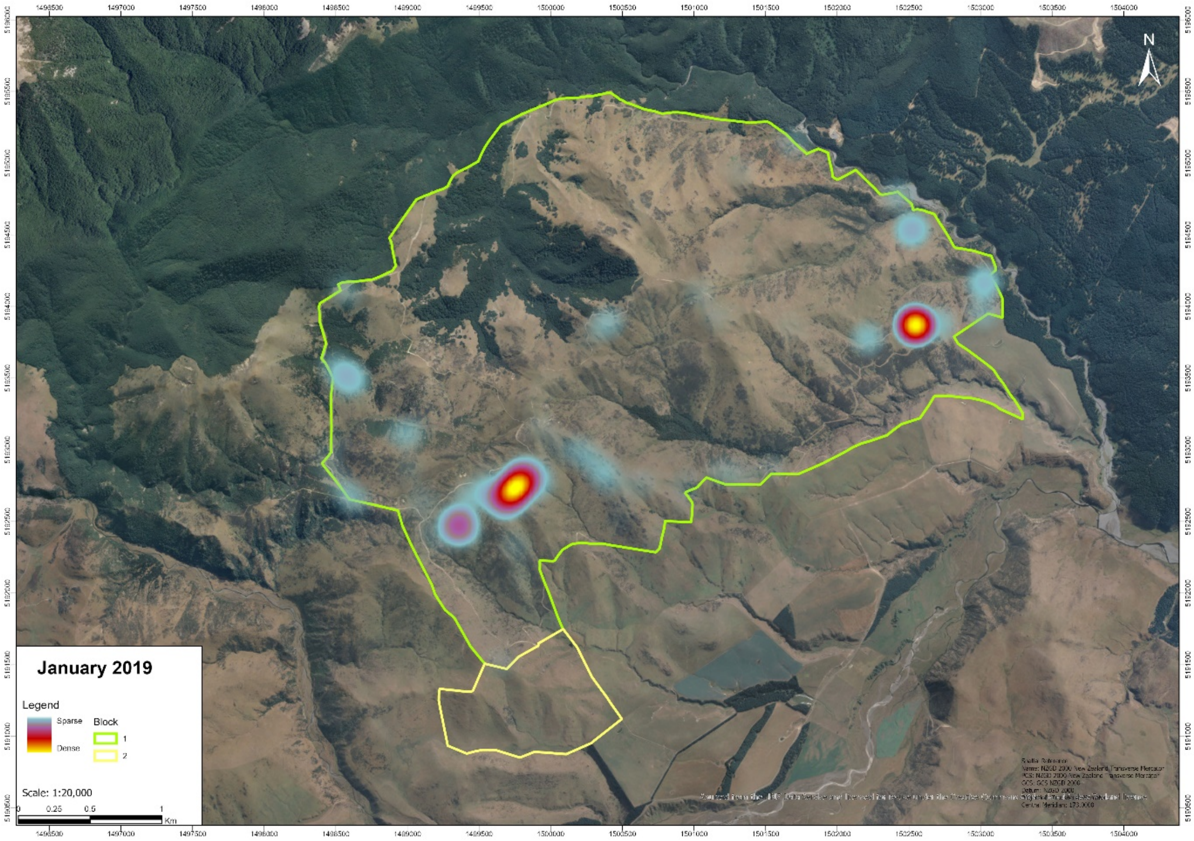

Figure 4: January 2019 heat map

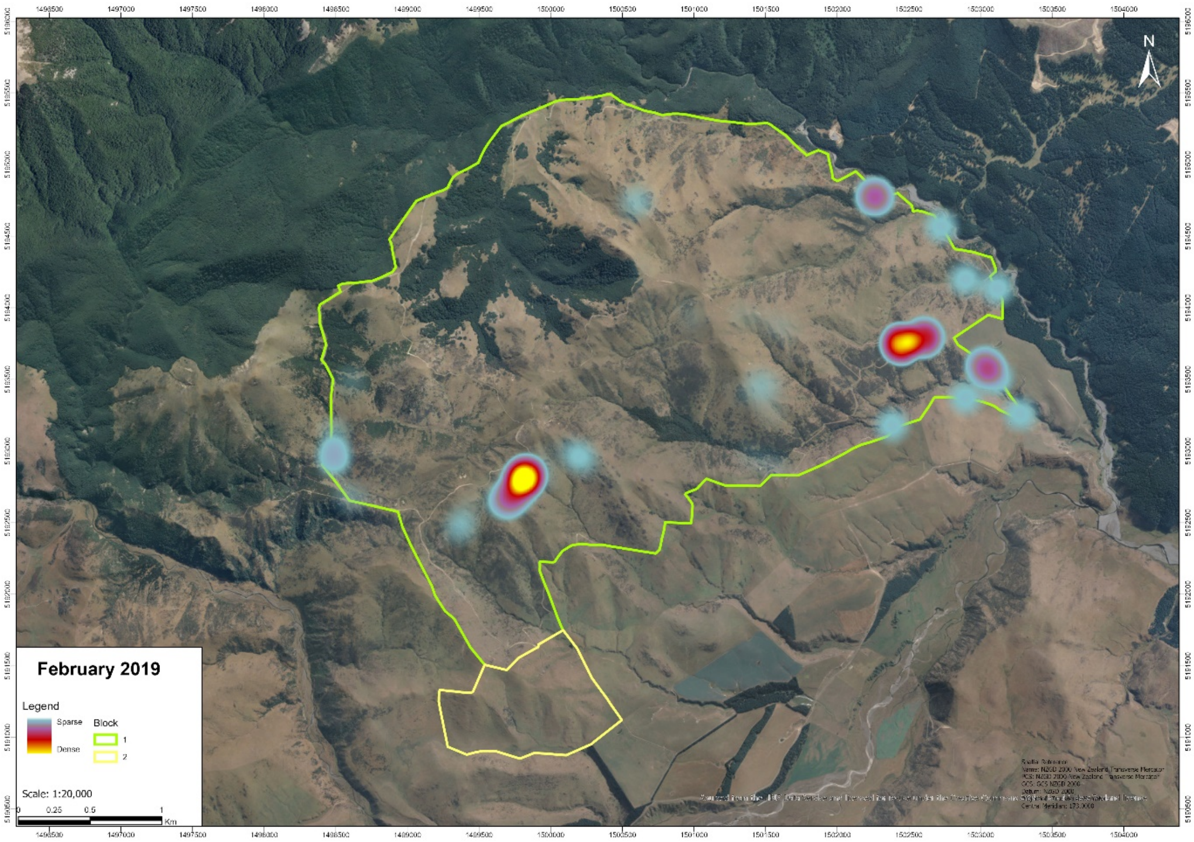

Figure 5: February 2019 heat map

