

Kaweka Mountain Beech Project Annual Report 2017/18



Introduction

In the late 1990's, a study found browsing by sika deer was having a widespread detrimental influence on regeneration and species composition of the mountain beech forest within the Kaweka Forest Park. In 1998, the Kaweka Mountain Beech Project began, to address the issue. It was agreed that aerial deer control supplemented by enhanced recreational hunting would be the control method used to address this issue.

Aerial Deer Control (ADC) commenced in 1998 over 11,386 ha. The ADC operation has had minor changes through the years with block sizes changing depending on the results of annual monitoring. ADC ceased in 2015 for a period of three years to allow the opportunity for recreational hunters to prove that they can keep deer populations at a level that allows for mountain beech regeneration.

Result monitoring has been carried out annually in the form of faecal pellet index monitoring. Vegetation monitoring, using various methods, has been carried out periodically as outcome monitoring.

This report presents field data and information collected over the 2017-2018 monitoring season for the following Targets and Objectives;

Objective One: Maintain adequate seedling recruitment and growth rates that allow for ongoing regeneration. *Adequate mountain beech regeneration is identified as seedling growth rates that lead to canopy and gap closures at most open sites within 40 years.*

This will be achieved by:

- continuing to control deer to densities that allow for adequate mountain beech regeneration
- employing a deer density monitoring programme to assess the results
- employing a vegetation monitoring programme to assess the objectives
- reviewing management options and researching methods to increase protection of the mountain beech forest and the biodiversity of the Kaweka Forest Park

Objective Two: Increase visitor use in the Kaweka Forest Park and actively promote and enhance all recreational hunting opportunities.

This will be achieved by:

- raising awareness of and improving access to information on recreational hunting opportunities
- maintaining relationships and regularly meeting with Kaweka Forest Park user groups including NZDA, Tramping Clubs, concessionaires, Forest and Bird, Iwi, Federated Mountain Clubs and the Kaweka Hunter Liaison Group.
- working within Conservancy towards a more holistic approach to all issues relating to the Kaweka Forest Park.

Kaweka Mountain Beech Project Review

Dr Sean Husheer was contracted to carry out a review of the Kaweka Mountain Beech Project and work done to date in order for DOC to understand the current state of the mountain beech forest within the Kaweka Forest park. The objectives were to;

- Review the last ten years of data which informed management decisions to date.
- Describe the current state of the Kaweka mountain beech forest.
- Estimate the impacts of sika deer browsing.
- Determine if the objectives of the Kaweka Mountain Beech Project have been met.
- Make recommendations for monitoring and control.

In May 2018 Dr Husheer provided his review, Kaweka Forest Park Mountain Beech Project Culling and Monitoring Review doc-5515934

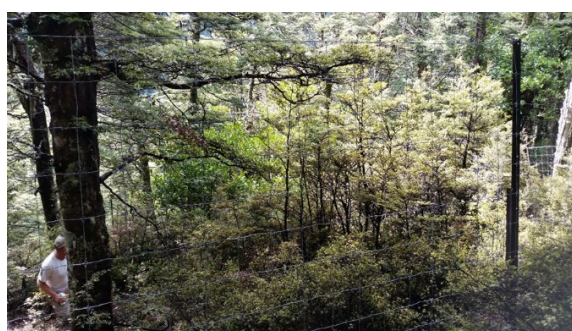
Vegetation Monitoring

Re-measurement of paired fenced & non-fenced plots

Paired fenced and non-fenced permanent plots were established between 1997 and 1999 at over twenty subjectively selected canopy gap sites in the Kaweka Forest Park to show the effects of deer on mountain beech regeneration and the consequences of deer culling. Mountain beech seedlings were tagged and measured between 1997 and 2000.

New Zealand Forest Surveys' Sean Husheer was contracted to carry out a re measurement of a selection of paired fenced and non-fenced 10 x 10 plots within the KMB project area. 36 plots were measured at 18 sites by New Zealand Forest Surveys staff between February and May 2018. This included re-measuring tagged seedlings.

Statistical power analysis of tagged seedling data from paired plots shows that mountain beech seedling growth, numbers, survival and recruitment is lower where deer have access. Because responses varied between sites, Dr Sean recommended additional plots be re-measured to allow analysis to be more conclusive. Additional plots will be remeasured during 2018/19 and the results of this monitoring will be presented in a peer reviewed journal article.



