2018 Aerial Feral Horse Survey Report

Bogong High Plains and surrounding valleys

May 2018

Executive Summary

A population of feral horses were counted in an area centred around the Bogong High Plains (BHP), in the Alpine National Park, in May 2018. The survey area included the Bogong High Plains and surrounding valleys. The survey used a sight-resight (mark-recapture) survey method, from a helicopter. This survey continues to build on, and compare information obtained from five previous surveys, undertaken in 2005, 2007, 2009, 2012 and 2015 using the same method.

Horses have also been removed from this area using passive trapping techniques. This survey aimed to demonstrate the effectiveness of this horse removal in relation to the total population.

Horse Numbers

There were 109 (95% confidence interval: 102-123) feral horses in the Bogong High Plains area using the Chao estimator (Chao 1988).

Table 1 Horse sighting numbers – Bogong High Plains

Sighting Detail	Value
Total number of horses sighted	153
Total number individual horses sighted	96
Number of horses (groups) sighted on day 1	74 (9)
Number of horses (groups) sighted on day 2	79 (11)
Number of horses sighted once	39
Number of horses sighted twice	57

Comparison with previous surveys

A comparison of the population sighted during the previous three surveys is shown below.

Table 2 Comparison of horse population 2005 – 2018

Year	Population estimate	95% confidence interval
2005	92	81-116
2007	95	90-100
2009	98	83-133
2012	52	51-57
2015	63	55-83
2018	109	102-123

Effectiveness of horse removal program

Feral horses were removed during the period 2005 -2018. Table 5 shows horses removed as a comparison to horse population (horses generally removed earlier in the year, prior to the survey on the same year).

Table 3 Comparison of horse population and horses removed 2005-2018

Year	Horse population	Horses removed
2005	92	10
2006	-	6
2007	95	11
2008	-	55
2009	98	37
2010	-	38
2011	-	31
2012	52	7
2013	-	26
2014	-	34
2015	63	20
2016	-	8 (early season before suspension)
2017	-	0
2018	109	3 (after aerial survey, end of season)

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Introduction

A population of wild, or feral horses were counted in an area centred around the Bogong High Plains (BHP), in the Alpine National Park, and surrounding State Forest areas, in May 2018. The survey area included the Bogong High Plains and surrounding valleys. The survey used a sight-resight (mark-recapture) survey method, from a helicopter. This survey continues to build on, and compare information obtained from five previous surveys, undertaken in 2005, 2007, 2009, 2012 and 2015 using the same method.

Horses have also been removed from this area in the past using passive trapping techniques. This survey aimed to demonstrate the effectiveness of this horse removal in relation to the total population.

The overall objectives of the project were to:

- Collect comparable data on feral horse abundance within the BHP and surrounding State Forest areas;
- Understand the effect of horse removal on the population; and
- Continue to refine methods for monitoring the BHP feral horse population.

Feral horses pose a risk to the significant natural values of the Bogong High Plains (including waterways, peatlands, and a range of threatened flora and fauna species), through pugging, trampling, selective and close grazing, and dust bathing. A reduction in the abundance of feral horses in Victoria's national parks is necessary to meet obligations under the National Parks Act 1975 (Vic.), Flora and Fauna Guarantee Act 1988 (Vic.), and Environment Protection and Biodiversity Conservation Act 1999 (Cwth.).

Aim

The aim of this project was to conduct an aerial survey to measure the Bogong High Plains feral horse population within the Alpine National Park, and surrounding State Forest.

Survey Methodology

Study Area

The survey was conducted on and around the Bogong High Plains, in the Alpine National Park, and in adjacent State Forest area in North East Victoria (Appendix 1). The survey area is characterised by flat open alpine grasslands, with the peripheral areas consisting of open and closed snow gum forest, graduating to a tall Alpine ash forest. The elevation of the study area ranges from 900m ASL to 1883m ASL. There are two significant river valleys within the study area (the Cobungra and Bundara Rivers). The survey was conducted over an area of approximately 47,000ha. The survey area was based on that used in previous surveys in 2005 (Dawson 2005; Dawson & Miller 2008) 2007, 2009, 2012 and 2015.

Survey design and field methods

The feral horse population assessment was carried out using a sight-resight (mark-recapture) survey method, from a helicopter (Dawson 2005; Dawson & Miller 2008). Each section was flown twice, a day apart, with Day 1 being the 'sight' opportunity, and Day 2 being the 're-sight' opportunity. A total of two days was spent flying. The survey was carried out on the 16th and 17th of May 2018. Surveys were performed using a Squirrel AS 350 Helicopter (contracted from Forest Air), with four persons on board. There were four people involved in the survey. The morning prior to the surveys a training and familiarisation and induction session was undertaken for all participants, including the pilot. Surveys were flown at a constant height of about 150 metres above ground, with a speed of approximately 100km/hr.

The area was flown in parallel transects, 1km apart (Appendix 2). The transects in the northern part of the Bogong High Plains Section were flown in an east west direction, as this was the most efficient and effective way to cover this area. The southern part of the Bogong High Plains section (Youngs Tops area) was flown in a north south direction, to account for the variability in the land shape as well as considering the large valleys. This flight path maximised our ability to locate horses, whilst maintaining a relatively constant speed and height above ground and not flushing horses from open country into denser vegetation where they may have been harder to see. The survey design method suggests that the second day's flight should occur at an offset of 500m to the first day's flight, as an attempt to reduce potential bias associated with possible unequal sightability from different transect lines (Dawson 2005). It was determined during the previous surveys that this was not likely to be a significant issue, due to the closeness of transects and the similarity of landform and vegetation among nearby transect. Therefore the same transects were flown on both days. Transects were recorded by the Helicopter's inboard GPS (enabling the second day's flight to accurately follow the first day's flight – Appendix 2), as well as a hand held GPS (to be downloaded for reporting purposes).