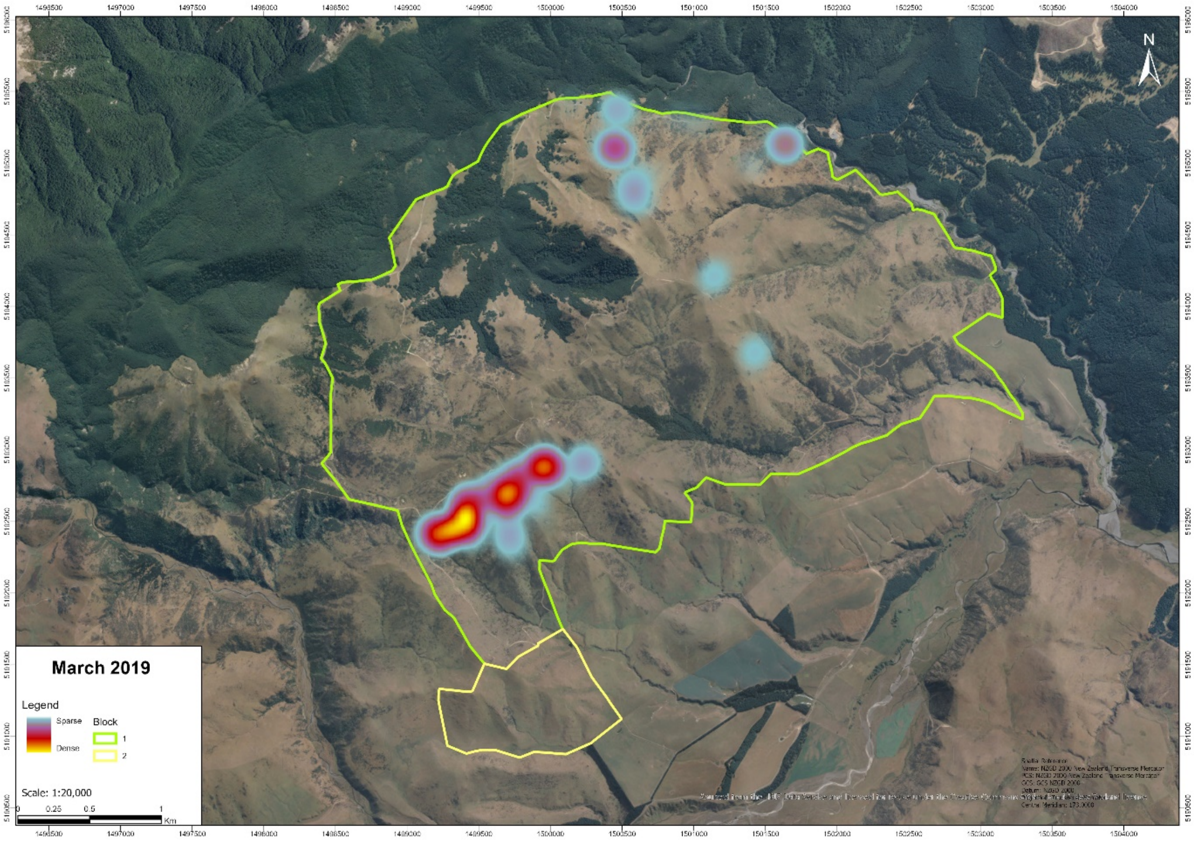

Figure 6**:** March 2019 heat map

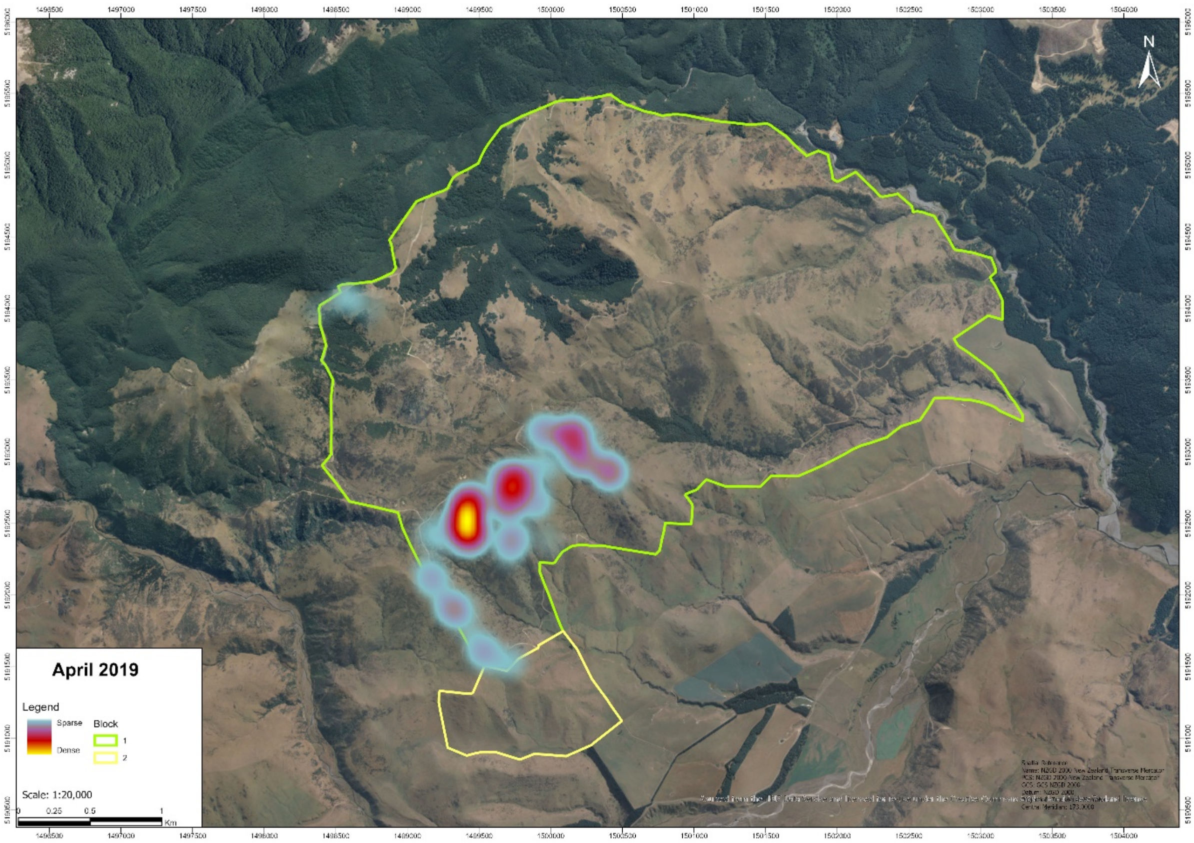

Figure 7: April 2019 heat map

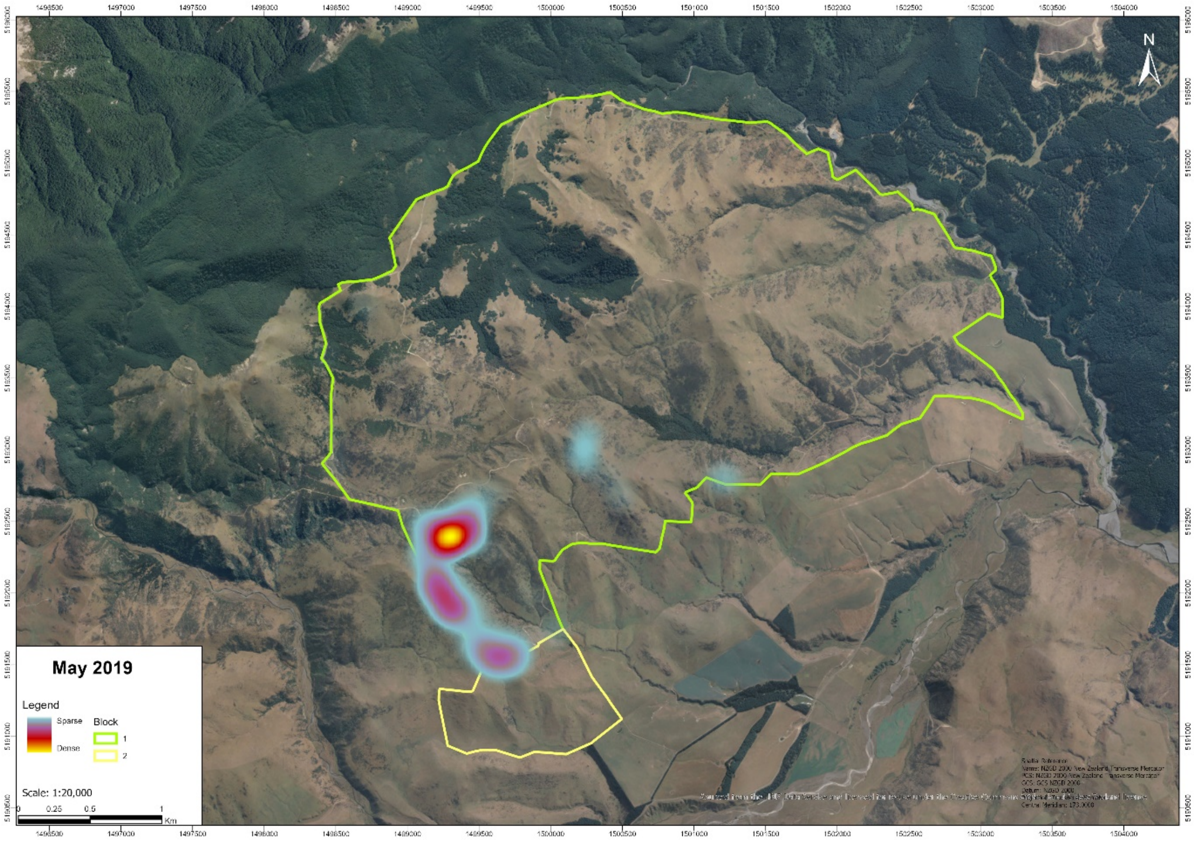

