Australian Government
Department of the Environment and Energy

NVIS Fact sheet
MVG 19 – Tussock grasslands

Australia's native vegetation is a rich and fundamental element of our natural heritage. It binds and nourishes our ancient soils; shelters and sustains wildlife, protects streams, wetlands, estuaries, and coastlines; and absorbs carbon dioxide while emitting oxygen. The National Vegetation Information System (NVIS) has been developed and maintained by all Australian governments to provide a national picture that captures and explains the broad diversity of our native vegetation.

This is part of a series of fact sheets which the Australian Government developed based on NVIS Version 4.2 data to provide detailed descriptions of the major vegetation groups (MVGs) and other MVG types. The series is comprised of a fact sheet for each of the 25 MVGs to inform their use by planners and policy makers. An additional eight MVGs are available outlining other MVG types.

For more information on these fact sheets, including its limitations and caveats related to its use, please see: 'Introduction to the Major Vegetation Group (MVG) fact sheets'.

Overview

Typically, vegetation areas classified under MVG 19 – Tussock grasslands:

- represent treeless communities dominated by native perennial tussock grasses widely distributed over seven per cent of the Australian continent through arid, temperate and tropical areas
- comprise natural areas of grassland, as well as vast areas of native grasslands derived from woodland vegetation in which most or all of the tree and shrub cover has been removed. The structure and species composition of these derived grasslands may resemble some of those described here, although mostly they are derivatives of MVGs 5 and 11
- were in existence before European colonisation when natural temperate lowland grasslands occupied large areas of south-eastern Australia, most notably on the southern tablelands of New South Wales, basalt plains of western Victoria, in southern South Australia and in the Riverina region of New South Wales and Victoria
- in tropical and arid regions cover extensive black soil plains in central and northern Queensland, the Northern Territory and Western Australia
- may be dominated by grass species with C3 or C4 photosynthetic pathways or a mixture of both, depending on temperature regimes and aridity
- are fire-prone and able to regrow rapidly after being burnt
- have species that lack persistent soil seedbanks
- Cattle and sheep grazing has been the major land use in tussock grassland since settlement.

Temperate Tussock Grasslands of Rytidosperma and *Austrostipa* species, Ivanhoe, NSW (Photo: B. Pellow)

SSD18S.0117

Facts and figures

Major Vegetation Group	MVG 19 - Tussock grasslands
Major Vegetation Subgroups	34. Mitchell grass (Astrebla) tussock grasslands 35. Blue grass (Dicanthium) and tall bunch grass (Vitiveria syn: Chrysopogon) tussock grasslands 36. Temperate tussock grasslands 37. Other tussock grasslands
Typical NVIS structural formations	Closed Tussock Grassland (mid, low) Open Tussock Grassland (mid, low) Tussock Grassland (mid, low)
Number of IBRA regions	71
Most extensive in IBRA region (Est. pre-1750 and Present)	Mitchell Grass Downs (Qld and NT)
Estimated pre-1750 extent (km^2)	570 001
Present extent (km^2)	527 147
Area protected (km^2)	31 674

Structure and physiognomy

- Grasslands are characterized by large perennial tussock grasses, broad-leaved and lilioid herbs in the inter tussock spaces and a lack of woody plants. In localised areas, forbs may dominate the tussock grasses.
- Grasses have modular growth forms that grow as single plants in clumps, tufts or bunches, rather than forming a continuous lawn or meadow.
- The growth and reproductive phenology of C3 and C4 grasses depends on temperature and photoperiod – the C3 grasses grow mainly in spring and autumn and the C4 grasses grow mainly in late spring-early summer, as soil moisture levels permit.
- Although the dominant grasses are perennial, some annual grasses may also be present.
- Some areas of grassland are the result of extensive clearing of woodland communities that had a high grass component in the ground layer. The Riverina region of New South Wales is generally considered to have been originally dominated by woodlands of *Acacia pendula* and *Atriplex nummularia* with both species rapidly eliminated by heavy stock grazing which form extensive secondary grasslands.

