VAST–2 - Site-based recording of use and land management and their effects on native vegetation over time

Citation: Thackway, R (2012). Belconnen Naval Transmitter Station, ACT. Ver. 1. VAST–2: tracking the transformation of vegetated landscapes. Australian Centre for Ecological Analysis and Synthesis, University of Queensland, Brisbane.

1. Name of site/area

Belconnen Naval Transmitter Station (BNTS), ACT.

2. Last modified (version no. 1)

Minor changes July 2013.

3. Location of site

State: ACT

IBRAv7 Classification

REG_NAME_7:	REG_CODE_7:	SUB_NAME_7:	SUB_CODE_7:
South Eastern Highlands	SEH	Murrumbateman	SEH06

Co-ordinates: 35°13'17.85"S, 149°5'23.63"E

Spatial precision refer Attachment 1: Code = 1

4. Area of the site

115 hectares.

5. Brief description of the natural undisturbed ecosystem of the site/area

Natural temperate grassland is a native ecological community that is dominated by native perennial tussock grasses. The dominant grasses are *Themeda triandra, Austrodanthonia* species, *Austrostipa* species*, Bothriochloa macra* and *Poa* species. The upper canopy stratum varies in height from mid-high (0.25–0.5 metres) to tall (0.5–1.0 metres). There is a diversity of native herbaceous plants (forbs), which comprise up to 70% of species present. The community is naturally treeless or has less than 10% projective foliage cover of trees, shrubs and sedges in its tallest stratum. In the ACT this community occurs where tree growth is limited by cold air drainage, generally below 625 metres altitude.

Source: Office of the Commissioner for Sustainability and the Environment (2010).

6. Current purpose (2011) of the site/area

Nature conservation. A secure area of Defence land within the suburb of Lawson, ACT (ACT Government 2005). Area has a secure people-proof fence.

7. Reference or benchmark vegetation description: pre-clearing or pre-European community

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Area of the plot: n/a

Component	Attributes	Description and values
Vegetation		
Overstorey	Dominant life forms (tree, shrub, other)	Trees and shrubs
	Dominant species (list max 5 species)	
	Species richness (#)	
	Average top height (m)	
	Foliage projective cover (%)	<10% projective foliage cover of trees, shrubs and sedges in its tallest stratum
	Structural/age class (stem density sizes)	
Understorey	Dominant life forms (shrub, grass, forb, other)	Forbs
	Dominant species (list max 5 species)	*Themeda triandra*, *Austrodanthonia* species, *Austrostipa* species, *Bothriochloa macra* and *Poa* species.
	Species richness (#)	Forbs may comprise up to 70% of species present
	Average top height (m)	Mid-high (0.25–0.5 metres) to tall (0.5–1.0 metres)
	Ground cover (%)	
	Bare ground (%)	
Soil	Type, compaction, hydrology, depth of A0 horizon, chemistry (NPK).	n/a
Fire	Importance for regeneration and reproduction, frequency, area burnt.	n/a

8. Brief history of the site/area

1815	Area managed by Indigenous Ngunnawal people.
1830s	Sheep and cattle grazing with the aid of shepherds.
1860	Fences established and continuous stocking commenced.
1900	Patches of woodland areas on higher ground were partly cleared.
1900-1939	Heavy grazing pressure due to sheep and cattle.
1940-1993	Naval transmission station established.
1940-1992	Sheep grazing under continuous stocking.
1970	People and kangaroo proof fence established.
1993	Sheep grazing ceased.
1995	Mowers used to manage the grass fuel loads.
1997-2008	Kangaroo population increased to unacceptable levels.

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2006	Naval transmission towers demolished. Area continued to have a secure people proof fence.
2008	Kangaroo population culled to reduce grazing pressure.
2012	Site managed for nature conservation values.