Horse sightings

Horse sightings were identified and recorded as follows: once an individual or mob of horses was sighted in that 1km transect, the helicopter was directed to their location (eg, "there is a mob at 10 o'clock"). The helicopter then flew to that location and undertook a slow, high circling of the group. This allowed some initial information to be collected and photographs to be taken prior to the horses taking flight or dispersing. If able, the helicopter also hovered for several seconds while an accurate count of the numbers of the horses was undertaken. This was done with the sun to the rear, so the observers were not looking into the sun, reducing glare off the windows (that is, the sun was kept to the pilot's side, while the passengers on the left of the aircraft recorded and photographed). Photographs of the horses were also taken at the same time. Information collected during this time was: group size, group number, time, vegetation type, location (using waypoint on GPS).

Once this initial information was collected, and photographs taken, the helicopter flew closer to the horses. Information collected during this time to 'mark' individual horses for identification was: age, sex, colour (general body coat colour – Appendix 7), specific marks or features and associations within the group. Face and leg markings were key identifying characteristics. The face markings were defined as a blaze, stripe, snip or star, with the size, shape and colour of this noted. The leg markings were defined as socks or stockings, and the leg that they occurred on was noted. See Appendix 6 for marking pattern template. Once all information was collected, and photographs taken, the photograph numbers were recorded. The helicopter then resumed its flight path by returning to the transect from where it left to look at that mob.

Cameras

Photographs were taken using two digital cameras – a Nikon D80 SLR Digital Camera with an 18-135mm zoom lens, and a Panasonic Lumix digital camera with 30X optical zoom and 20-megapixel resolution. Settings for these cameras were set on high speed, high resolution and multiple shot. Between 20 and 30 photographs were taken of each horse group sighted.

Analysis method

The data sheets and photographs were reviewed after the survey and each group assigned with a number and each horse within a group analysed. This information was then used as part of the analysis phase to determine which horses were seen on Day 2 as well as Day 1 (that is, which horses were re-sighted), as opposed to those horses only seen once (on either day on or day two). Group size and composition was also used as an identifier of whether the horses were re-sighted, although this was done with caution. It was assumed that groups would remain stable across a short timeframe (one day to the next), however we were also aware that the helicopter can temporarily disrupt group cohesion and that

groups could potentially change form one day to the next as part of normal behaviour. The location that horse groups were observed was also used to aid in identifying re-sightings, as it was assumed that horse groups would not move far from Day 1 to Day 2. The combination of group size and composition, together with individual markings, and the locations that groups were seen from Day 1 to Day 2 gave more accuracy overall.

Population size was estimated using the Chao estimator (Chao 1988), following the methodology adopted for previous Bogong High Plains feral horse surveys (Dawson 2005, Dawson and Miller 2008). The Chao estimator allows for heterogeneity in sighting probability between individuals but assumes that the population is closed and that sighting probability does not vary between samples (i.e. between day 1 and day 2).

Results

Flight Path

The survey was conducted over approximately 32,000 hectares over Parks Victoria managed land and 15,000 hectares of DELWP managed land. The original Bogong High Plains survey area was extended by about 6000ha to include an area around Mount Nelse to which a mob of horses has relocated a year ago, extending the known population area to the northern area of the Bogong High Plains. On day 1 there was 4.15 hours of flying time and on day 2 there was 5.46 hours of flying time. The transects travelled on both days were identical (Appendix 2). The variation in flying time and distance travelled was due to slight variations in flight transit flights (an extra section of State Forest was flown near Dinner Plain, not as part of the original survey flights) and clouding in on day 1.

The transects began in the Bogong High Plains section, in the northern part of the study area, closest to Falls Creek, finishing in the south east corner of this section, near Mt Battery.

Horse sightings

Bogong High Plains section

There were 109 (95% confidence interval: 102-123) feral horses in the Bogong High Plains area using the Chao estimator (Chao 1988).

The average group size seen over the two days was 6.8.

The average percentage of juveniles in the population is 25%.

The population density of horses for this section is 0.32 horses/km^2.

Consistent with the 2015 survey, most of the horses were seen in the Youngs Tops area, in open grassy plains of the National Park.

Table 4 Horse sighting numbers – Bogong High Plains

Sighting Detail	Value
Total number of horses sighted	153
Total number individual horses sighted	96
Number of horses (groups) sighted on day 1	74 (9)
Number of horses (groups) sighted on day 2	79 (11)
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DELWP section

A possible sighting of 4 horses was noted south of the Great Alpine Road but due to tall forest the animals could not be found again after the initial spotting (Appendix 9). With a high number of cattle and some deer in the area, the sighting could not be 100% reconfirmed despite searching effort. Only 1 deer was found during the following search.

Discussion

Survey Methodology and Study Area

The survey methodology is consistent with other approaches taken to measure horse abundance (Walter & Hone 2003, Vernes *et al.* 2009). It is also consistent with previous surveys on the Bogong High Plains, conducted in 2005, 2007, 2009, 2012 and 2015 (Dawson 2005, Dawson & Miller 2008). There are, however, some areas that require further refinement, and which could potentially affect the results.

The Chao estimate was used in preference to other estimators because it does not assume equal catchability (sightability). Clearly not all horses were equally sightable because horses are more difficult to see if they are in small groups, under a tree canopy and/or do not move.