Astrebla spp. (Mitchell grasses) west of Blackall, Qld (Photo: M. Fagg)

Indicative species

- The principle plant families represented in tussock grasslands are *Poaceae, Asteraceae, Fabaceae, Geraniaceae*, and *Chenopodiaceae*.
- Species composition varies depending on seasonal conditions and local variations in soils and topography. Grasses tend to dominate after summer rainfall or flooding, while forbs generally dominate after winter rainfall events.
- At continental scale, tropical and arid environments tend to be dominated by C4 grass species, while C3 grasses become important components of the communities in cooler climates.
- C4 grasses *Astrebla* (Mitchell grass) and *Dichanthium* (Bluegrass), dominate grasslands of the tropical and arid regions, with *Chrysopogon* (Ribbon grass) and *Eulalia* (Browntop) also common. A wide range of smaller perennial grasses, including species of *Iseilema* and *Aristida,* occupy the spaces between the large tussocks. Forbs and native legumes are also common, being more prevalent in southern areas where annual rainfall is more evenly distributed.
- Tussock grasslands of the temperate south-east are typically dominated by a mixture of C3 and C4 perennial tussock grasses including species of *Austrostipa*, *Bothriochloa*, *Chloris*, *Poa*, *Rytidosperma* and *Themeda*. *Poa* and *Themeda* dominate in areas of relatively high rainfall e.g. southern Victoria, New South Wales southern tablelands and Tasmania, whereas *Chloris*, *Rytidosperma* and *Austrostipa* co-dominate in drier regions including the Riverine plains and south-central South Australia. Inter-tussock spaces include a variety of forbs including species of *Brachyscome*, *Burchardia*, *Chrysocephalum*, *Cullen*, *Desmodium*, *Dianella*, *Geranium*, *Ranunculus*, *Tricoryne Viola*, *Wahlenbergia* and various orchids. On exposed coastal headlands and islands of south-eastern Australia, *Themeda triandra, Poa poiformis* and *Sporobolus virginicus* are the most common dominants.
- A range of other grasslands not dominated by genera typical of temperate or Mitchell/Blue grass grasslands, are included in this MVG. An important component of this group is Alpine grasslands dominated by genus *Poa*, with *Agrostis, Deyeuxia* and *Rytidosperma* sometimes present, and C4 species are absent. Another example is in the northern Kimberley in Western Australia, where various grasslands of *Sorghum, Astrebla, Chrysopogon* and *Triodia* occur, typically described as savanna. Savanna communities with emergent trees over 0.25% crown cover (scattered isolated trees), are assigned to MVG 12.

Environment

- Climate varies from warm tropical with summer maximum rainfall to temperate with winter maximum rainfall to alpine climates where snow cover may persist for several months.
- Most grasslands fall within the 400 – 1000 mm mean annual rainfall band, but may occur in wetter and drier climates.
- Most grasslands are found on plains, rolling downs, undulating plateaus and local depressions.
- Soils are typically high in clay content, with substrates including alluvium, basalt, siltstones and granitoid geology.
- Many grasslands occupy heavy-textured soils that remain wet for extended periods after rain.
- Along local topographic or edaphic gradients, tussock grasslands may transition into temperate woodlands, tropical savannas, shrublands and wetlands.
- Grasslands of the tropical and arid regions (e.g. Blue Grass, Mitchell grass etc) generally occur on black, cracking clay soil plains, mostly in tropical and subtropical latitudes receiving summer maximum rainfall (mean 400 – 900 mm per annum), but may extend to warm temperate latitudes in the arid zone (mean annual rainfall as low as 250 mm) on landforms such as gilgais or stony plains with heavier clay soils.
- Temperate tussock grasslands occur in areas with relatively low rainfall (mean 400 – 800 mm per year), with semi-arid ecosystems in the New South Wales Riverina and South Australia at the drier end of this range. They occur on flat to gently undulating topography on poorly drained clay and clay loam soils of relatively high fertility. On the coast they are found on exposed coastal cliffs and headlands and islands.
- Other grasslands are found in a range of environments from Alpine to tropical savannas. Alpine grasslands occur on elevated plateaus (mostly above 1700 m on the mainland, and above 1000 m in Tasmania) receiving more than 1000 mm mean annual rainfall; soils are relatively fertile organic loams derived from substrates such as granodiorite, dolerite, basalt or limestone. Western Australian grasslands experience high temperatures and low irregular rainfall (200 and 350 millimetres per year). The Pilbara grasslands are found along the coastal sand plains while grasslands further north in the Kimberley, are found inland on flatter lateritic orthent soils.

