TASMANIAN
LAND
CONSERVANCY

Annual Report

Vale of Belvoir Reserve 2017-18

www.tasland.org.au

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 2017-18, 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: TLC ecological monitoring at the Vale of Belvoir Feb 2018. Photo: Phil Laroche

VALE OF BELVOIR RESERVE SCORECARD 2017-18

Target	***Indicator***		***Status 2014-15***	***Status 2015-16***	***Status 2016-17***	***Status 2017-18***	***Trend***
Highland grassland	Floristic diversity (species/site)		10.9	9.6	11.2	12.7	Stable/ increasing
	Structural complexity (lifeforms/site)		3.7	3.8	3.7	3.7	Stable
	Leucochrysum albicans (cm/transect)		26.5	26.5	19.0	11.5	Decreasing
	Stackhousia pulvinaris (cm/transect)		23.8	23.8	18.8	16.4	Decreasing
	Oreixenica ptunarra (count/transect)		29	13	55	38	Stable – natural fluctuation
Streams and wetlands	Floristic diversity		12.6	10.3	9.9	13.7	Stable – natural fluctuation
	Structural complexity		2.9	2.9	2.9	2.9	Stable
	Water quality	Total N Total P	No data No data	1.2 0.12	No data No data	No data No data	Insufficient data Insufficient data
Highland forest	Floristic diversity		8.8	8.5	8.5	8.4	Stable
	Structural complexity		8.5	8.5	8.5	8.5	No change
	Recruitment (cohorts/site)		1.1	1.1	1.1	1.1	No change
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	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	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	Stable/ increasing
	Tasmanian devil	Occupancy Activity	0.53 0.08	0.46 0.08	0.73 0.29	0.60 0.21	Stable / increasing
	Eastern quoll	Occupancy Activity	0.89 0.12	0.69 0.09	0.73 0.16	0.73 0.39	Stable/increasing
	Spotted-tailed quoll	Occupancy Activity	0 0	0 0	0.08 0.004	0.18 0.013	Low density population data
	Wombat	Occupancy Activity	1 0.48	1 0.66	1 0.82	1 0.64	Stable, with natural fluctuation including activity peak in 2017
Strategy	***Indicator***		***Status 2014-15***	***Status 2015-16***	***Status 2016-17***	***Status 2017-18***	***Trend***
	Grazing Intensity		120 + 60	130 + 40	92 + 16	80 + 16	Decrease

Grazing management	No of summer cattle + calves						
	Dry Sheep Equivalent		1156	1137	747	659	Decreasing
Fire management	Fire extent (ecological)		0 ha	27 ha	0 ha	16 ha	Fluctuating
	Fire extent (unplanned)		0	0	0	0	Flat
Weed management	Weed extent		Not measured	Not measured	<200m2	Not measured	Flat
	Weed density		Not measured	Not measured	Sparse	Not measured	Flat
Feral animal management	Wasp abundance		Not measured	Not measured	0 observations	Not measured	Insufficient data
	Feral cat	Occupancy Activity	0 0	0 0	0.15 0.01	0.09 0.004	Low density population
	Rabbit	Occupancy Activity	0 0	0 0	0.08 0.007	0 0.003	Low density population
	Fallow deer	Occupancy	Present – not captured on camera	Present – not captured on camera	Present – not captured on camera	Present – not captured on camera	Present but trend unknown

Note: The 'Visitor Management and Community Engagement' Strategies have been removed and are now reported across all TLC reserves annually

MONITORING SUMMARY

HIGHLAND GRASSLANDS	**Status: Very Good**
Goal: Maintain the condition and extent of highland grasslands and threatened species	**Outcome: 2 alerts identified**

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 (*Leucochrysum albicans*), and alpine candles (*Stackhousia pulvinaris).* 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 threated species.

