



Annual Report

Vale of Belvoir Reserve 2018-19

Advocate 6 June 1968 1/13
**LUGGING A PACK —
 ACHING BACK — AND
 BLISTERED FEET?
 NOT A BIT OF IT!**

Murray Geard's picture of members of the North-West Walking Club resting at an old hut in the Vale of Belvoir on a recent trip from Black Bluff via Lake Lea and the Vale to the Cradle Mountain road.

The sense of achievement and satisfaction derived from success in most fields of sport and recreation can be readily appreciated, even by non-participants.

The triumph of booting a goal from 50 yards out, sinking the highest, sinking a 20 ft. putt, being first over the finishing line or through the tapes, hitting a six, serving an ace . . . even winning a game of crib.

These are achievements which provide the kind of satisfaction most of us can easily understand.

Perhaps it is because in most forms of sport and recreation there is but one result. Either we win or we are beaten. And it is in our make-up to derive personal satisfaction from victory, not defeat.

But there is one recreation — and it is becoming increasingly popular — which leaves a lot of people guessing.

It is the recreation known simply as bushwalking.

What enjoyment or satisfaction do they get from it, these bushwalkers?

Most of us can appreciate scenery, sure, and most of us enjoy a quiet stroll in the bush now and then.

THE ADVOCATE
**WEEKEND
 MAGAZINE**

scrub — up mountains and down valleys — lugging a heavy pack; setting out one day in sweltering heat and returning the next perhaps in driving rain; crawling into a pup tent at night with blistered feet and aching muscles — where's the pleasure in it?

boots, your feet don't blister. Wearing the right clothing, you don't get too wet.

"And a sleeping bag can be a very welcome and comfortable bed after a good day's walk," he said.

Men like explorer Henry Hellyer, surveyors James Sprent, Ronald Campbell Gunn and the eccentric Nathaniel Kenilsh, prospector James (Philosopher) Smith, nature lover and botanist . . . and his

53-mile walk through the Cradle Mountain reserve is unique in Australia and attracts walkers even from overseas."

★
MALCOLM says the N.W.

INTRODUCTION

The Tasmanian Land Conservancy (TLC) protects important natural areas as permanent reserves and aims to demonstrate excellence in reserve management for biodiversity conservation. The TLC has adopted an adaptive management framework – the Open Standards for the Practice of Conservation which comprises 6 key steps – planning, implementing, monitoring, reporting, review/adaptation and communication.

The Vale of Belvoir Reserve was acquired by the TLC in 2008 and protects 476 hectares of highland grassland, wetlands and rainforest in the Tasmanian highlands, northwest of Cradle Mountain National Park. The management of the Reserve is guided by the Vale of Belvoir Reserve Management Plan. The plan is implemented by TLC staff through an Annual Work Plan and Monitoring Plan. Details of ecological monitoring methods can be found in TLC's Ecological Monitoring Procedures Manual on www.tasland.org.au.

This report describes progress made towards delivery of the management plan in 2018-19, and is divided into three sections:

1. Reserve Scorecard – a table summarising the results of ecological monitoring to date;
2. Management Summary – providing details of the implementation of key management strategies and making recommendations for plan improvement;
3. Ecological Monitoring Summary – providing details of the status of conservation targets and trends of key ecological indicators

The recommendations made in this report are used to adapt and improve management of the Reserve, update the management plan, and revise work and monitoring plans for the coming year. Key findings of this report are communicated to TLC Board, supporters and other stakeholders.