Figure 8: May 2019 heat map

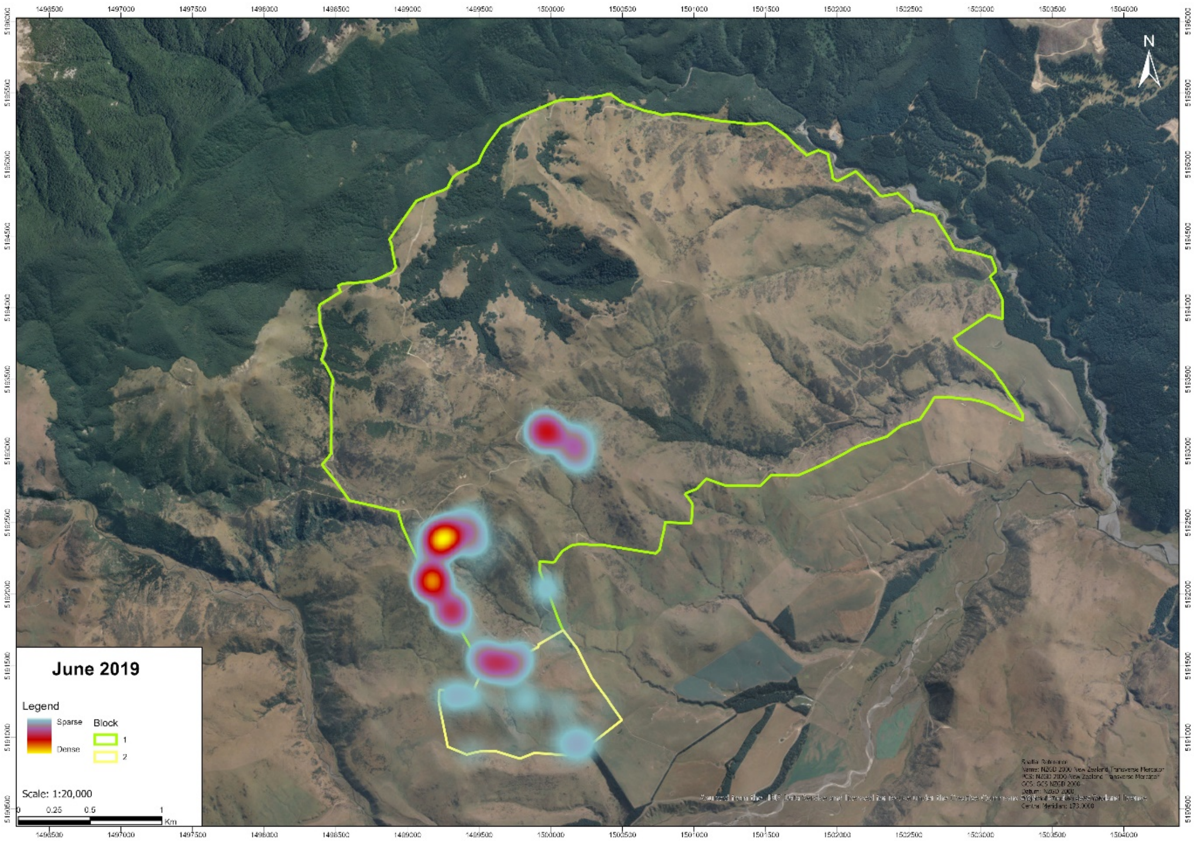

Figure 9: June 2019 heat map
(Note use of adjacent block while available 14-24 June)