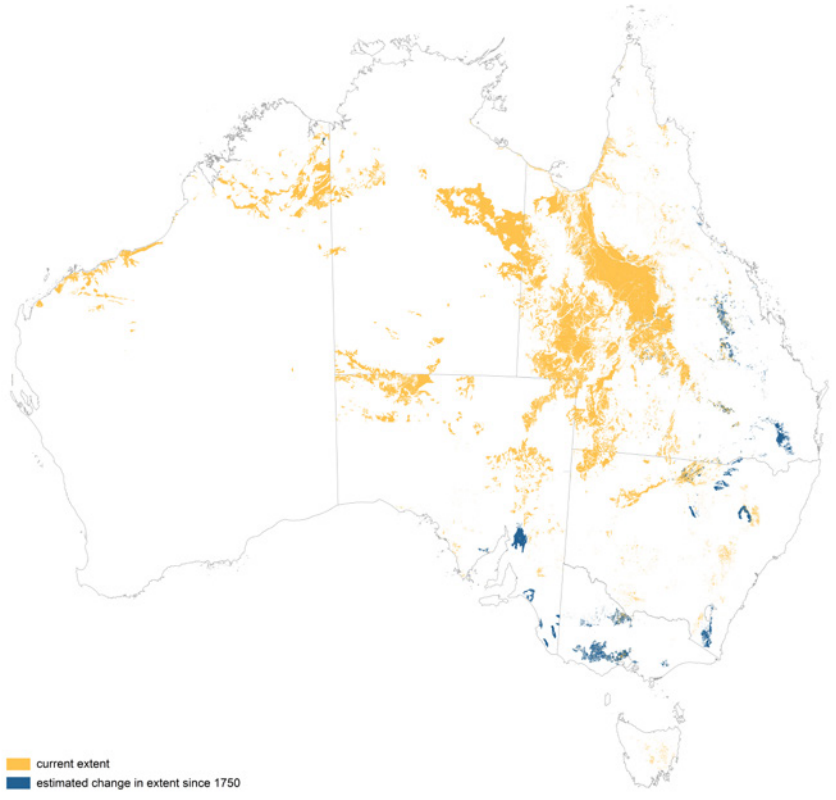
Geography

- Extend from tropical to semi-arid, temperate and alpine areas of Australia and include valuable areas for pastoralism (e.g. the Mitchell Grasslands).
- Mitchell grass and Blue grass grasslands occur around the Gulf of Carpentaria and the Channel Country of south western Queensland extending to north-west New South Wales on the Moree and Liverpool plains, with scattered occurrences in the Victoria River and Kimberley-Pilbara region Western Australia.
- Temperate tussock grasslands extend along the tablelands from the New England region in New South Wales to the Victorian highlands and basalt lowland plains, and west into South Australia. Outliers occur in the Tasmanian midlands and mountain valleys. Grassy balds occur in restricted sites in south-east Queensland and north-east New South Wales, while coastal forms occur on headlands and offshore islands from north-east New South Wales to southern Tasmania.
- Other grasslands extend from the Alpine grasslands and herbfields of the Kosciuszko plateau, Victorian Alps, Tasmania central plateau and southern mountains, through central New South Wales, along the periphery of Blue Grass/Mitchell grasslands in central/northern Australia, to the northern Kimberley savannas and Pilbara Coast.
- Largest area is in Queensland (304 124 km^2).

The below image outlines the location of this MVG group in Australia.

Change

- Approximately eight per cent (43 000 km^2) cleared since European settlement.
- Temperate tussock grasslands have been extensively cleared for cropping and improved pasture, while tropical arid grasslands and other grasslands remain largely uncleared.
- Fragmentation of temperate grassland results in a reduced suite of native grasses amid a matrix of introduced species.
- Grazing by livestock has been the dominant land use of tussock grasslands since European settlement, altering vegetation structure, species composition and soil



structure. Severe overgrazing leads to loss of palatable species and soil degradation.

- Grasslands recover from degradation slowly or not at all, in part due to the lack of a persistent soil seedbank in many species.
- Fire regimes may affect the growth of tussocks and other annual and short-lived perennial grasses and a range of colonising invasive species may replace the dominant tussock grasses immediately after a fire. In some systems, infrequent fires may lead to limited gaps for seedling, establishment senescence of tussocks or invasion of woody plants, although the latter is mainly a phenomenon in derived grasslands.
- Threats include land clearing, pasture improvement and other sources of nutrient enrichment, inappropriate fire regimes, mining and high total grazing pressure.