The area for this year's survey was determined from previous surveys and from incidental sightings from staff. There is potential for horses that are part of this population to exist on public land to the east of Mt Battery or on private land in the Bundara and Cobungra valleys. Options to further extend the survey to cover these areas should be explored.

Horses among trees

Locating and identifying horses and horse groups among trees is difficult. Horses would often shelter under trees when spooked by the helicopter, and when this occurs, the ability to distinguish markings of individual horses is very difficult. An infra-red camera capability of the helicopter could help finding animals in more forested areas but would not eliminate the difficulty of identifying horses for the mark recapture method.

Helicopter type

The helicopter used for the survey was a Squirrel, this type of helicopter can hover for longer periods and it was stable in flight and therefore easier to take pictures and record information about horses. There are quieter helicopters that should be investigated, the Squirrel being quite loud. Quieter helicopters would have the advantage of not disturbing horses, and thus allowing more time to identify individuals, as well as reducing the risk of horses being spooked.

Camera type, light, angle, scaring of horses

As in the previous survey, we found that the Nikon D80 SLR Digital Camera with an 18-135mm zoom lens as well as Panasonic Lumix with 30X zoom provided the best photographs. The still digital cameras worked the best on their maximum pixel (resolution) setting so that when pictures were later zoomed in, they retained image quality. The type of digital camera did not appear to be critical but having a high zoom capability and the ability to take 'fast' pictures, with no shutter delay, were highly desirable features. There are now high quality, helicopter mounted camera's available. These should be investigated. These would have the advantage of better quality photographs, enabling far more accurate identification.

Undertaking the survey in the middle of the day, on a clear, cloud free day provides the best overall visibility. This did, however, create shadows among treed areas, which can make horse locating and identifying difficult. In these areas, horses are only visible when they move.

Early light snow in parts of the area made finding horses and evaluating horse activity easier. However, the white background produced more glare and more contrast for the photos which made some of the identification slightly more difficult.

In general, horses did not react significantly to the presence of the helicopter. Upon approach, most horses were grazing when spotted. Grazing often ceased for the duration of the identification time (on average approximately 4 minutes), and was resumed shortly after the helicopter moved on. In some instances, horses moved (walked, galloped) to another area, often only for a short distance (100-200m) and then resumed grazing again.

Comparison of horse numbers with previous surveys

The feral horse population of the Bogong High Plains has been surveyed before, in 2005, 2007, 2009, 2012 and 2015. A comparison of the population sighted during the previous three surveys is shown in table 9.

Table 5 Comparison of horse population 2005 – 2018

Year	Population estimate	95% confidence interval
2005	92	81-116
2007	95	90-100
2009	98	83-133
2012	52	51-57
2015	63	55-83
2018	109	102-123

From 2015 to 2018 the horse numbers increased by 73% possibly largely influenced by the suspension of the trapping program between 2016 and 2018.

Effectiveness of horse removal program

Feral horses were removed from this area during the period 2005 -2018. Horses have been removed via passive trapping in the Youngs Tops area, and from the Bogong High Plains area. Table 10 shows horses removed as a comparison to horse population (horses generally removed earlier in the year, prior to the survey on the same year).

In 2016 the trapping program was suspended awaiting the outcome of stakeholder consultation and the release of the *Alpine National Park Feral Horse Strategic Action Plan 2018-2021*. Trapping did not recommence until the end of the 2018 season, and only for the Mount Nelse population. The Youngs Tops area, where most of horses have been counted, has not been trapped for 2.5 years. From 2015 to 2018 the horse numbers increased by 73% possibly largely influenced by the suspension of the trapping program between 2016 and 2018.

A high fertility rate of the horse population is reflected by a percentage of juveniles of 25% in the survey population and would have influenced the quick increase of numbers.

Table 6 Comparison of horse population and horses removed 2005-2018

Year	Horse population	Horses removed
2005	92	10
2006	-	6
2007	95	11
2008	-	55
2009	98	37
2010	-	38
2011	-	31
2012	52	7
2013	-	26
2014	-	34
2015	63	20
2016	-	8 (in the early season)
2017	-	0
2018	109	3 (after aerial survey)

References

Chao, A. (1988). Estimating animal abundance with capture frequency data. Journal of Wildlife Management 52: 295-300.

Dawson, M. (2005). Bogong High Plains Horse Survey: Final Report. Unpubl. Report to Parks Victoria