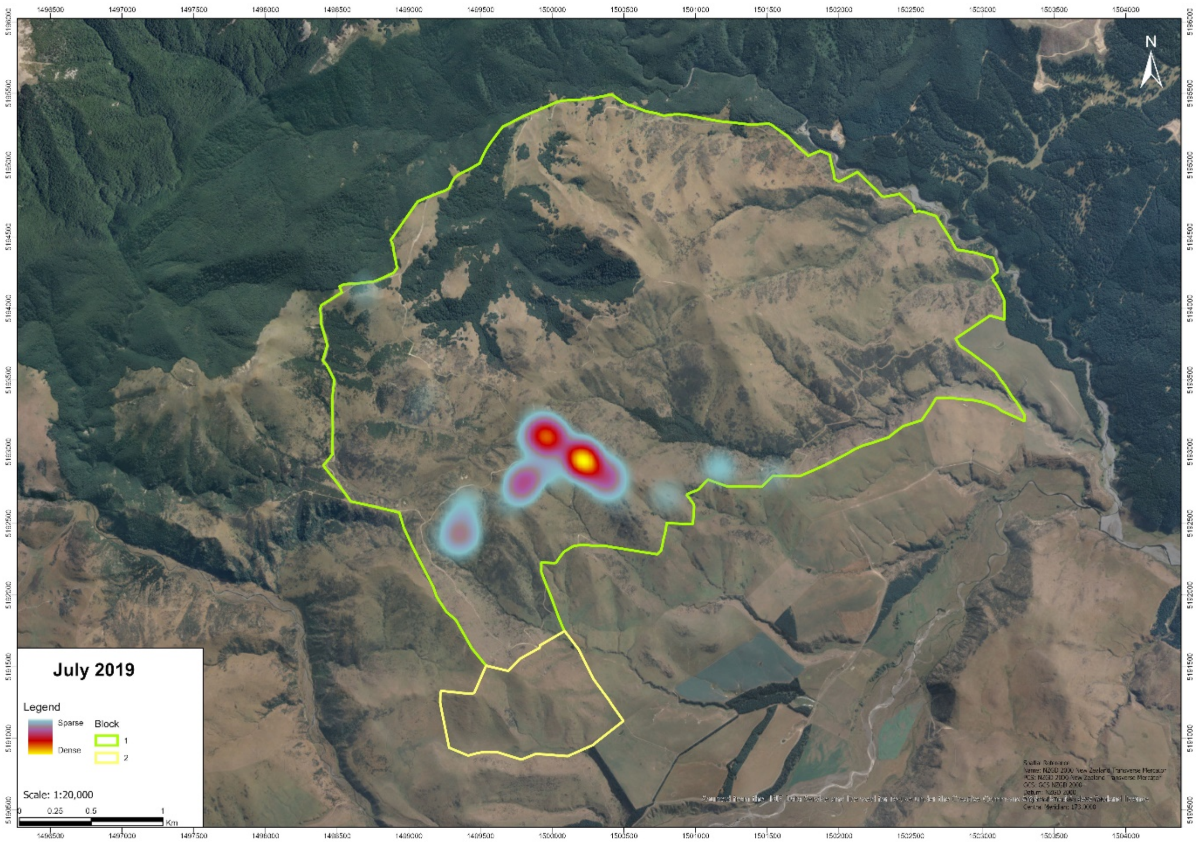

Figure 10: July 2019 heat map

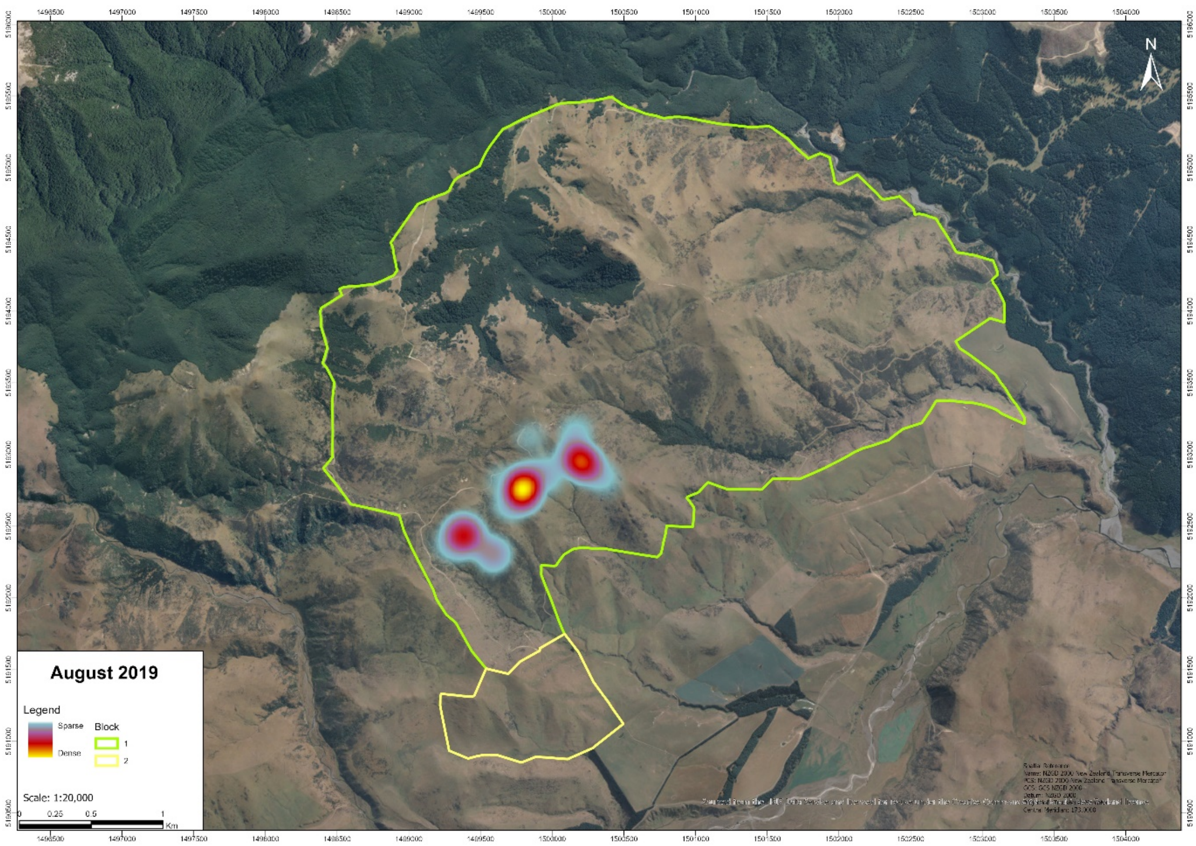

Figure 11: August 2019 heat map

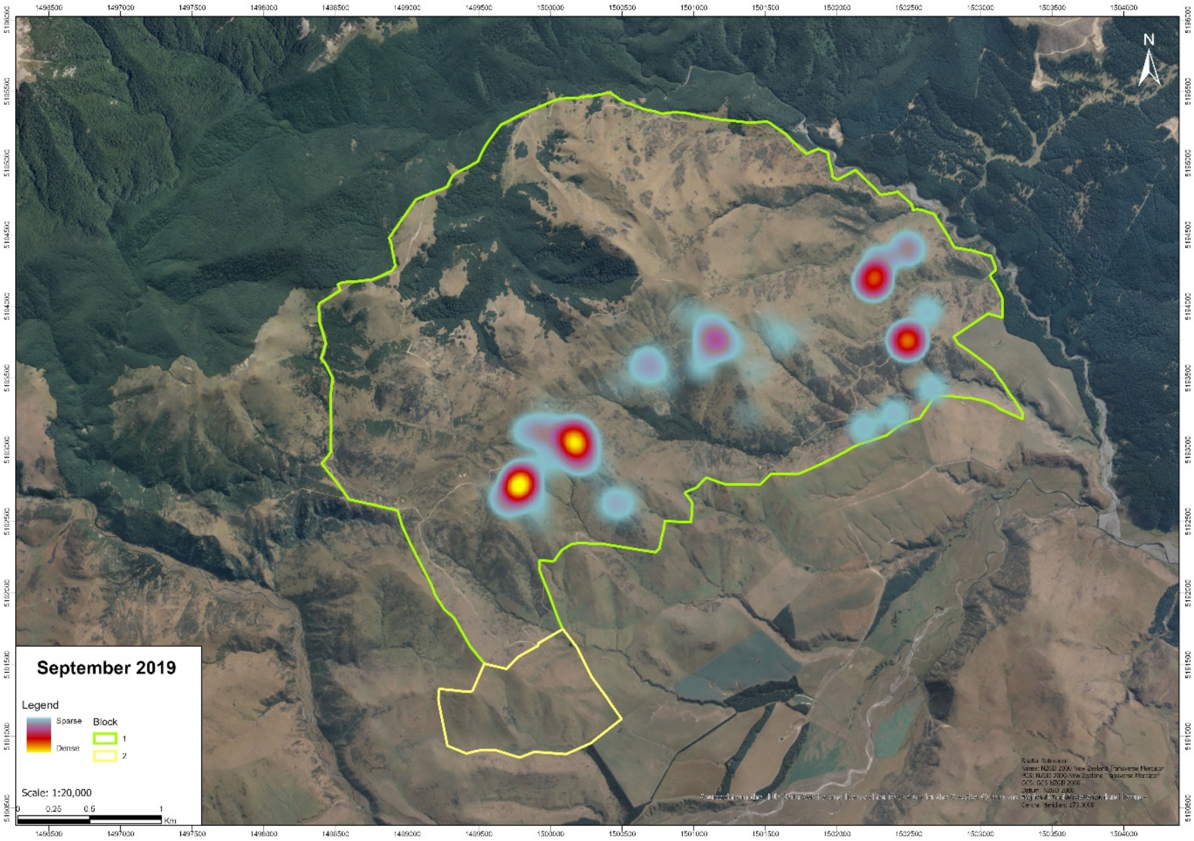

Figure 12: September 2019 heat map

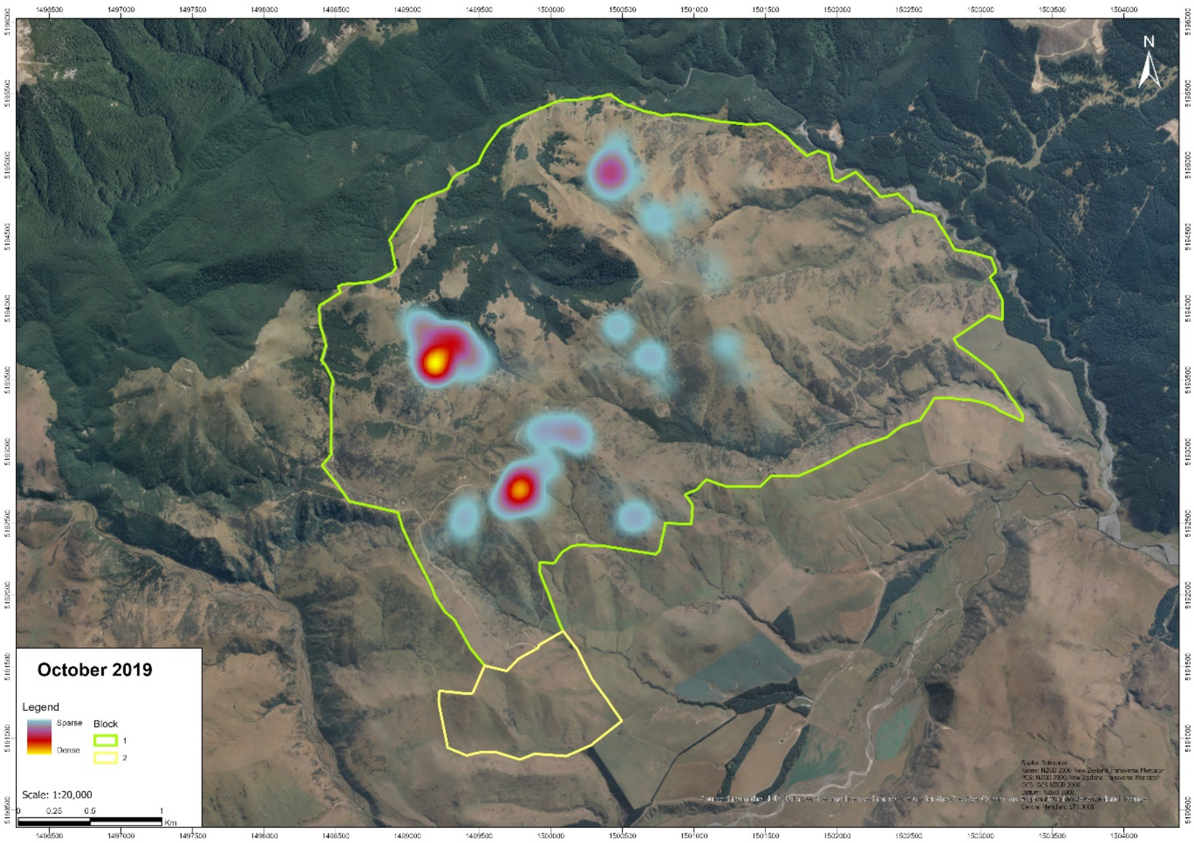