Cover image: Advocate weekend newspaper article 6 June 1964, p13. TLC's Vale of Belvoir featured in story


VALE OF BELVOIR RESERVE SCORECARD 2018-19

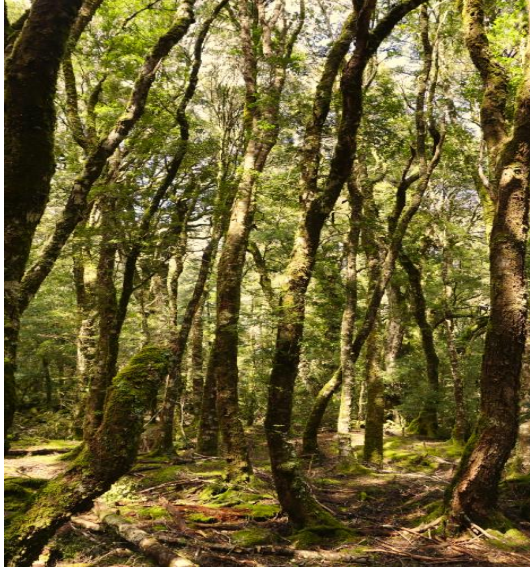
Ecological Monitoring								
Target	Indicator	Status 2014-15	Status 2015-16	Status 2016-17	Status 2017-18	Status 2018-19	Trend	
Highland grassland	Floristic diversity (species/site)	10.9	9.6	11.2	12.7	13.2	Good - Improving	
	Structural complexity (lifeforms/site)	3.7	3.8	3.7	3.7	3.7	Stable – No change	
	<i>Leucochrysum albicans</i> (cm/transect)	26.5	26.5	19.0	11.5	10.2	Decreasing	
	<i>Stackhousia pulvinaris</i> (cm/transect)	23.8	23.8	18.8	16.4	9.6	Decreasing	
	<i>Oreixenica ptunarra</i> (count/transect)	29	13	55	38	20	Variable	
Streams and wetlands	Floristic diversity	12.6	10.3	9.9	13.7	14.4	Natural fluctuation	
	Structural complexity	2.9	2.9	2.9	2.9	3.0	Natural fluctuations	
	Water quality	Total N No data Total P No data	1.2 0.12	No data No data	No data No data	No data No data	No data No data	Insufficient data Insufficient data
Highland forest	Floristic diversity	8.8	8.5	8.5	8.4	8.6	Stable	
	Structural complexity	8.5	8.5	8.5	8.5	8.5	Stable	
	Recruitment (cohorts/site)	1.1	1.1	1.1	1.1	1.1	Stable	
Terrestrial mammals (entire reserve)	Species richness	9 native species 1 introduced species	7 native species 3 introduced species	9 native species 2 introduced species	8 native species 1 introduced species	7 native species 2 introduced species	Most species stable, with natural fluctuation. Southern brown bandicoot not recorded since 2017, ringtail possum not since 2014	
	Proportion of native species	0.90	0.70	0.82	0.89	0.78	Stable/ decrease	
	Species diversity indices	Simpsons 0.70 Shannon-Wiener 1.49	Simpsons 0.76 Shannon-Wiener 1.54	Simpsons 0.79 Shannon-Wiener 1.69	Simpsons 0.81 Shannon-Wiener 1.72	Simpsons 0.79 Shannon-Wiener 1.67	Stable - increasing	
	Tasmanian devil	Occupancy	0.53	0.46	0.73	0.60	0.73	Stable - increasing
		Activity	0.08	0.08	0.29	0.21	0.19	
	Eastern quoll	Occupancy	0.89	0.69	0.73	0.73	1.00	Stable - increasing
		Activity	0.12	0.09	0.16	0.39	0.43	
Spotted-tailed quoll	Occupancy	0	0	0.08	0.18	0.07	Low density population data	
	Activity	0	0	0.004	0.013	0.003		
Wombat	Occupancy	1	1	1	1	1	Stable with natural fluctuation including activity peak in 2017	
	Activity	0.48	0.66	0.82	0.64	0.54		
Management Effectiveness								
Strategy	Indicator	Status 2014-15	Status 2015-16	Status 2016-17	Status 2017-18	Status 2018-19	Trend	
Grazing management	Grazing Intensity	120 + 60	130 + 40	92 + 16	80 + 16	80	Decreasing	
	No of summer cattle + calves							