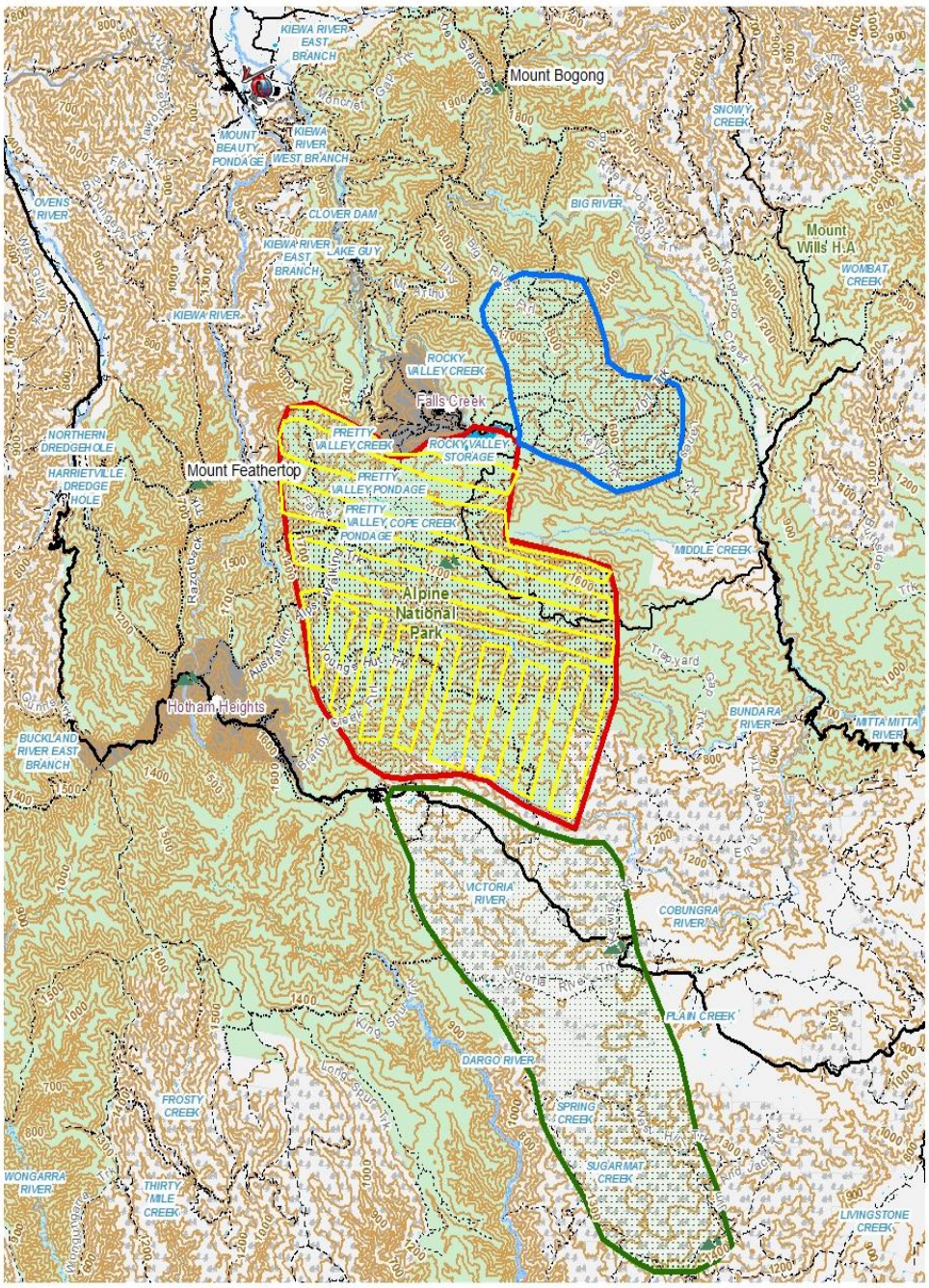
Dawson, M. & Miller, C. (2008). Aerial mark-recapture estimates of wild horses using natural markings. Wildlife Res. 35, 365-370.

Garrot, R.A., Sinniff, D.B. & Eberhardt, L.L. (1991) Growth rates of feral horse populations. *Journal of Wildlife Management* 55:641-648.

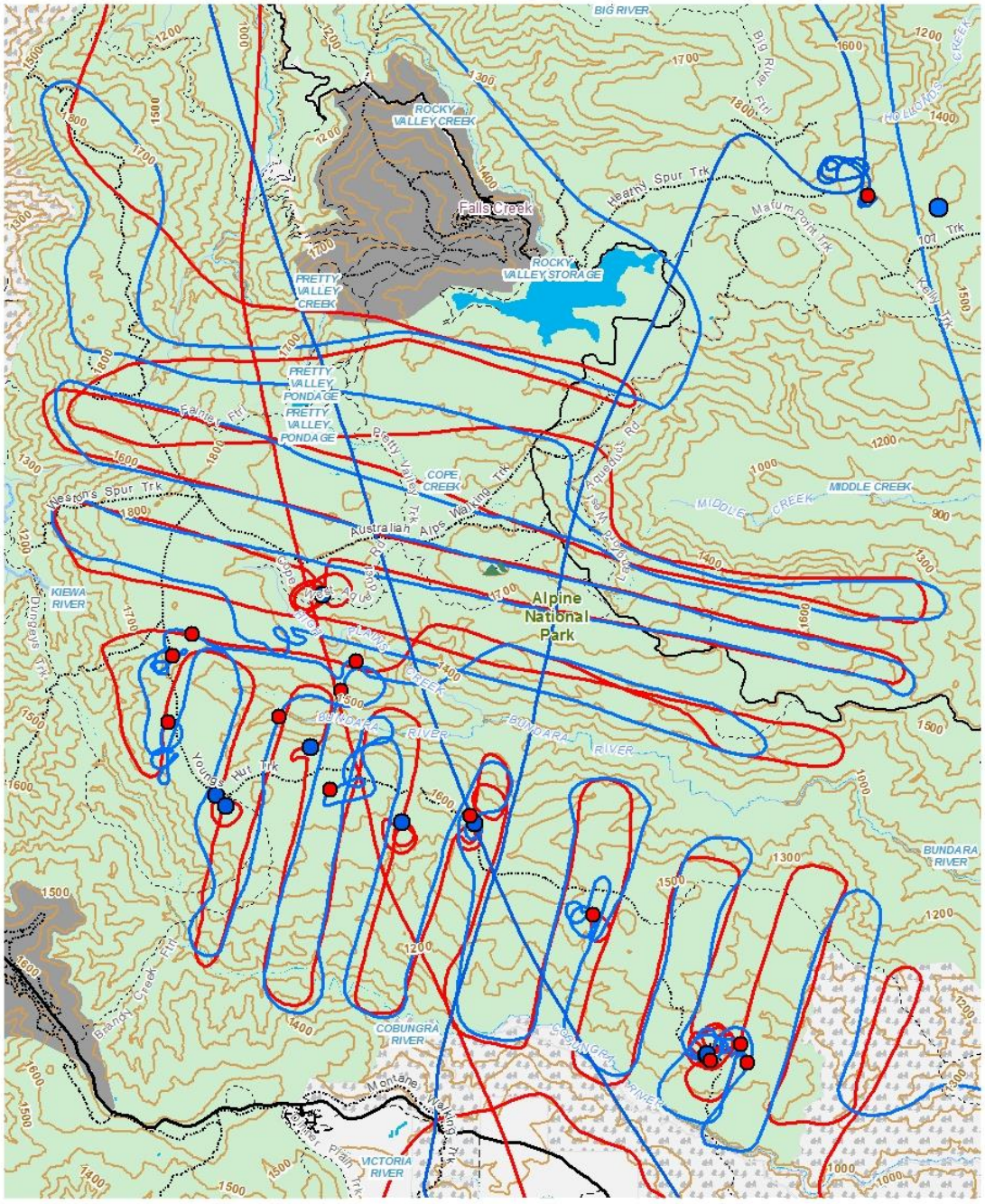
Vernes, K., Freeman, M. & Nesbitt, B. (2009). Estimating the density of free-ranging wild horses in rugged gorges using a photographic mark-recapture technique. Wildlife Res. 36, 361-367