Photos from visit to Spion kop paired fenced and non-fenced plots Sept 2017. Spion kop is in the Manson hunting block, which is the KMB block which receives the most deer hunting pressure from recreational hunters.

10 x 10 gap plots

Hawkes Bay District bio staff carried out 10 x 10 vegetation monitoring between February and May 2018. Staff who carried out this monitoring were; Matt Brady, Mel Williamson, Alan Lee, Matt Short, Kelly Eaton and Kellie Mayo.

Plot locations were selected from sites that had recorded a low basal area during monitoring in 2012/13. In the 2012/13 field season, 210 10 x 10 unmarked vegetation monitoring plots were measured in order to give a vegetation index for each of the 7 different blocks within the Kaweka Mountain beech operational area (see KMB annual report 12/13 doc-1453036). Plots were located on a back bearing from permanently marked FPI transect start points. A basal area prism was used to assess basal area in all plots. If a plot had a basal area reading of $<44\text{m}^2/\text{ha}^{-1}$, mountain beech saplings and seedlings were counted. Four subordinate species; *Coprosma foetidissima*, *Coprosma psedocuneata*, *Raukaua simplex* & *Griselinia littoralis* were counted in height classes in sub plots if a plot clearly had more than 200 seedlings.

This season, monitoring sites were selected from plots that were recorded in 2012/13 as having a basal area of between $16\text{m}^2/\text{ha}^{-1}$ and $40\text{m}^2/\text{ha}^{-1}$. Canopy gap plots were chosen in order to gain data from randomly located plots with which to compare against subjectively located paired fenced and non-fenced plots remeasured by Sean. Plots that were recorded as having red beech or being in inaccessible locations were filtered out of the selection, this left us with 38 plots to remeasure. 37 of the 38 selected plots were completed. (See maps Appendix 1 for monitoring locations). The final plot did not get completed due to winter conditions making further monitoring impractical. Results from the 37 plots already measured are so clear, that not measuring the final plot does not affect results.

Although original plot layout directions were followed, it was difficult to lay out the 10 x 10 plot in exactly the same location due to plots not being permanently marked during measurement in 2012/13. This makes it impossible to draw direct comparisons between basal area measurements. As in 2012/13, all mountain beech seedlings and saplings were counted, however mountain beech seedlings $<15\text{cm}$ were counted rather than measured.

Dr Sean's analysis of canopy gap plot data shows that mountain beech seedling and sapling densities remain low. Seedling and sapling counts were not significantly different between 2012/13 and 2018. There was a significant increase in small beech seedlings $<15\text{cm}$, however this is most likely attributed to greater vigour of field staff counting this season.

There is an absence of palatable species growing through into saplings within the Kaweka Forest Park. This season, only 2 subordinate species; *Raukaua simplex* (raukawa) & *Griselinia littoralis* (broadleaf) were counted in height classes. Although there were plenty of broadleaf seedlings $<15\text{cm}$ under and near big old broadleaf trees, there were very few seedlings between 15 - 75cm, and none $>76\text{cm}$. 79 Raukawa seedlings 15 - 145cm were recorded, but only 4 Raukawa seedlings 76 - 135cm were found on inaccessible bluffs where deer could not access them. This absence of palatable species is comparable to other forests in New Zealand where deer are present.

Faecal Pellet Index Monitoring

Over the past 10 years, FPI monitoring in the KMB project area has been carried out using a modified version of Forsyth et al.'s 2005 faecal pellet index (FPI) protocol. The modification to the protocol is that only pellet groupings get counted, rather than individual pellets in groups. KMB staff also tend to be stricter on what constitutes an 'intact pellet', tending to count less pellets/groupings as intact than Tier 1 monitoring staff.

In previous years, 30 FPI transects have been measured per block during November to March. This season transects were measured between Feb 2017 and May 2018, due to a late start to the field season. 37 transects were measured alongside vegetation monitoring plots. Table 1 shows how many transects were measured per block.

Block	Tussock	Harkness	South Kaweka	Te Puke	Manson	Manga/VT	Ballard
No. of transects	7	6	3	8	6	2	5

Table 1. No. of transects measured per block.