	Dry Sheep Equivalent		1156	1137	747	659	585.6	Decreasing
Fire management	Fire extent (ecological)		0 ha	27 ha	0 ha	16 ha	1 ha	Fluctuating
	Fire extent (unplanned)		0	0	0	0	0	Flat
Weed management	Weed extent		Not measured	Not measured	<200m2	Not measured	Not measured	Reducing
	Weed density		Not measured	Not measured	Sparse	Not measured	Not measured	Reducing
Feral animal management	Wasp abundance		Not measured	Not measured	0 observations	Not measured	Not measured	Insufficient data – needs review
	Feral cat	Occupancy	0	0	0.15	0.09	0	Low density population
		Activity	0	0	0.01	0.004	0	
	Rabbit	Occupancy	0	0	0.08	0	0.07	Low density population
Activity		0	0	0.007	0.003	0		
Fallow deer	Occupancy		Present – not yet on camera	Present – not yet on camera	Present – not yet on camera	Present – not yet on camera	Present – not yet on camera	Present, not yet captured on camera, trend unknown


MONITORING SUMMARY

HIGHLAND GRASSLANDS		Status: Good				
Goal: Maintain the condition and extent of highland grasslands and threatened species		Outcome: 2 Alerts Detected				
<p>Target description: Highland grasslands are the most extensive and significant conservation feature of the Vale of Belvoir Reserve. The grasslands are home to an outstanding diversity of wildflowers including many threatened species including the grassland paper daisy (<i>Leucochrysum albicans</i>), and alpine candles (<i>Stackhousia pulvinaris</i>). The grasslands also support an exceptionally diverse fauna, including high populations of native carnivores such as the Tasmanian devil, and grassland specialists such as the ptunarra brown butterfly and tussock skink – both threatened species.</p>						
	Monitoring quadrat in grasslands at the Vale. Photo: D Kingdom					
Indicator	2014-15	2015-16	2016-17	2017-18	2018-19 Trend	
Floristic diversity (species/site)	10.9	9.6	11.2	12.7	13.2 Increasing	
Structural complexity (lifeforms/site)	3.7	3.8	3.7	3.7	3.7 Stable	
<i>Leucochrysum albicans</i> (cm/transect)	26.5	26.5	19.0	11.5	10.2 Decrease	
<i>Stackhousia pulvinaris</i> (cm/transect)	23.8	23.8	18.8	16.4	9.6 Decrease	
<i>Oreixenica ptunarra</i> (count/transect)	29	13	55	38	20 Variable	
<p>Key findings</p> <ul style="list-style-type: none"> Monitoring has demonstrated that the richness and structure of native grassland vegetation has been maintained BUT a steady decline in <i>Stackhousia pulvinaris</i> and <i>Leucochrysum albicans</i> is occurring. This has been discussed and a larger number of monitoring sites will be installed in 2020 to improve our understanding on the magnitude of this change. Surveys undertaken for Ptunarra brown butterflies during their March flying season in 2019, confirmed the species was still present in sites burnt but variability in number of butterflies flying over the duration of the flying season makes it difficult to determine population trend. Ecological burning in two areas has resulted in improved species richness after 2-5 years. The floristic diversity of an area illegally burnt in 2012 is approximately 10% higher than in unburnt areas, while a more recent burn in 2015 has rebounded post fire and is on an upward trajectory. Research is continuing to build on the paper published by: Lennard & Kingdom (2017) Disturbance ecology of Tasmanian highland grassland — an overview and implications for conservation management. Papers and Proceedings of the Royal Society Tas, 151. pp. 1-10. 						
<p>Recommendations</p> <ul style="list-style-type: none"> Review cattle grazing at the end of the lease in 2020. Increase the number of monitoring sites to identify the voracity of the daisy decline. Continue to implement the fire management plan and maintain monitoring focus on burn areas. Repeat grassland diversity survey in Jan 2020. Prepare a paper to be published on the outcomes of the grassland diversity survey. Seek Cradle Coast NRM support to continue best-practice management of highland grasslands. 						