Walter, M. J. and Hone, J. (2003). A comparison of 3 aerial survey techniques to estimate wild horse abundance in the Australian Alps. Wildlife Society Bulletin, 31: 1138-1149.

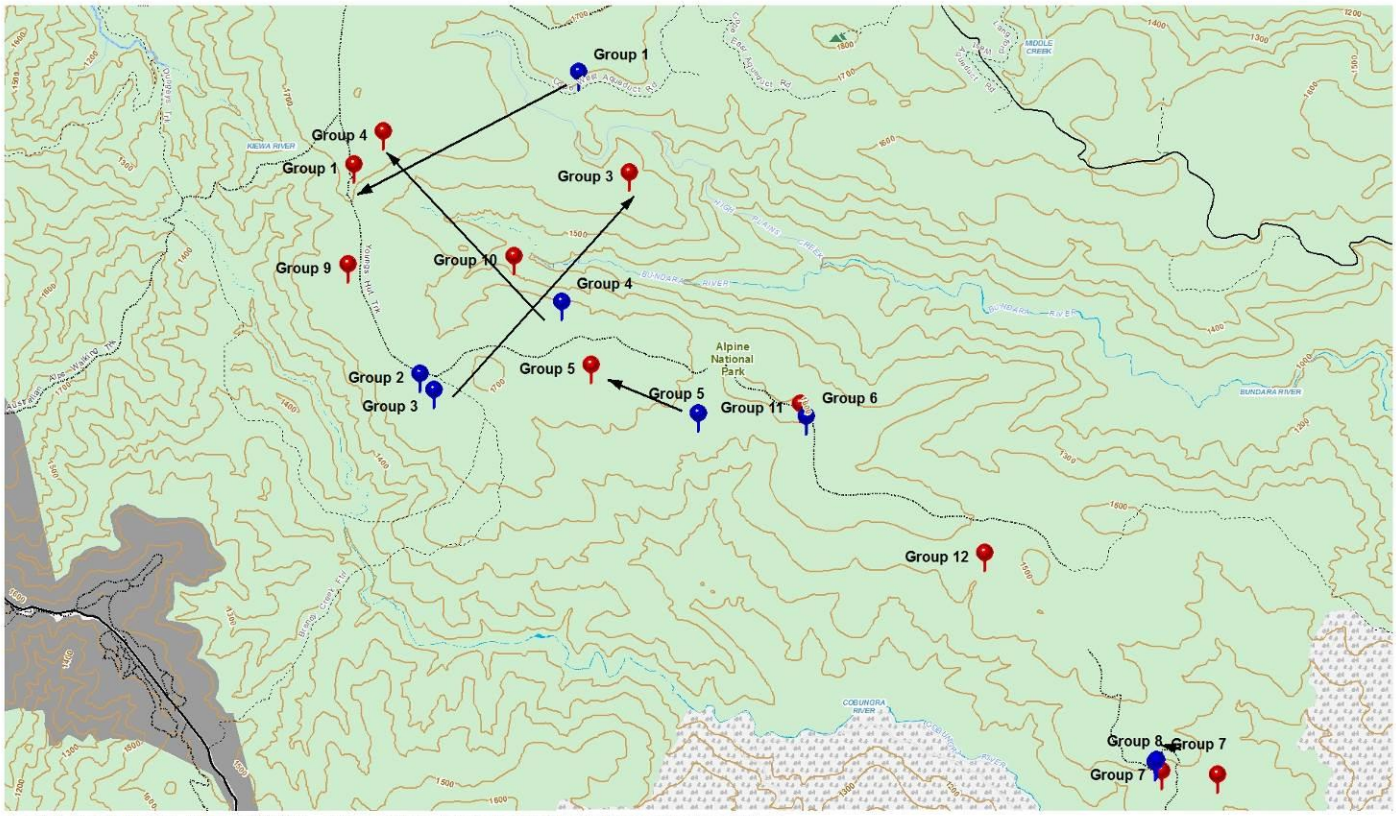
Appendix 1: General survey area



Appendix 2: Transects flown with horses sighting locations - Day one and Day two



Appendix 3: Horse group locations and movements Youngs Tops area - Day one and Day two