Combined average pellet counts for all blocks by year

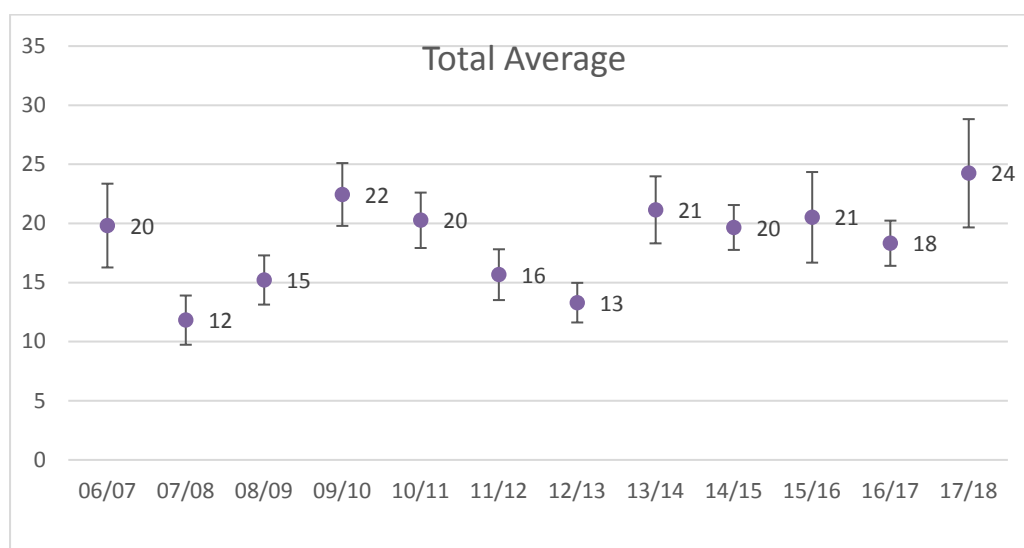


Figure 1. Combined average FPI score across all blocks for each year.

The overall average FPI score for 2017/18 is 24FPI. This is the highest average FPI recorded. Consideration should be given to the fact that the least number of FPI transects (37 transects vs 60 - 210 transects) were re measured this season, therefore error bars are higher.

Given the small sample size of FPI transects measured this season comparative to previous seasons, we are unable to draw direct conclusions against individual blocks. When analysing individual FPI transect scores from previous years, we can see that in Tussock block, over the 7 FPI transects measured this season compared to these 7 lines measured in 2016/17 season, there has been a 51% decrease in FPI scores. Manson block transects have only been measured once before in the 2012/13 season. FPI scores for the 6 FPI transects this season are considerably higher than the 2012/13 season, with an increase of 301% (see Appendix 1. FPI Values table)