Figure 13: October 2019 heat map

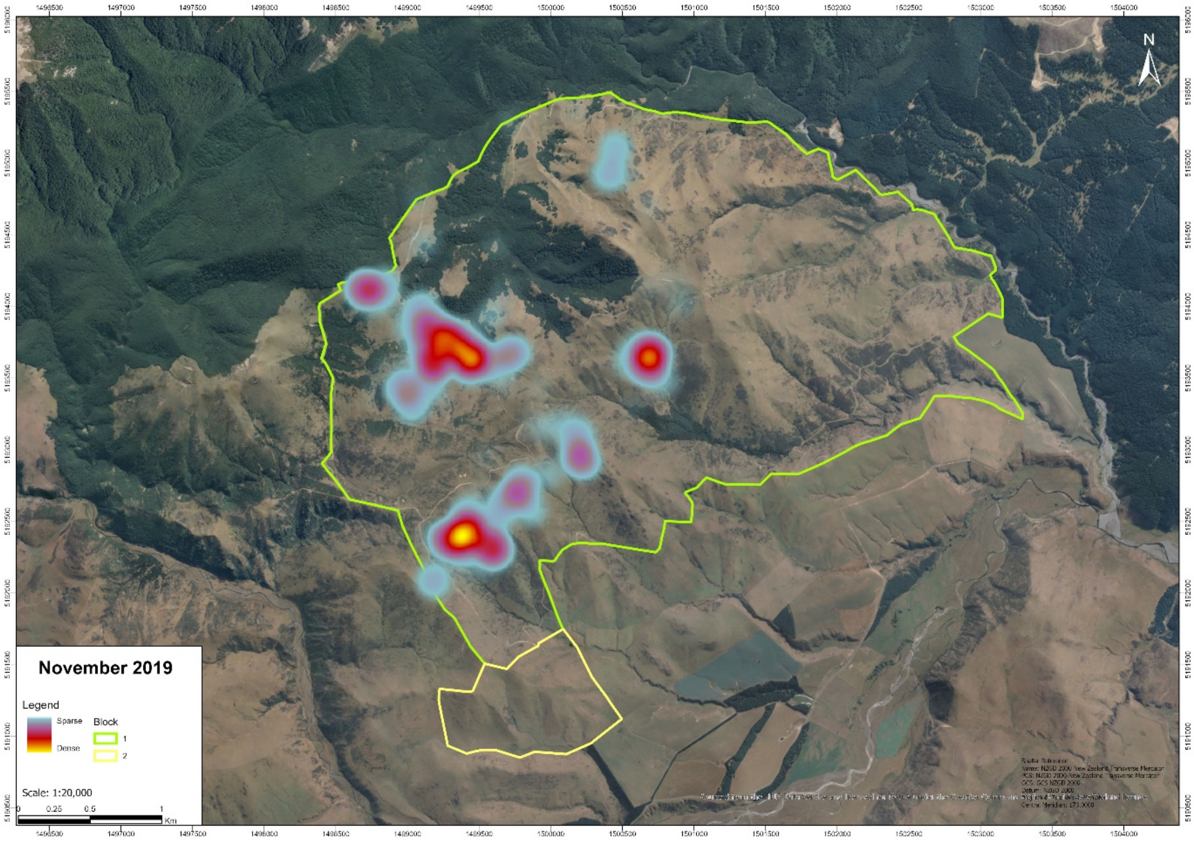

Figure 14: November 2019 heat map

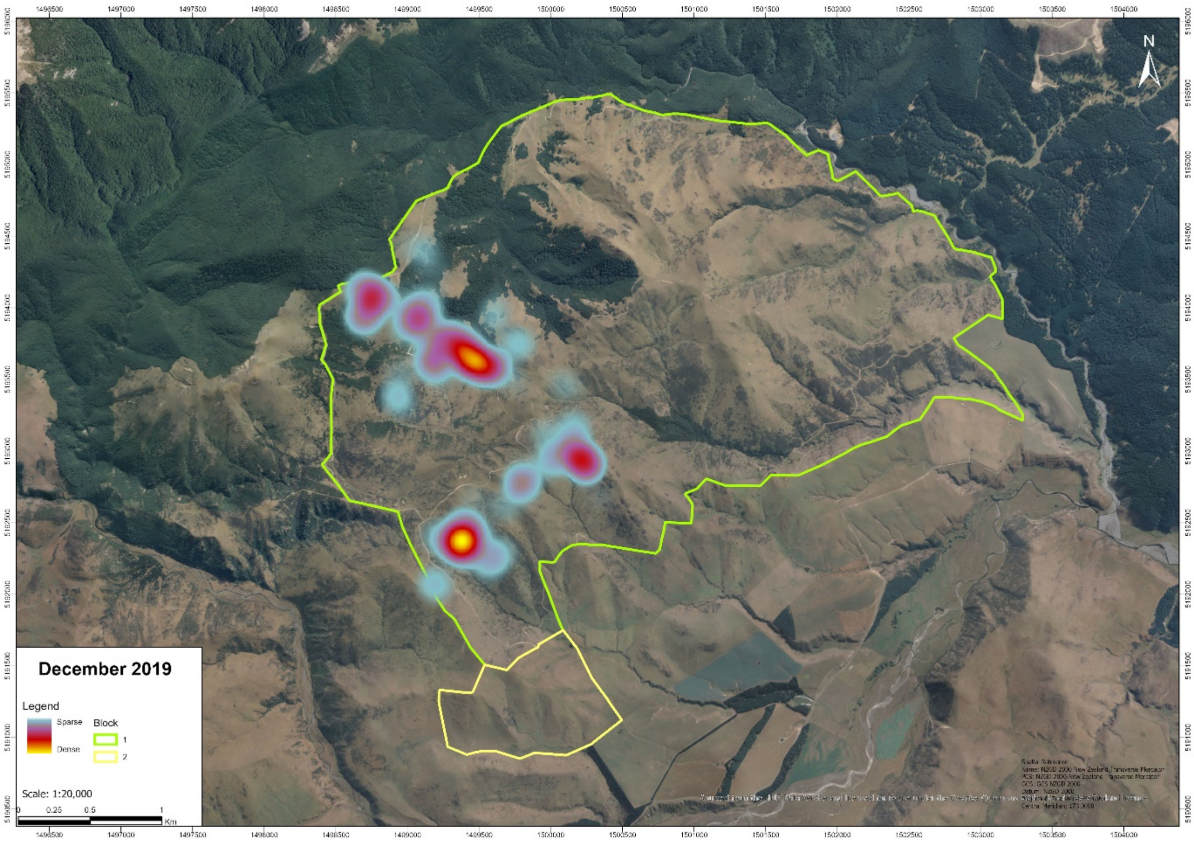

Figure 15: December 2019 heat map

2.1 Time at the fence

Time spent and duration of stay within the vicinity of the fence varied markedly by month, with similar patterns across the three different distances (Figures 16-18). During May and June the tahr spent more hours at the fence, with some notably long stays (up to 63 hours). There were no visits to the fence during August.