Vale of Belvoir grassland paper daisy. Photo: Phil Laroche

Indicator	***2014-15***	***2015-16***	***2016-17***	***Status 2017-18 Trend***
Floristic diversity (species/site)	10.9	9.6	11.2	12.7 – improving
Structural complexity (lifeforms/site)	3.7	3.8	3.7	3.7 - stable
Leucochrysum albicans (cm/transect)	26.5	26.5	19.0	11.5 - decrease
Stackhousia pulvinaris (cm/transect)	23.8	23.8	18.8	16.4 - decrease
Oreixenica ptunarra (count/transect)	29	13	55	38 - variable

Key findings

- Monitoring has demonstrated that the richness and structure of native grassland vegetation has been maintained over the past few years, except for a steady decline in populations of *Stackhousia pulvinaris* and *Leucochrysum albicans*. While this may be an artefact of sampling, a larger number of monitoring sites will improve our ability to detect the magnitude of change in these populations and hence is a priority.
- Surveys undertaken for Ptunarra brown butterflies during their March flying season, confirmed the species was still present in sites burnt in Sep 2015 but variability in number of butterflies flying over the duration of the flying season makes it difficult to determine population trend. Tussock skinks were also observed within the burnt area. These surveys are however establishing the fire tolerances and requirements of these grassland-dependent species.
- 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. A new paper published: 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.
- Research was undertaken to determine the specific effects that the cattle grazing and fire regimes have on grassland diversity and vegetation community composition. Data analysis was completed by Mark Hovenden (UTAS) and 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 Conference.

- Funding was provided by Cradle Coast NRM to support on-ground grassland management work and research into best-practice management of highland grasslands.

Recommendations

- Review cattle grazing at the end of the present lease in 2020.
- Increase the number of monitoring sites for threatened plants.
- Continue to implement the fire management plan and maintain monitoring focus on burn areas.
- Repeat grassland diversity survey in Jan 2019.
- Prepare a paper to be published on the outcomes of the grassland diversity survey.
- Seek support Cradle Coast NRM to continue the work on 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.

Wetlands and streams at the Vale. Photo: M Newton

Indicator	***2014-15***	***2015-16***	***2016-17***	***Status 2017-18 Trend***
Floristic diversity	12.6	10.3	9.9	13.7 – stable, natural variation
Structural complexity	2.9	2.9	2.9	2.9 – no change
Water quality (Total Nitrogen)	NA	NA	1.2	NA – high but insufficient data
Water quality (Total Phosphorous) Reference: Site VABE011 Nitrogen 0.43, Phosphorous 0.20	NA	NA	0.12	NA – low but insufficient data

Key findings

- Monitoring has shown that the diversity of riparian vegetation has improved during the 2017-18 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 more consistent basis, with the assistance of freshwater ecologist Laurie Davies.
- Jeremy Williams photographed a ground parrot on the edge of the wetlands Sep 2017
- 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

- Review grazing at the Vale of Belvoir in terms of riparian and water quality impacts
- Continue long-term ecological monitoring of vegetation
- Undertake more consistent water quality monitoring with standardised sampling

HIGHLAND FOREST	**Status: Very Good**
Goal: Maintain the condition and approximate extent of highland forests	**Outcome: On track**

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.

Vale of Belvoir Reserve rainforest. Photo: H Holden

Indicator	***2014-15***	***2015-16***	***2016-17***	***2017-18***	***Trend***
Floristic diversity	8.8	8.5	8.5	8.4	Stable
Structural complexity	8.5	8.5	8.5	8.5	Stable
Recruitment (cohorts/site)	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	Stable
Proportion of native sp	0.90	0.70	0.82	0.89	Stable
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	Increasing
Tasmanian devil	Occupancy	0.53	0.46	0.73	Stable
	Activity	0.08	0.08	0.29	Increase
Eastern quoll	Occupancy	0.89	0.69	0.73	Stable
	Activity	0.12	0.09	0.16	Variable
Spotted-tailed quoll	Occupancy	0	0	0.08	Low data
	Activity	0	0	0.004	Low data
Wombat	Occupancy	1	1	1	Stable
	Activity	0.48	0.66	0.82	Stable

Key findings 2017-18

- Highland forest vegetation remains in excellent condition with no changes detected this season
- Forest margins remain a hotspot for terrestrial mammals.
- Most common annually recorded mammals are: echidna, Tas pademelon, Bennetts wallaby, brushtail possum, wombat, Tas devil and eastern quoll. Spotted-tail quoll are irregularly recorded, southern brown bandicoot not recorded since 2017 and ringtail possum only once in 2014-15.

Recommendations

- 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)

- 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 2017-18
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.

Gates and fences control stock. Photo: TLC.