Supporting documents

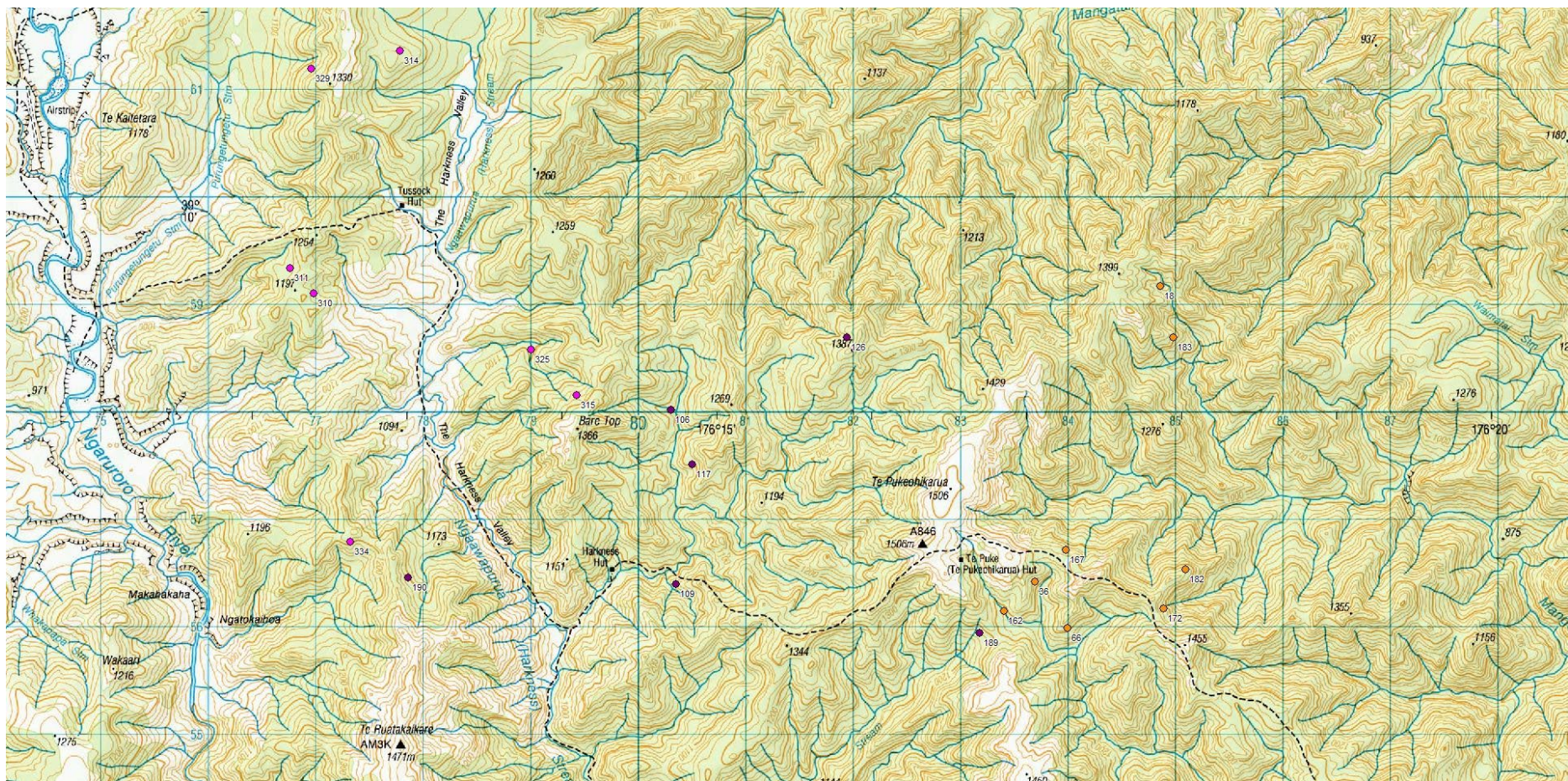
Document title	Location
Kaweka Forest Park Mountain Beech Project Culling and Monitoring Review (Sean Husheer 2018)	DOC-5515934
Kaweka Forest Park Mountain Beech 2018, Re-measurement of paired exclosure and 10 x 10m seedling plots (Sean Husheer 2018)	DOC-5509460
KMB Veg plot data 2018	DOC-5509480
Kaweka exclosure plots remeasured. Data 2018	DOC-5509476
Protocol for estimating changes in relative abundance of deer in NZ forests using faecal pellet index (FPI) (David Forsyth 2005)	DOC-5466548
Memo. Tagged seedling remeasurement. Spion kop, Manson.	DOC-3172043
Mountain beech forest dynamics in the Kaweka range and the influence of browsing animals (Allen & Allan 1997)	DOC-470377
Kaweka Mountain Beech Monitoring review (Cathy Allen 2008)	DOC-260492
Consequences of deer control for kaweka mountain beech forest dynamics. Landcare Research Report 2006	DOC-457501
FPI Raw data worksheet	DOC-2737113
Kaweka Mountain Beech Project Annual Report 2010/11	DOC-755502
Kaweka Mountain Beech Project Annual Report 2012/13	DOC-1453036
Kaweka Mountain Beech Project Annual Report 2015/16	DOC- 2825102
Kaweka Mountain Beech Project Annual Report 2016/17	DOC- 5511540

Appendix 1. FPI Values

Block	Transect no.	Previous FPI score (see note below)	2017/18 FPI score
Tussock	310	43	17
Tussock	311	68	19
Tussock	314	39	23
Tussock	315	25	32
Tussock	325	42	14
Tussock	329	42	18
Tussock	334	11	15
Harkness	106	18	32
Harkness	109	6	3
Harkness	117	18	69
Harkness	126	23	33
Harkness	189	25	25
Harkness	190	18	26
Te Puke	18	18	13
Te Puke	36	28	22
Te Puke	66	9	9
Te Puke	162	16	5
Te Puke	167	24	37
Te Puke	172	26	31
Te Puke	182	12	13
Te Puke	183	17	10
Manga/VT	3	3	38
Manga/VT	161	15	7
Ballard	71	27	23
Ballard	140	12	20
Ballard	141	9	28
Ballard	143	7	18
Ballard	161	15	7
Manson	403	5	12
Manson	404	8	49
Manson	405	6	38
Manson	420	9	20
Manson	422	20	41
Manson	435	9	12
South Kaweka	512	16	34
South Kaweka	518	23	12
South Kaweka	531	23	33