Aerial Feral Horse Survey 2018 - Horse Movements and Locations Youngs Tops

22/05/2018
Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator

Parks Victoria 0 0.75 1.5 3 Km N

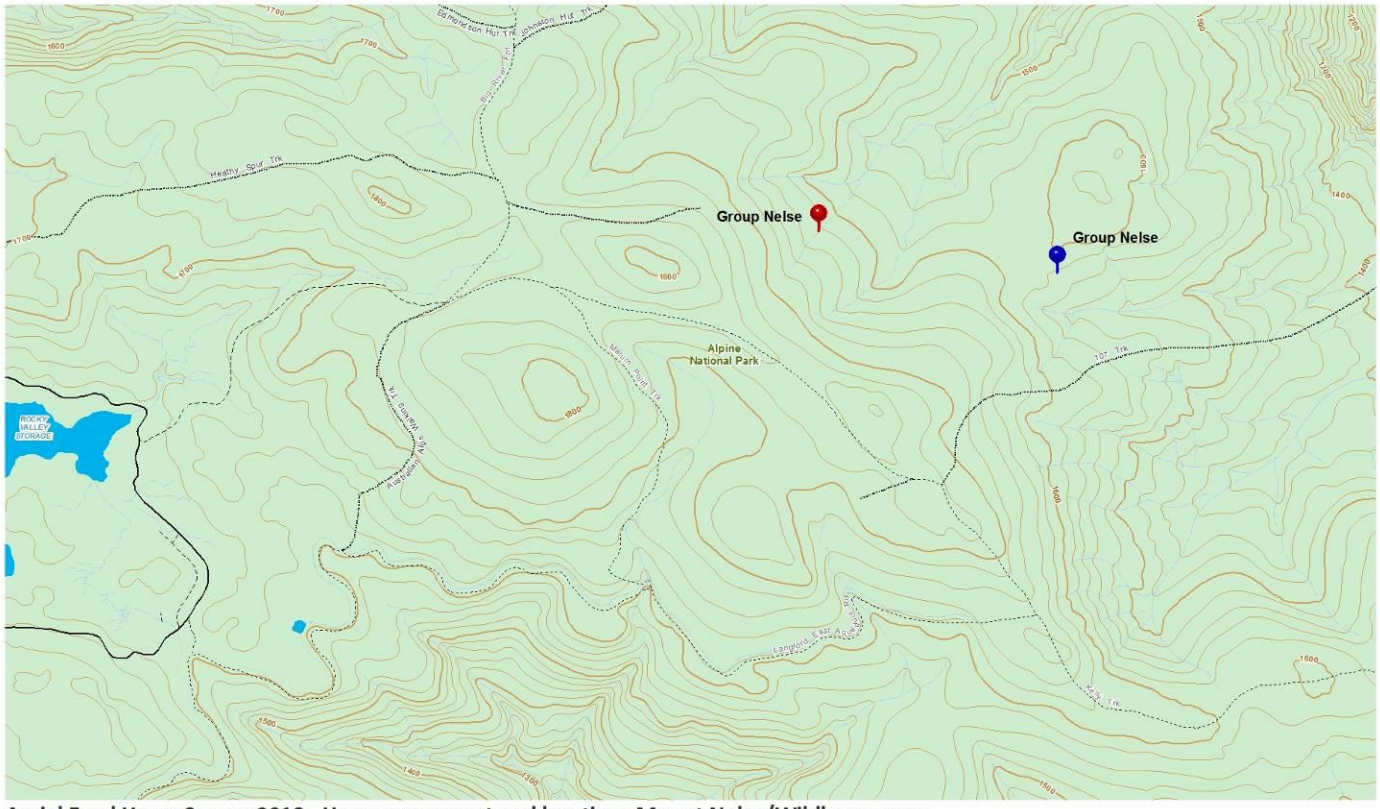
Disclaimer: Parks Victoria does not guarantee that this data is without flaw of any kind and therefore disclaims all liability which may arise from you relying on this information.
Data source acknowledgements: State Digital Mapbase, The State of Victoria and the Department of Environment, Land, Water and Planning.

Legend

Horse Group Sighting Day 1

Horse Group Sighting Day 2

Appendix 4: Horse group locations and movements Mt. Nelse area - Day one and Day two