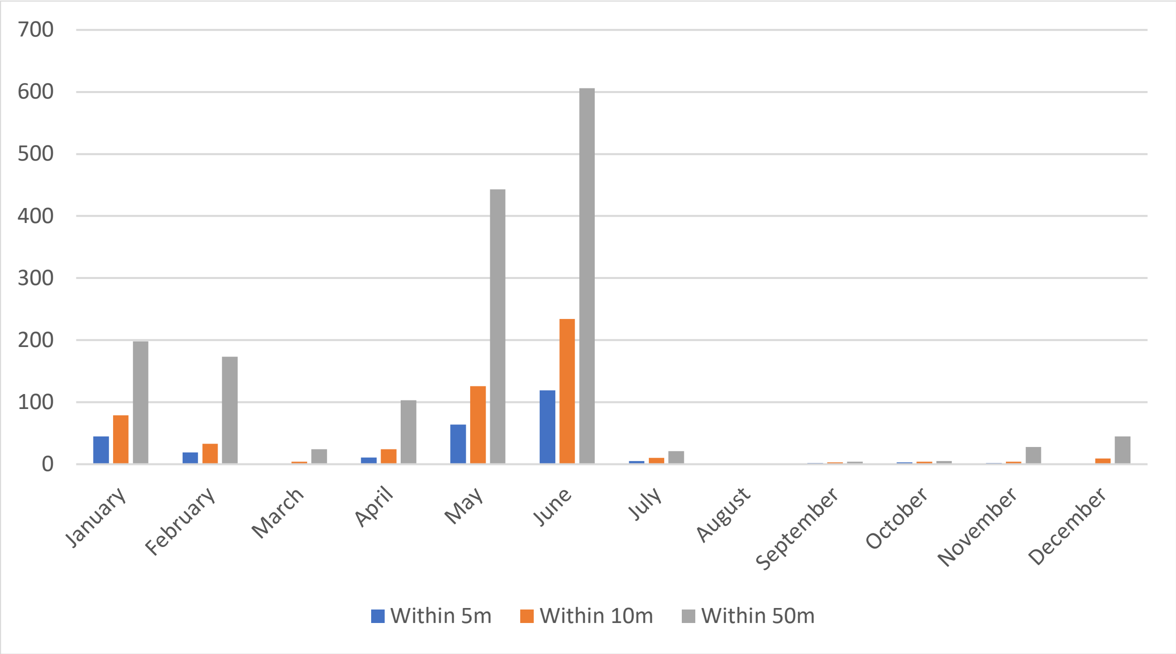

Figure 16: Total hours at the fence

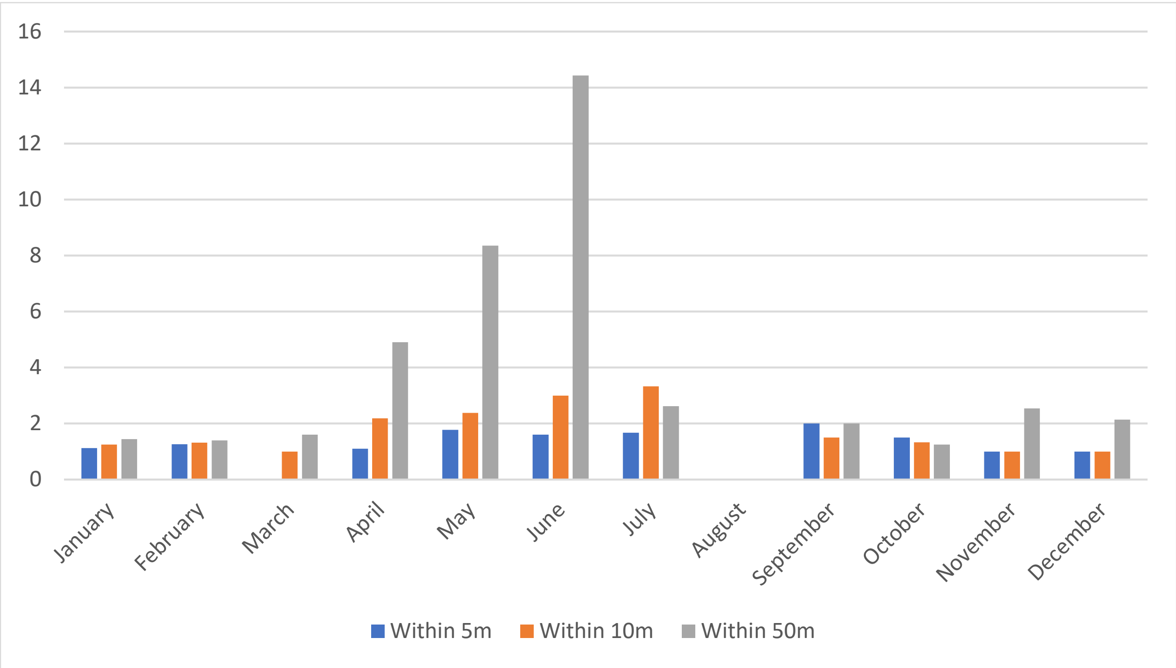

Figure 17: Mean duration of stay at the fence (hours)

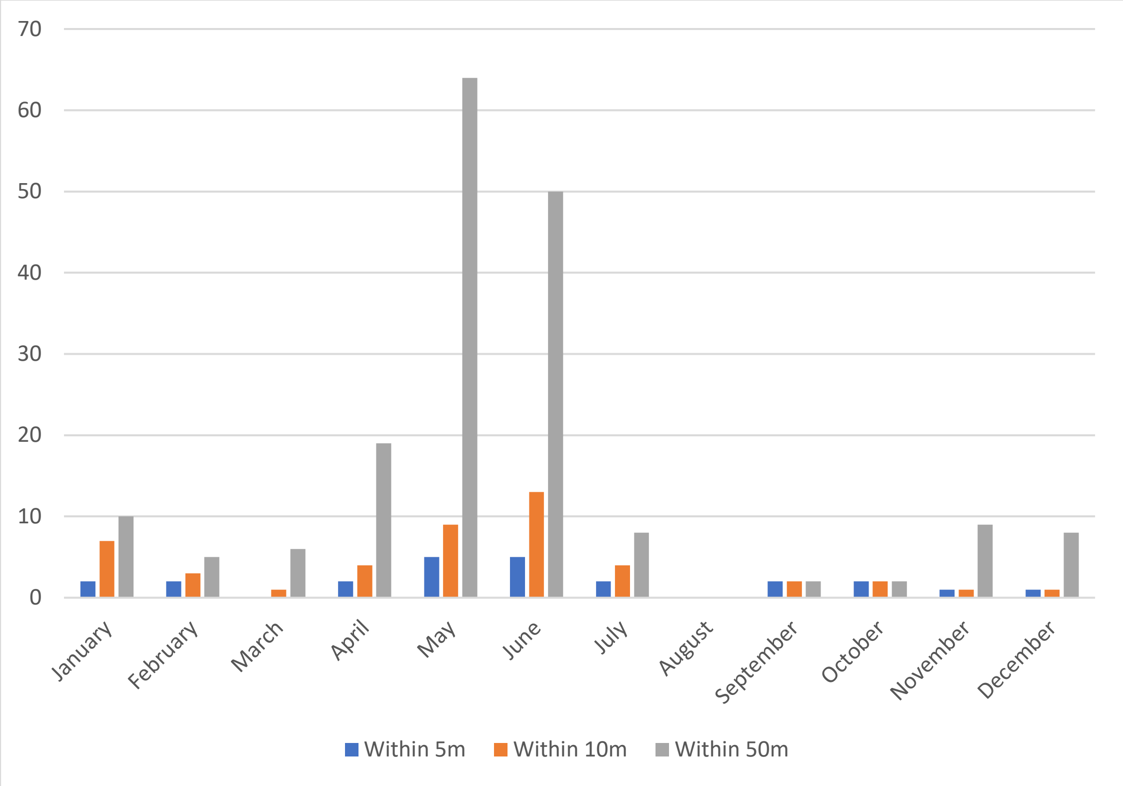

Figure 18: Longest stay at the fence (hours)

2.2 Statistical Analysis

We tested a wide range of statistical model specifications to describe fence proximity. The best model used a mixture of seasonal, monthly, and time of day independent variables, with an interaction between time Night and Spring (Table 1). The model is a moderately good fit to the data, and all coefficients are highly significant.