STREAMS AND WETLANDS		Status: Good			
Goal: Improve the condition of streams and wetlands		Outcome: More data needed			
Target description: The Vale of Belvoir forms the upper catchment of the Vale River, and is scattered with numerous streams and wetlands. Limestone underlies the whole valley and a range of karst features, including caves, sinkholes and outcroppings are scattered across the landscape.					
		Ground parrot at the Vale. Photo: Jeremy Williams			
Indicator	2014-15	2015-16	2016-17	2017-18	2018-19
Floristic diversity	12.6	10.3	9.9	13.7	14.4 Improving
Structural complexity	2.9	2.9	2.9	2.9	3.0 Stable
Water quality (Total Nitrogen)	NA	NA	1.2	NA	NA data needed
Water quality (Total Phosphorous) Reference: Site VABE011 Nitrogen 0.43, Phosphorous 0.20	NA	NA	0.12	NA	NA data needed
Key findings <ul style="list-style-type: none"> Monitoring has shown that the diversity of riparian vegetation has improved during the 2018-19 year but this may be due to resuming normal weather conditions after an exceptionally dry period or even reflect just natural variation. Sampling of water and macroinvertebrates needs to be undertaken on a consistent basis to inform management. Seek the assistance of freshwater ecologist Laurie Davies. Pugging and nitrification caused by cattle continue to have a major impact on wetlands across the reserve. While the level of impact varies from wetland to wetland, some wetlands are severely impacted, with nutrient levels up to 4 times higher than reference sites. Cattle continue to trample sensitive vegetation esp sphagnum peatland and riparian vegetation. 					
Recommendations <ul style="list-style-type: none"> Review grazing at the Vale of Belvoir in terms of riparian and water quality impacts in 2020 Continue long-term ecological monitoring of vegetation Seek assistance to undertake water quality monitoring with standardised sampling on a regular basis 					

HIGHLAND FOREST		Status: Very Good			
Goal: Maintain the condition and approximate extent of highland forests		Outcome: On track			
<p>Target description: Highland forest occurs on the eastern and western slopes of the Vale of Belvoir. Grassy woodland dominated by cider gum fringes the open grassy valley. These woodlands are exceptionally diverse in terms of flora, and are a hotspot of activity for fauna. Beyond the woodland fringe, fire has created a sharp boundary where the vegetation changes suddenly to closed rainforest dominated by mature myrtle, with a dark but open understorey covered in mosses, lichens and fungi.</p>					
		Vale of Belvoir Rainforest. Photo: J Hattam			
Indicator	2014-15	2015-16	2016-17	2017-18	2018-19
Floristic diversity	8.8	8.5	8.5	8.4	8.6 Stable
Structural complexity	8.5	8.5	8.5	8.5	8.5 Stable
Recruitment (cohorts/site)	1.1	1.1	1.1	1.1	1.1 Stable
Terrestrial Mammals (data across entire reserve)					
Species richness	9 native species 1 introduced sp	7 native sp 3 introduced sp	9 native sp 2 introduced sp	8 native sp 1 introduced sp	7 native sp 2 intro sp
Proportion of native sp	0.90	0.70	0.82	0.89	0.78
Species diversity indices	Simpsons 0.70 Shannon- Wiener 1.49	Simpsons 0.76 Shannon-Wiener 1.54	Simpsons 0.79 Shannon- Wiener 1.69	Simpsons 0.81 Shannon- Wiener 1.72	Simpsons 0.79Shannon -Wiener 1.67
Tasmanian devil	Occupancy	0.53	0.46	0.73	0.73
	Activity	0.08	0.08	0.29	0.19
Eastern quoll	Occupancy	0.89	0.69	0.73	1.00
	Activity	0.12	0.09	0.16	0.43
Spotted-tailed quoll	Occupancy	0	0	0.08	0.07
	Activity	0	0	0.004	0.003
Wombat	Occupancy	1	1	1	1
	Activity	0.48	0.66	0.82	0.54
Key findings 2018-19					
<ul style="list-style-type: none"> Highland forest vegetation remains in excellent condition with no changes detected this season Forest margins remain a hotspot for terrestrial mammals. Most common recorded mammals are: echidna, Tas pademelon, Bennetts wallaby, brushtail possum, wombat, Tas devil and eastern quoll. Southern brown bandicoot not recorded since 2017 and ringtail possum only once in 2014-15. This year Tas devil and eastern quoll occupancy and activity remained good with spotted-tail quoll now being recorded on a more consistent basis but still in low density. Wombats remain in good numbers across the Vale and were detected at 100% of monitoring sites. 					
Recommendations					
<ul style="list-style-type: none"> Continue long-term ecological monitoring on an annual basis Encourage a research project investigating non-vascular flora Score wombat images for evidence of mange and Tasmanian devils for facial tumour disease. 					