Note- Previous FPI score for Tussock, Harkness, Te Puke, Manga/VT & Ballard was taken in 2016/17. Manson and South Kaweka was taken 2011/12

Appendix 2. Maps

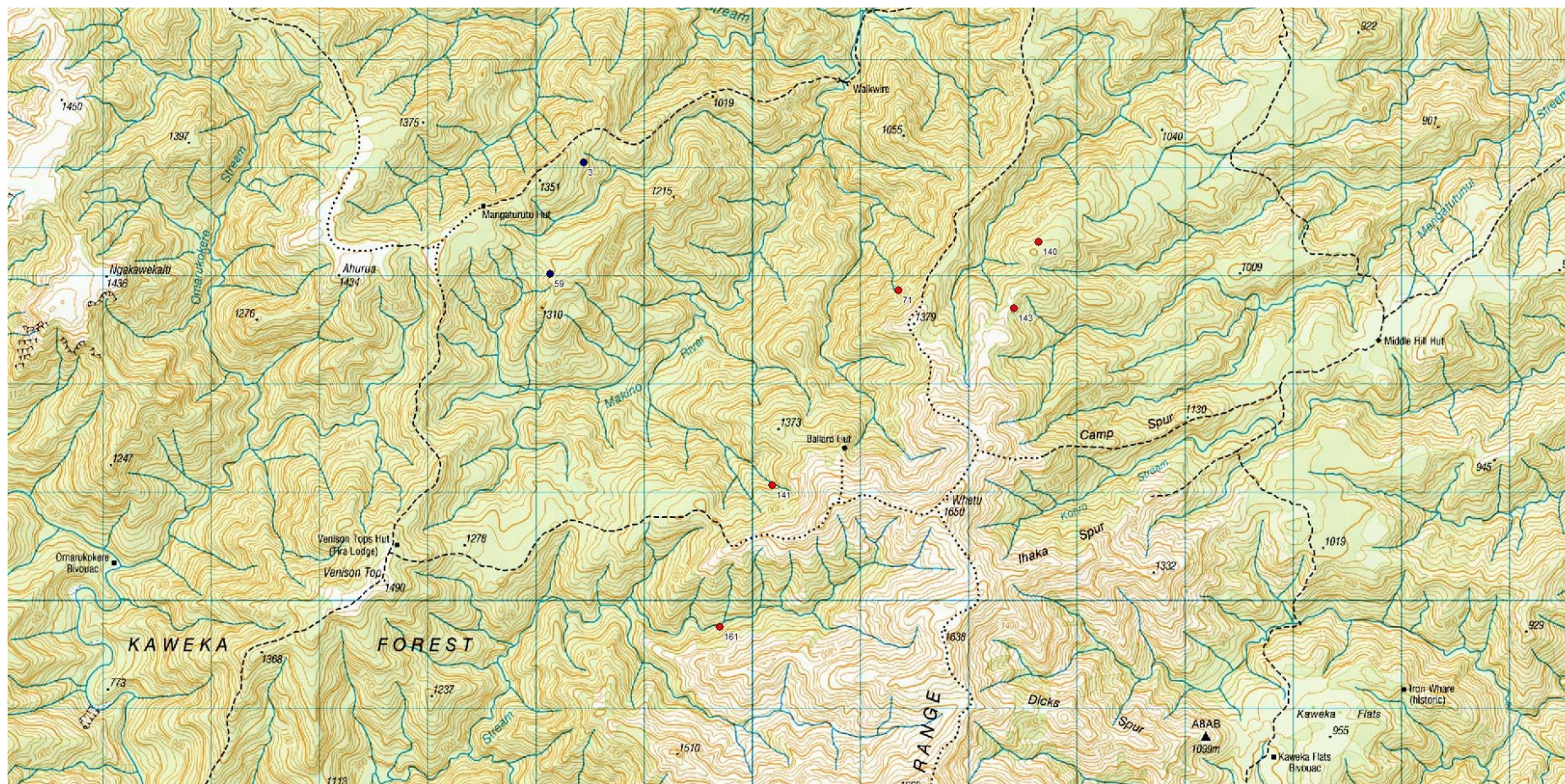


Tussock, Harkness and Te Puke blocks monitoring sites.