The statistical model powered Monte Carlo estimation of the proportion of time that the tahr spent within 5 metres of the fence (Figure 19). Model coefficient estimates and the variance-covariance matrix generated 50,000 appropriately correlated estimates of each of the predicted proportions. The distributions of these estimates provided the 95% confidence intervals. Point estimates are the means of the distributions.

This model divides the year into four periods: May, June, Spring (September – November), and other months (the excluded dummy variable). The day has three periods: Daytime (the excluded dummy variable), Evening, and Night.

May and June experienced a marked increase in time spent at the fence, particularly during the day. Except for during the spring, night was the least common time to visit the fence.

Table 1: Logit model of fence proximity. The dependent variable is "Within 5 metres of the fence".

Variable	Coefficient	Z score
Constant	-4.55725***	-34.45
May	2.03817***	11.30
June	2.79560***	17.20
Spring	-2.13654***	-3.61
Night	-1.28413***	-8.16
Evening	-0.58490***	-2.79
Spring * Night	2.11430***	2.71
Log likelihood	-1052.32729	
Restricted log likelihood	-1295.11310	
McFadden Pseudo R-squared	.187	
AIC/N	.133	
Number of observations	15,942	

*** Significant @ p<.01

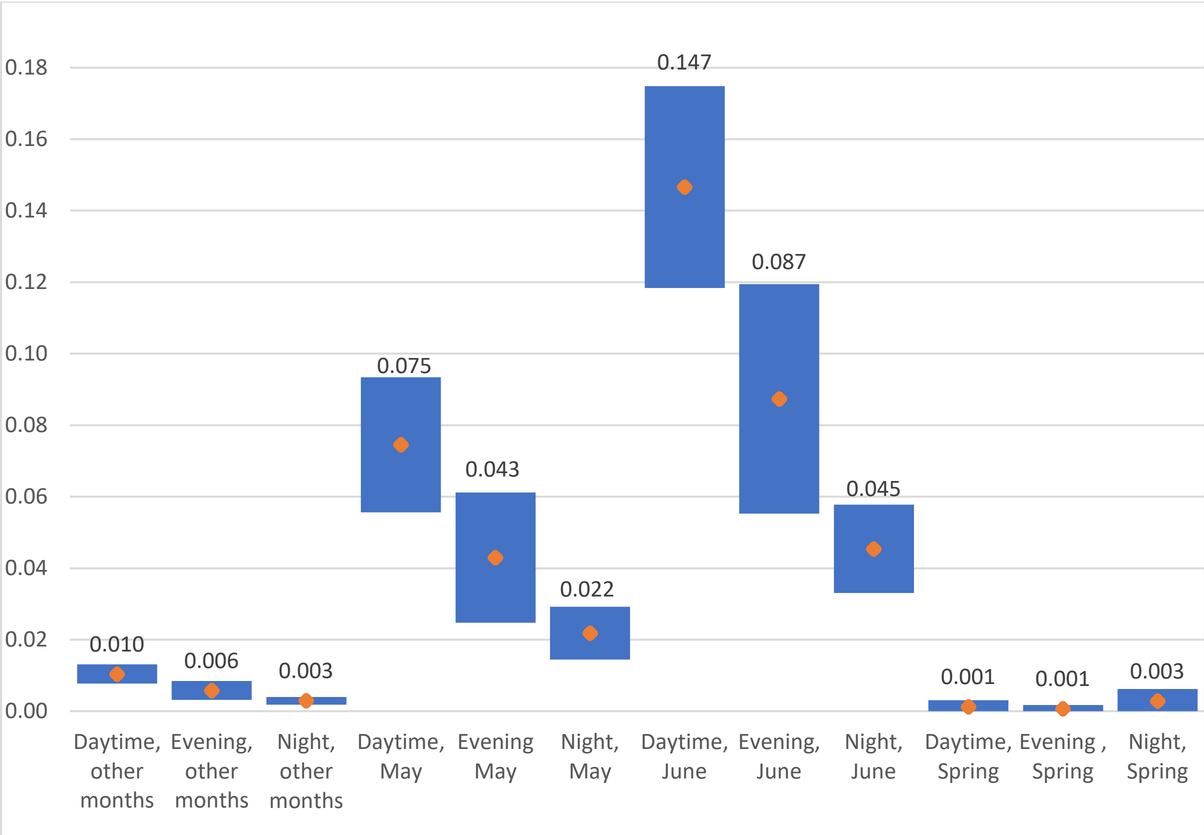

Figure 19: Predicted proportion of time within 5 metres of the fence. Blue bars are 95% confidence intervals.

Chapter 3
Discussion

Observed spatial use patterns are consistent with prior expectations. The tahr mating period occurs from mid-May through June, which probably accounts for the additional time spent at the fence during this period – a time when male tahr are known to cover large distances in search of mates (Forsyth 1997, 1999; Authors' own observations from unpublished prior GPS tracking studies). During July and August the tahr confined themselves to a very small area, consistent with a mid-winter decrease in overall activity observed in wild tahr (Tustin & Parkes, 1988). The more extensive use of the enclosure in spring is consistent with improved feed availability at these times, and generally higher associated activity levels.

The trial was a success in that the tahr did not leave the enclosure. Although the sample size is extremely small, it supports the proposition that mature farm-bred male tahr can be successfully contained within game estates outside the feral range. While there was some expectation that the tahr might show determination to escape from their new environment soon after release, that did not happen. Estate staff regularly sighted them, and confirmed they did not show distress, and soon became established in their new domain. The GPS data show that the tahr spent little time at the fence after introduction, and quickly established preferred territory within the enclosure.

For most of this study, only two male tahr were enclosed in the game estate. Commercial operations are likely to involve considerably more than that. It is possible that natural herding behaviour of tahr will make them less likely to attempt escape when more tahr are present. Further research could help test that hypothesis.

Where tahr are purchased from breeders within the feral range and released into an estate outside the range, it is in the game estate's financial interest to hunt the tahr within a much shorter timeframe than the full year these tahr were on High Peak, which further mitigates risk of escape.

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