MANAGEMENT EFFECTIVENESS SUMMARY

GRAZING MANAGEMENT					
Key objective(s) <ul style="list-style-type: none"> Assess the impact of cattle grazing on the Vale's biodiversity. Manage grazing in accordance with lease arrangements. Maintain good relationships with the graziers (the Charleston family) and the grazing lessee (PWS). 			Status 2018-19 On-track		
Strategy description There has been a long history of cattle grazing at the Vale of Belvoir and grassland ecologists have suggested that grazing may have helped maintain grassland diversity, by preventing grass species from outcompeting herbs and other minor species. Following the Reserve's acquisition, the TLC has continued to graze cattle under a lease arrangement with the previous owners and the PWS, while the effects of grazing on biodiversity values are determined.					
Cattle in Vale waterways. Photo: TLC.					
Indicator	2014-15	2015-16	2016-17	2017-18	2018-19 Trend
No cattle + calves	120 + 60	130 + 40	92 + 16	80 + 16	80 -Reducing
Dry Sheep Equivalent	1156	1137	747	659	586 - Reducing
Progress in 2018-19 <ul style="list-style-type: none"> The historic grazing regime was maintained in accordance with the lease arrangements. Cattle numbers were lower this year (80 cattle) equating to a reduced Dry Sheep Equivalent/ha = of 586, and grazed for a total of 5 months. Species richness data was analysed to examine the effects of the various combinations of grazing and burning, or their absence on grassland diversity and vegetation community composition. Data analysis by Mark Hovenden (UTAS) identified that species richness was significantly lower, and was sedgier, in areas where disturbance by cattle grazing or burning was absent. The highest species diversity was in areas that were either grazed and burnt, or only burnt. Multi-variate analysis showed that burning had a strong influence on community composition, while grazing had very little influence. A paper presenting these results was given at the NSW Nature Conservation Council's Fire and Biodiversity Conf. Cattle grazing will be reviewed at the end of the current grazing lease (ending 2020). TLC continued good relationships with the Parks and Wildlife Service and the Charleston family. 					
Key recommendations for future management <ul style="list-style-type: none"> The decision to phase out grazing should be based on monitoring data for ecological health and condition of the Vale ecosystem but managed sensitively given the cultural significance of cattle grazing at the Vale and the Charleston family history. Continue to communicate the findings of monitoring and research to all stakeholders and to publish findings in a relevant scientific journals. Continue the ecological burning program to ensure that an appropriate disturbance regime maintains the conservation values especially grassland floristic diversity and threatened species. Continue to take a precautionary approach by monitoring the Reserve annually, so that any potential adverse effects associated with grazing cessation are identified quickly. Particular focus should be on disturbance regimes, the role of fire in maintaining diversity, and threatened species population dynamics. 					