Pink = Tussock block

Purple = Harkness block

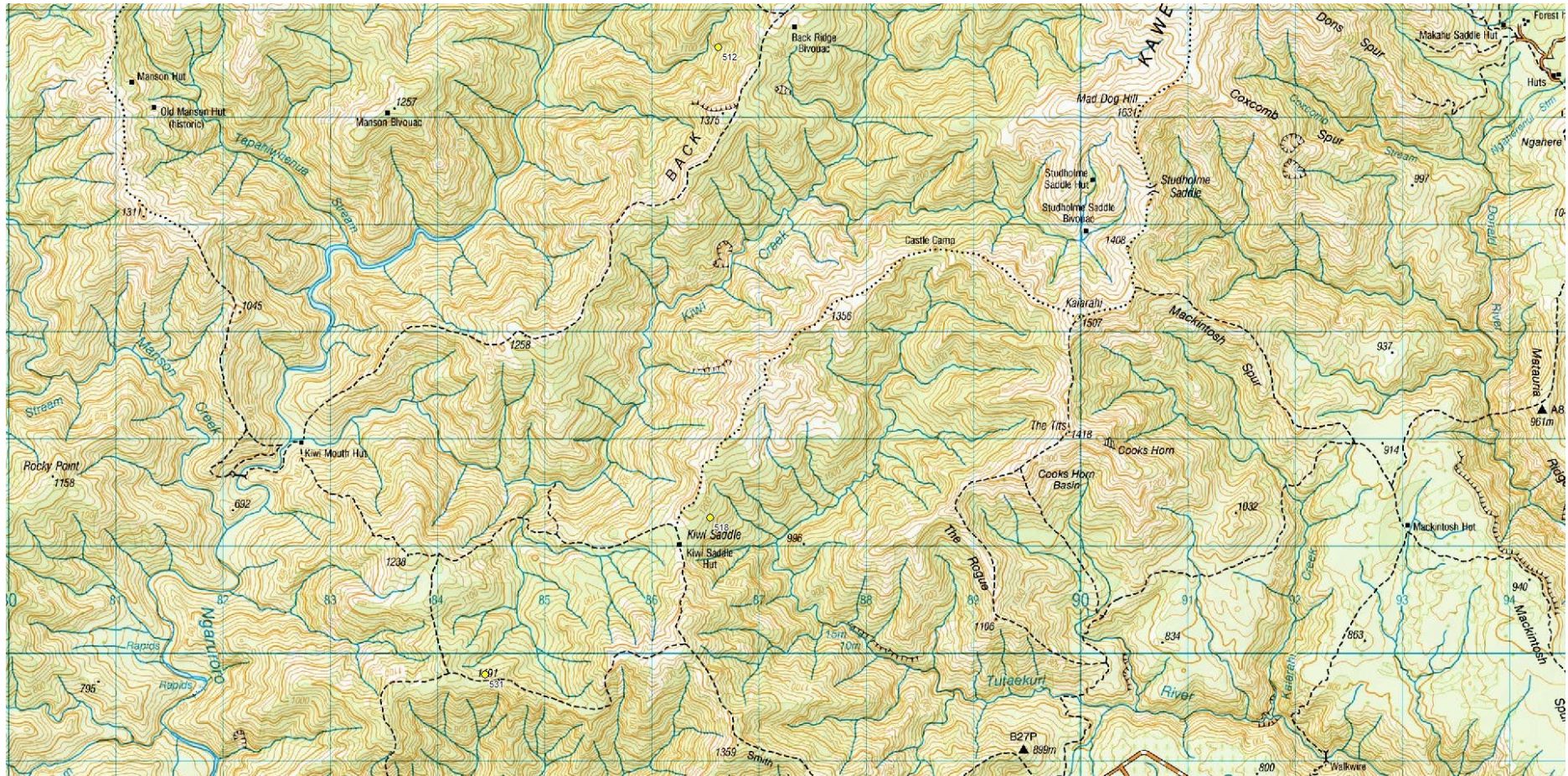
Orange = Te Puke block



Managatarutu/VT and Ballard block monitoring sites

Blue = Mangatarutu/VT block

Red = Ballard block



South Kaweka block monitoring sites
Yellow = Sth Kaweka block