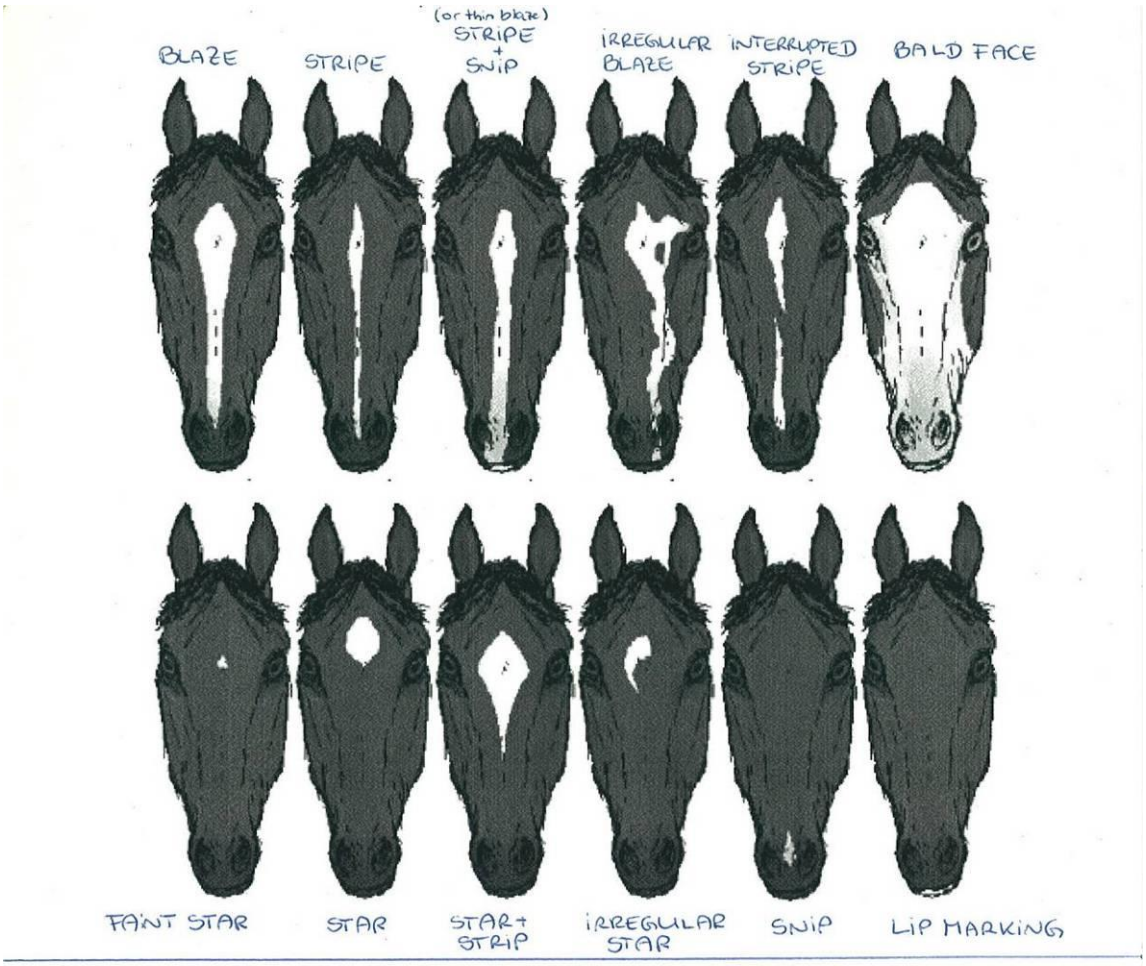


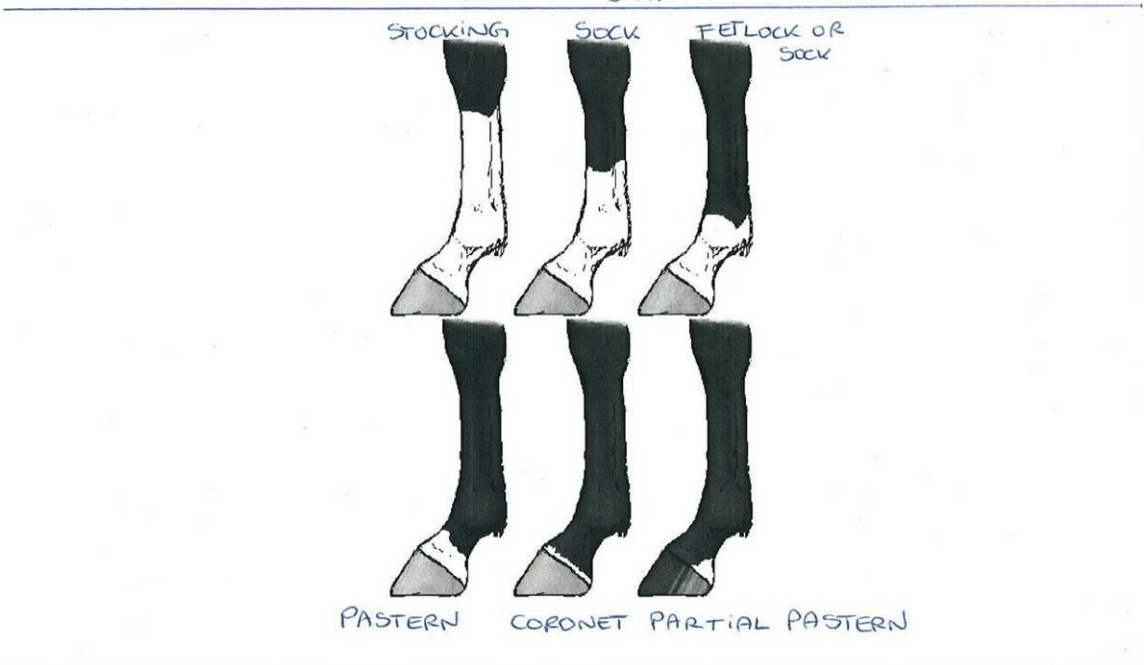
Appendix 5. Photos from helicopter to identify and match horse groups

Group 1, Day 1 of survey

Group 1, Day 2 of survey (resighting)

Appendix 6. Horse Markings Identification Chart





Appendix 7. Horse Colour Identification Chart

Black

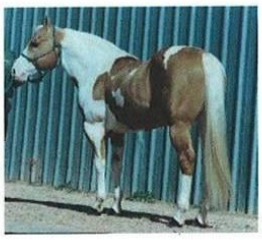
Black horses have pure black coats with no signs of brown or any other color. Many horse-people mistake dark bays or liver chestnuts for black. If you can see any other color (with the exception of white markings) on the horse's coat in the winter, he is not a true black. The reason I say "in the winter" is because the sun tends to lighten a dark horse's coat in the summer, and the exception is when the hair has been sun-burnt.