Indicator	Status 2014-15	Status 2015-16	Status 2016-17	Status 2017-18 Trend
No cattle + calves	120 + 60	130 + 40	92 + 16	80 + 16 - decreasing
Dry Sheep Equivalent	1156	1137	747	659 - decreasing

Progress in 2017-18

- The historic grazing regime was maintained in accordance with the lease arrangements. Cattle numbers were lower this year (80 cattle + 16 calves) equating to a reduced Dry Sheep Equivalent/ha = of 659.
- 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 phased out at the end of the current grazing lease (ending June 2018).
- TLC continued good relationships with the Parks and Wildlife Service and the Charleston family.
- Wally Herman's weed report in May 2018 noted "It is again evident that many of the thistle locations are in areas disturbed by cattle; e.g. at the stockyards at T27, T28 &T29, and in places where cattle have sheltered along the forest edges from T01 to T15. I noted that the T12 - T15 area is currently extensively pugged-up; it appears to be the favourite camping place of the 40-odd cattle that are at present in the Vale and there seem to be a greater density of thistles there now than a year ago. Obviously, the ground is most susceptible to pugging (and consequently creating a seed bed for thistles) when it is wet - as it currently is."

Key recommendations for future management

- Phasing out grazing should be managed sensitively given the cultural significance of cattle grazing at the Vale of Belvoir. Maintaining a good relationship with the Charleston family is a priority.
- Communicate the findings of monitoring and research to all stakeholders including TLC supporters and the wider community. Continue 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 2017-18
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.

Leigh Walters at the Vale Oct 2017. Photo: A Povey

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

Progress in 2017-18

- A burn was undertaken in 17 Oct 2017 (second planned burn at the Vale). Burn permits were obtained from TFS and Threatened Species Unit DPIPWE.
- Approximately 16 ha was burnt in a cool mosaic patchwork. The burn was 'out' by the evening and declared successful.
- Fuel load data collected in Jan 2016 was analysed to determine the effect that cattle grazing has on grassland fuel loads. The results of this analysis suggest 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, which is important given that 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 2017-18.
- A video of fire management and ecological recovery at the Vale was made (see 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.

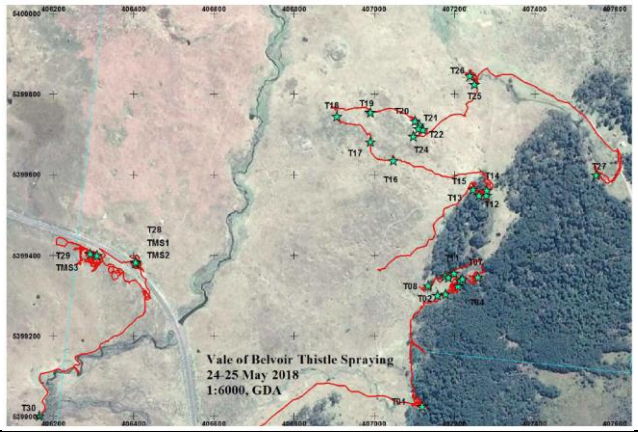
Status 2017-18
On-track

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.

Wally Herman undertook weed work at the Vale May 2018

Indicator	2014-15	2015-16	2016-17	2017-18
Weed extent	Not measured	Not measured	<200m2	Not measured
Weed density	Not measured	Not measured	Sparse	Not measured

Progress in 2017-18
A detailed report provided by Wally Herman on 24-25th May 2018 who conducted herbicide spraying for Spear thistles at thirty locations in the south-eastern sector of the Vale of Belvoir (map below). A total of 4635 thistles were treated and recommendations made for follow-up.



Key recommendations for future management

- Use volunteers skilled in weed identification to assist with weed control.
- Continue 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 whether cats, rabbits and deer present a significant threat to natural values.

Status 2017-18
Minor issues

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.

Traps to measure European wasp activity. Photo: J Potter

Indicator	***Status 2014-15***	***Status 2015-16***	***Status 2016-17***	***Status 2017-18***
Wasp abundance	No counts	No counts	0 observations 0% of sites	No counts
Feral cat Occupancy	0	0	0	0.15
Feral cat Activity	0	0	0	0.01
Rabbit occupancy	0	0	0	0.08
Rabbit Activity	0	0	0	0.007
Fallow deer Occupancy	0	Scat seen but not id on camera	Scat seen but not id on camera	Scat seen but not id on camera

Progress in 2017-18

- 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 but that cats and rabbits are being detected at more sites.
- Deer scats were observed for the first time at the Vale of Belvoir in 2016 and again in 2017-18. Deer have never occurred there previously. No measures of deer abundance are available as 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 signs of fallow deer.