9. Proximity to large area of intact and largely intact and unmodified remnant

n/a

10. Sources of data and information used to complete description of use and management and their effects on native vegetation over time

A. Kangaroo Culling on Defence lands – Fact Sheet http://www.tams.act.gov.au/pv_obj_cache/pv_obj_id_F7B6D8DB167802513D82D6ACF06DBFB63F650000/filename/Kangaroo_Culling_on_Defence_lands.pdf [Accessed on 30 April 2011]

B. Friends of Grasslands submission to ACT Government inquiry into 'lowland native grasslands management' http://www.fog.org.au/Submissions/20071203.htm [Accessed on 30 April 2011]

C. Office of the Commissioner for Sustainability and the Environment. (2010). ACT lowland native grasslands investigation: Belconnen Naval Transmission Site (BNTS) http://www.environmentcommissioner.act.gov.au/publications/special_reports_and_investigations/belconnen/introduction [Accessed on 30 April 2011]

D. Final Expert Report – 19 February 2008 Attachment G http://www.environmentcommissioner.act.gov.au/__data/assets/pdf_file/0009/169245/AttachmentG.pdf [Accessed on 30 April 2011]Attach

E. Remediation of the Belconnen Naval Transmission Station. Scott Ludlam. http://scott-ludlam.greensmps.org.au/content/transcript/remediation-belconnen-naval-transmission-station. 28th October 2008 [Accessed on 30 April 2011]

F. http://www.cas.asn.au/reports/Belconnen-Naval-Transmitting-Station-Bells-P-Dowling.pdf [Accessed on 30 April 2011]

G. http://www.kangaroo-protection-coalition.com/belconnen-kangaroos.html [Accessed on 30 April 2011]

H. Inferred by Richard Thackway

I. http://www.argylecounty.com.au/towns/gundaroo.html [Accessed on 30 April 2011]

J. BOM drought anomaly

K. ACT Government (2005). Vision Splendid of the Grassy Plains Extended ACT Lowland Native Grassland Conservation Strategy. Action Plan No. 28. Department of the Arts, Heritage and Environment, Canberra.

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Description of use and management and their effects on native vegetation over time (explanation of numbered codes in Attachment 1)

Year	Source year	Temporal Reliability	Land use (ALUM[1])	List of LU[2] and LMP[3]	Source LMP	Reliability LMP	Observed effect and impacts on ecological function and native vegetation	Source Effect	Spatial reliability Effects
1800	H	4	Indigenous land management 1.2.0	Area managed by Indigenous Ngunnawal people	H	7	Native vegetation of the area unmodified	H	7
1815	H	4	Indigenous land management 1.2.0	Kangaroos are likely to have been in relatively low numbers at that time, being prey for dingoes and for local people with a hunter gatherer mode of life.	I	7	Little grazing pressure allows for the accumulation of biomass and selects for tall-growing grazing-intolerant plant species (e.g. *Themeda triandra*) [Reasonable coverage of biomass]…provides the primary food source for herbivores, including large grazers and invertebrates functioning as a stable entity … included the conservation of vital resources: to some extent water, but particularly nutrients and organic matter a fire regime small-scale soil disturbances associated with small mammal digging and herbivory by Kangaroos	D	7
1820	H	5	Indigenous land management 1.2.0	First explorers traverse the area	H	7			
1830	H	5	Grazing native vegetation 2.1.0	Grazing of native vegetation (shepherds), sheep and cattle	H	7			
1850	H	5	Grazing native vegetation 2.1.0	Grazing of native vegetation, fences established (set stocking commenced) - freehold land	H	7			
1860	H	4	Grazing native vegetation 2.1.0	The Crown Lands Alienation Act 1861 (NSW), commonly referred to as the Robertson Land Act led to closer settlement – smaller paddocks	H	7	Increased stocking density – heavier grazing… loss of soil, nutrients and organic matter … washed out of the landscape as dissolved nutrients, soil particles and loose plant litter	H	7

[1] ALUM = Australian Land Use and Management classification
[2] LU = Land Use
[3] LMP = Land or vegetation Management Practice