FIRE MANAGEMENT

Key objective(s)

- No unauthorised fires occur on the reserve (ongoing)
- Ecological burns are used to maintain floristic diversity of grasslands

Status 2018-19

Some delays but on-track

Strategy description

Fire has been an important ecological process at the Vale of Belvoir for thousands of years. The burning practices of aboriginal people and then graziers are largely responsible for the extent and condition of today's grasslands. Cool burns at the end of winter maintain the openness of grassy vegetation, which enables herbs to thrive. Fires also prevent the encroachment of trees and shrubs into grassland areas. The TLC contracted two expert fire ecologists to prepare an ecological fire management strategy in 2013, and began implementing a program of ecological burning in 2014, with the aim of maintaining the diversity and extent of grasslands.



Tim Deveraux undertaking a pre-burn assessment at the Vale Sep 2018. Photo: TLC

Indicator	2014-15	2015-16	2016-17	2017-18	2018-19
Fire extent (ecological)	0 ha	27 ha	0 ha	16 ha	1 ha
Fire extent (unplanned)	0	0	0	0	0

Progress in 2018-19

- A pre burn assessment was undertaken in Sep 2018 by T Deveraux (third planned burn at the Vale) for approximately a 20 ha patch burn north of Daisy Hill. Burn permits were obtained from TFS and Threatened Species Unit DPIPW.
- In mid Sept the burn was attempted with TLC staff present. The burn did not take hold due to the ground being saturated and was postponed and re-scheduled for the 2019 season.
- Fuel load data collected in Jan 2016 was analysed to determine the effect of cattle grazing on grassland fuel loads. These results suggested that cattle grazing has a small effect on reducing fuel loads. Fire initially has a large effect on fuel loads, however this is likely to decrease as the period since fire increases.
- TLC continues to maintain good relations with the PWS, as planned burns use natural boundaries, such as drainage lines or ridges, that are relatively unsecure and can result in burns extending beyond the planned burn area into the PWS managed Vale of Belvoir Conservation Area.
- There were no unauthorised fires on the Reserve in 2018-19.
- A video of fire management and ecological recovery at the Vale is available on the web site.
- A fuel stove only policy is being implemented, except at Charleston's hut, where a wood-burning stove was installed in 2015 to replace an open fireplace.

Key recommendations for future management

- Continue to undertake and monitor ecological burns at the Vale.
- Continue the monitoring program around ecological burning and cattle grazing.
- Ensure several monitoring sites are in each planned burn area.
- Ensure that regulatory permits for burning are requested 6 – 12 months before the planned burn timeframe, to ensure that permits are received in sufficient time.

WEED MANAGEMENT

Key objective(s)

- Control existing infestations of scotch thistle.
- Prevent establishment of other weed species.

Status 2018-19

On-track

Strategy description

The Reserve is largely free of weeds. There are isolated patches of Scotch thistle, but these pose minimal threat to the natural values and are a low priority for management. Gorse, broom, blackberry, foxglove and ragwort occur in the local area and pose a more serious threat to the values. Ongoing monitoring will minimise the risk of these weeds becoming established.



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Update #3 on Thistle Control, Vale of Belvoir, 23/4/2019

24th April 2019
Walter Herrmann

Wally Herman undertook weed work at the Vale April 2019

Indicator	2014-15	2015-16	2016-17	2017-18	2018-19 Trend
Weed extent	No data	No data	<200m ²	No data	No data but reducing
Weed density	No data	No data	Sparse	No data	No data but reducing