Bay

Bay horses run from light reddish or tan shades to dark brown and mahogany/auburn shades. Bay horses **always** have black points (legs, muzzle, mane and tail, and the tips of their ears are black). Many bay horses have black legs that are covered by white markings.

Dark Bay

Dark brown coat, reddish or black highlights, black points.

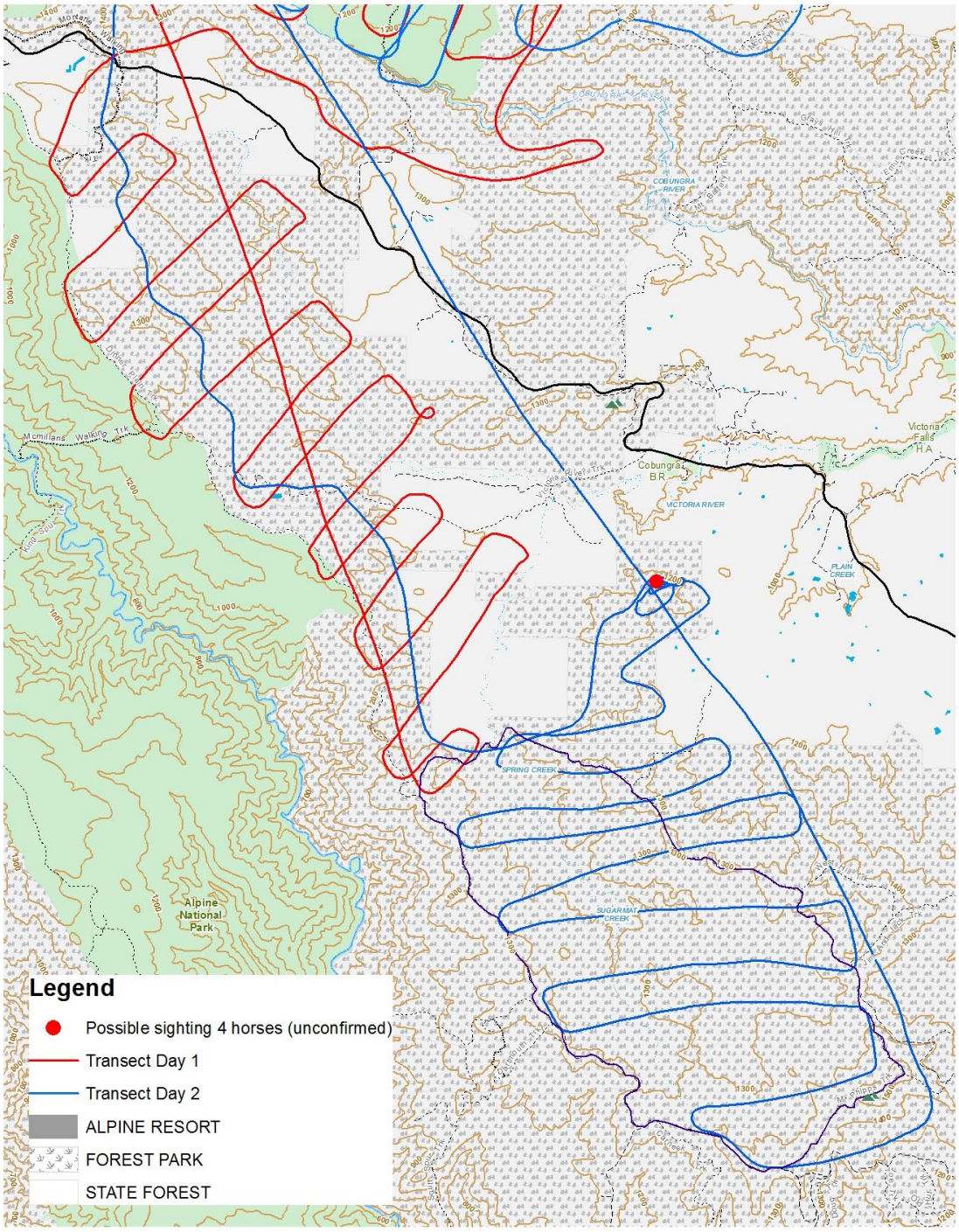


Pinto

Chestnut

Chestnut, (also known as "sorrel"), is reddish brown. The points (mane, tail, legs and ears) are the same color as the horse's body (other than white markings). Chestnuts range from light yellowish brown to a golden-reddish or dark liver color. All chestnuts have shades of red in their coats

Appendix 8. DELWP managed land survey – Location of possible horse sighting (4 horses)



Appendix 9. Raw data of horse numbers

Table 7 Horse numbers – Bogong High Plains survey area

	Sighting Number	Group ID	Number of new horses	Number of horses recaptured
Day 1	1	1	8	
	2	2	6	
	3	3	9	
	4	4	7	
	5	5	10	
	6	6	3	
	7	7	9	
	8	8	7	
	Nelse1	Nelse/0	15	
Day 1			**74**	
Day 2	9	3	0	9
	10	4	0	7
	11	1	0	8
	12	9	6	
	13	10	4	
	14	5	0	10
	15	11	4	
	16	12	5	
	17	7	0	8
	18	13	3	
	Nelse2	Nelse/0	0	15
Day 2			**22**	**57**