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Year	Source year	Temporal Reliability	Land use (ALUM[1])	List of LU[2] and LMP[3]	Source LMP	Reliability LMP	Observed effect and impacts on ecological function and native vegetation	Source Effect	Spatial reliability Effects
1898	J	4	Grazing native vegetation 2.1.0	Start prolonged drought	J	7			
1900	H	4	Grazing native vegetation 2.1.0	The woodland areas on higher ground were partly cleared. Likelihood of moderate to heavy grazing pressure due to sheep and cattle	D	7	Moderate grazing with sheep in native grasslands creates patchiness - areas of both tall and short grass swards. Heavy grazing pressure results in non-selective grazing - the herbivores eat virtually all plants on offer and the resulting grass sward is very short and lawn-like.	D	7
1902	J	4	Grazing native vegetation 2.1.0	End prolonged drought	J	7			
1939	D	5	Grazing native vegetation 2.1.0	Grazing native vegetation 2.1.0continues – sheep	D	7	Likelihood of heavy to very heavy grazing pressure due to sheep and cattle ... many non-indigenous plant species were introduced … establishment of exotic species and loss of tall tussock structure	D	7
1940	F	4	Other minimal use 1.3.0	Defence facility - navigation and communication established	F	7			
1940	H	4	Other minimal use 1.3.0	Grazing native vegetation 2.1.0continues – sheep	H	7			
1945	J	4	Other minimal use 1.3.0	Start of prolonged drought	J	7			
1948	J	4	Other minimal use 1.3.0	Start of prolonged drought	J	7			
1989	H	4	Other minimal use 1.3.0	Grazing native vegetation 2.1.0continues – sheep	H	7			
1990	H	5	Other minimal use 1.3.0	Site beginning to be surrounded by suburbs	H	7			

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1993	H	5	Other minimal use 1.3.0	Domestic livestock - sheep removed	D	7			
1994	H	5	Other minimal use 1.3.0	People proof fence erected with kangaroo population captive	D	7			
1995	B	4	Other minimal use 1.3.0	Mowers used to manage the grass	B	7			
1996	H	5	Other minimal use 1.3.0	kangaroo population allowed to increase	D	7	Heavy grazing pressure results in non-selective grazing - the herbivores eat virtually all plants on offer and the resulting grass sward is very short and lawn-like. Plants selected for under heavy grazing pressure (e.g. *Austrodanthonia carphoides, Chloris truncata*) are grazing tolerant and shortgrowing (even when ungrazed).	D	7
1997	H	5	Other minimal use 1.3.0	kangaroo population begins to increase	D	7	Loss of tall and medium height patches	D	7
2002	J	4	Other minimal use 1.3.0	Start of prolonged drought	J	7			
2003	B	4	Other minimal use 1.3.0	kangaroo population estimated at 4.4 /ha within the secure area	B	7	Total biomass is still relatively low over much of the area grass and palatable herbs had been grazed very short, and there were frequent patches of bare ground. There were significant patches of *Triptilodiscus pygmaeus*, *Goodenia hederacea*, *Vittadinia cuneata*, *Eryngium rostratum*, *Stackhousia monogyna*, *Calocephalus citreus, Leptorhynchos squamatus*. some invasion by serrated tussock number of weeds such as African lovegrass, Paterson's curse, Capeweed, St Johns wort, *Briza minor,* nodding and saffron thistles, *Oxalis* spp., clover, exotic plantains and flatweed. Some apple box seedlings were also encroaching on the area	B	7

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2004	H	5	Other minimal use 1.3.0	The site is a former landfill. It has underground fuel storage tanks and some surface soil and has also been contaminated with lead paint and asbestos from demolition waste. Restricted sites with the area.	E	7			
2004	H	5	Other minimal use 1.3.0	Over the years the site was used for domestic waste, which was buried. Restricted sites with the area.	E	7			
2005	E	4	Other minimal use 1.3.0	site was decommissioned as a defence facility - navigation and communication	E	7	High diversity and cover of native species, including disturbance sensitive species and/or moderately sensitive species. Includes high diversity of forbs	K	7
2006	E	4	Other minimal use 1.3.0	Naval masts were demolished	E	8	lead paint contamination that chipped from the masts is essentially widespread	E	7
2006	E	5	Other minimal use 1.3.0	Demolition waste (asbestos contained in demolition waste) was buried. Restricted sites with the area.	E	8			
2007	F	4	Other minimal use 1.3.0	Low frequency towers demolished	F	8			
2007	B	4	Other minimal use 1.3.0	kangaroo population estimated at 4.4 /ha within the secure area	B	7	overgrazed native grassland, mostly wallaby grass (*Danthonia*), with inter-tussock spaces that seemed more extensive than normal. No peppercress were observed , possibly because they had been grazed	B	7
2007	C	4	Other minimal use 1.3.0	kangaroo population estimated at 5.88 /ha within the secure area	C	7			
2008	E	4	Other minimal use 1.3.0	Defence aims to remediate the site	E	7	identifying a contractor to undertake the remediation work. Contractor would be expected to remove a large volume of contaminated landfill off site.	E	7