Progress Report by W Herman 2018-19

On 23rd April I re-visited and re-applied herbicide spot sprays to thistles at thirty-two previously treated sites at the Vale of Belvoir (Figure 1). The method of herbicide application was similar to that of my two previous rounds of spraying in May 2018 and January 2019, i.e. spot sprays at the rate of 2.2 ml MCPA herbicide, 7ml Blazon Blue dye, and 1 ml Pulse penetrant per litre of water (Herrmann, 2018). In the latest round of spraying I used a total of 6 litres of that mixture applied to 1764 spots. The majority of spot sprays were on individual thistles at the rosette stage of growth, and some spots were on patches of very small rosettes growing in clusters up to about 30 cm diameter. No mature live thistles were observed. The table on the next page lists the locations and the number of spot sprays at each site for the three herbicide applications to date. A full-seasonal evaluation, comparing the May 2018 and April 2019 data, suggests a significant overall reduction of about 60% in the known thistle population. Figure 2 graphically and spatially represents the decrease. My three thistle monitoring sites TMS 1, 2 & 3 also show, at metre-scale, large reductions in thistle numbers over the past year. These are depicted in Figures 3, 4 & 5. Most gratifyingly, the current absence of mature thistles shows that the control program has greatly reduced, possibly nearly eliminated, the generation and dispersal of new seed from mature thistles in the previous two summers. That reduction is well depicted in comparative photos in Figure 6. However, a number of sites showed a significant increase in numbers of thistles relative to the previous midsummer spray conducted at around the turn of this calendar year. Most notably, the combined thistle population in sites T01 to T15, along the forest margin, appears to have more than doubled in the last four months. That, unsurprisingly, indicates a considerable reservoir of seed remains in the ground. This April 2019 round of thistle spraying involved a total of ten hours voluntary work: seven hours in the field and one return trip of three hours from Forthside. The thistle decline is encouraging – but they clearly have potential to rebound. Accordingly, I shall continue to monitor thistles at these sites and re-spray as required. A twice yearly control regime seems appropriate: an initial spray in November-December targeting the spring-germinated thistles that may be developing flower stems (which are easy to spot), and a follow-up spray in April to kill rosette-stage thistles germinated during subsequent summer and autumn.

Key recommendations for future management

- Continue to use skilled volunteers for weed control and to monitor for other priority weeds species.
- Update weed mapping and collect weed data on a consistent basis.

FERAL ANIMAL MANAGEMENT

Key objective(s)

- Monitor the impact of European wasps on ptunarra brown butterflies and undertake control if required.
- Determine if cats, rabbits and deer present a significant threat to natural values.

Status 2018-19

Low densities persist

Strategy description

European wasps have been recorded preying on endangered ptunarra brown butterflies near the Vale of Belvoir, where butterfly populations have subsequently crashed. PhD research investigating the specific impact of European wasps on ptunarra brown butterfly populations, may provide management clues. It is likely that, if wasps are present in high numbers, then active wasp control during March when adult ptunarra brown butterflies are emergent, may reduce their impact on this species.

Cats present a serious threat to native animals although in relatively low numbers. Rabbits are also in low numbers, and fallow deer scat was observed for the first time in 2016.



European rabbit at VABE 111.

Indicator	2014-15	2015-16	2016-17	2017-18	2018-19 Trend
Wasp abundance	No counts	No counts	0 observed - 0% of sites	No counts	0 observed – 0% of sites - Stable
Cat occupancy	0	0	0	0.15	0 – low density
Cat Activity	0	0	0	0.01	0 – low density
Rabbit occupancy	0	0	0	0.08	0.07 – low density
Rabbit activity	0	0	0	0.007	0 – low density
Fallow deer	0	Scats - no id on camera	Scats – no id on camera	Scats - no id on camera	Scats - no id on camera

Progress in 2018-19

- Wasps were surveyed during ptunarra brown butterfly surveys, with no individuals or nests observed.
- Fauna monitoring has shown that cats and rabbits are in low numbers, with rabbit being detected at VABE111 this year.
- Deer scats were observed for the first time at the Vale of Belvoir in 2016 and have now been seen in every subsequent year. They have yet to be detected on camera so no measures of abundance are available yet.

Key recommendations for future management

- Undertake more rigorous monitoring of European wasps. Continue to search and destroy any wasp nests found. Collect data on the location and number of wasp nests controlled, to monitor changes in the relative abundance and distribution of wasps. If wasp numbers are found to be increasing then a systematic search for wasp nests should be considered.
- Continue to monitor feral cats, rabbits and status of fallow deer.