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2008	D	4	Other minimal use 1.3.0	kangaroo population estimated at 5.88 /ha within the secure area	D	7	Total biomass is relatively low over much of the area. ground between the grass tussocks is no longer stabilized by the presence of plant litter, mosses or lichens, allowing for rapid rainfall runoff and creating conditions for further soil loss. Evidence of soil erosion at the site includes the presence of scalds, sheeting, small gullies and terracettes. There are also extensive areas where pedestals are present. These are soil columns associated with persistent plant bases remaining after the surrounding soil has eroded away … the condition of the soil [surface is] restricting rainfall infiltration and the phenomenon that short-growing, low productivity species are most persistent in eroded areas Evidence of soil erosion: bare scalded areas between tussocks, individual tussocks remain raised while surrounding soil has washed away, leaving a lowered soil surface	D	7
2008	D	4	Other minimal use 1.3.0	kangaroo population estimated at 5.9 /ha within the secure area	D	7	Presence of short patches (lawn areas grazed non-selectively) at BNTS exceeds (30%) threshold and tall species such are Themeda are highly restricted on the site.	D	7
2008	D	4	Other minimal use 1.3.0	kangaroo population about 5.90 /ha within the secure area	D	7	extreme current and historical grazing pressure … resulted in dominance by low growing species. Combined with continuing grazing pressure, these small plants have failed to produce good grass cover despite favourable growing conditions	D	7
2008	D	4	Other minimal use 1.3.0	End of prolonged drought – favourable growing conditions	J	7			
2008	D	4	Other minimal use 1.3.0	kangaroo population about 5.90 /ha within the secure area	D	7	Recommended carrying capacity 1.16 kangaroos per hectare. That is 5.08 times too many kangaroos	D	7

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2008	D	4	Other minimal use 1.3.0	kangaroo population about 5.90 /ha within the secure area	D	7	The current dense kangaroo population is preventing the recovery of the Grassland by impeding biomass accumulation, preventing re-colonization by less grazing tolerant, more productive Grassland plants and preventing the reestablishment of a soil crust of cryptogams (mosses, algae and lichens) on the bare ground between the grass tussocks.	D	7
2008	A	4	Other minimal use 1.3.0	kangaroo population reduced from an estimated 5.90 /ha to 1.16 /ha within the secure area	A	7	After the proposed cull at the Belconnen site, about 60 female and 40 male kangaroos will be left.	A	7
2008	H	4	Other minimal use 1.3.0	kangaroo population about 1.16 /ha within the secure area	H	7			

11. Data Use and Accuracy Disclaimer

These data are compiled to the best of our knowledge and ability. The information contained in this document is subject to revision. The user accepts all risks and responsibility for loss, damages, costs and other consequences (direct or indirect) resulting directly or indirectly from using this information.

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Attachment 1

Reliability standards used to compile historic and contemporary site-based chronologies.

Reliability level standards	Spatial precision (Scale)	Temporal precision (Year of observation)	Attribute accuracy (Land use, land management practices, effects on condition)
HIGH "Definite"	Reliable direct quantitative data. Examples: Site, plot and transect based records. **Code: 1**	Reliable direct quantitative data. Examples: Day-month-year, season-year and year. **Code: 4**	Reliable direct quantitative data. Examples: Inventory and counts, recorded observations from field survey and monitoring, farm records **Code: 7**
MEDIUM "Probable"	Direct (with qualifications) or strong indirect data. Examples: Land unit and soil-landscape reports. **Code: 2**	Direct (with qualifications) or strong indirect data. Examples: Mid 1850s **Code: 5**	Direct (with qualifications) or strong indirect data. Examples: Reconnaissance surveys, medium and moderate resolution remote sensing, regional mapping **Code: 8**
LOW "Possible"	Limited qualitative and possibly contradictory observations. More data needed. Examples: Land system, sub-bioregion and bioregion reports. **Code: 3**	Limited qualitative and possibly contradictory observations. More data needed. Examples: Early 1800s and first half of 19th century. **Code: 6**	Limited qualitative and possibly contradictory observations. More data needed. Examples: Generalised descriptions and narratives, census-based surveys **Code: 9**

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