Key values

- Biodiversity including a variety of specialist species and threatened ecological communities.
- Tussock grasslands provide shelter for a large variety of reptiles and small marsupials in Australia.
- Ecotourism including bushwalking and landscape scenic values.
- Pastoralism production, including a substantial proportion of Australia's rangeland output.
- Value to Indigenous communities.

List of key management issues

- Continued small-scale clearing in temperate tussock grasslands.
- Total grazing pressure from domestic, feral and native animals, especially during extended drought and around watering points.
- Degradation of temperate remnants by nutrient-enriched runoff.
- Soil degradation by overgrazing.
- Fire regimes.
- Weed control.
- Impacts of climate change.
- Long-term monitoring to inform future management strategies.

Alpine grasslands and herbfields Kosciusko National Park, NSW (Photo: D. Keith)

References

Australian Surveying and Land Information Group (1990) *Atlas of Australian Resources. Volume 6 Vegetation*. AUSMAP, Department of Administrative Services, Canberra, 64pp. & 2 maps.

Beadle N.C.W. (1981) *The Vegetation of Australia.* Cambridge Univ. Press, Cambridge, 690pp.

Beard J.S., Beetson, G.R, Harvey J.M. Hopkins A.J.M. and Shepherd D.P. (2013) *The Vegetation of Western Australia at 1:3,000,000 Scale. Explanatory Memoir.* Second Edition. Science Division, Department of Parks and Wildlife, Western Australia.

Carter O., Murphy A.M. and Cheal D. (2003) *Natural Temperate Grassland.* Department of Natural Resources & Environment (Vic.); online at URL: http://www.deh.gov.au/biodiversity/publications/grasslands/index.html.

Fox I.D., Neldner V.J., Wilson G.W., *et al.* (2001) *The Vegetation of the Australian Tropical Savannas*. Env. Prot. Agency, Qld and Tropical Savannas CRC, 2 map sheets and 1 legend; online at URL: http://savanna.ntu.edu.au/information/.

Harris S. and Kitchener A. (2005) *From Forest to Fjaeldmark. Descriptions of Tasmania's vegetation.* Dept of Primary Industries, Water and Environment, Hobart.

Keith D.A. (2004) Ocean Shores to Desert Dunes. *The native vegetation of New South Wales and the ACT.* Department of Environment and Conservation (NSW), Hurstville.

Leigh J.H. and Noble J.C. (1972) *Riverine Plain of New South Wales: Its Pastoral and Irrigation Development*. CSIRO Division of Plant Industry, Canberra.

Lunt I.D, Morgan J.W. (2002) The role of fire in temperate lowland grasslands of south-eastern Australia. In: *Flammable Australia*. The fire regimes and biodiversity of a continent. (eds. Bradstock R.A., Williams J.E. and Gill A.M.) pp. 177 - 198. Cambridge University Press, Cambridge.

McIntyre S, Barrett G.W. (1992) Habitat variegation an alternative to fragmentation. *Conservation Biology vol.* 6, pp. 31 – 37.

Moore C.W.E. (1953) The vegetation of the south-eastern Riverina, New South Wales. II. The disclimax communities. *Australian Journal of Botany* vol. 1, pp. 548 – 567.

Mott J.J. and Groves R.H. (1994) Natural and derived grasslands. In: *Australian Vegetation* (ed. R.H. Groves) pp. 369 - 392. Cambridge Univ. Press, Cambridge.

National Land and Water Resources Audit (2001) *Australian Native Vegetation Assessment 2001.* National Land and Water Resources Audit, Canberra, 332pp.

Neldner, V.J., Niehus, R.E., Wilson, B.A., McDonald, W.J.F. and Ford, A.J. (2014). *The Vegetation of Queensland. Descriptions of Broad Vegetation Groups.* Version 1.1. Queensland Herbarium, Department of Science, Information Technology, Innovation and the Arts.

Victorian Department of Sustainability and Environment (2004). EVC Bioregion Benchmark for Vegetation Quality Assessment http://www.depi.vic.gov.au/environment-and-wildlife/biodiversity/evc-benchmarks [Accessed June 2015].

White A., Orr D., Novelly P., Bastin G. (2014) Tussock grasslands. In: *Biodiversity and Environmental Change Monitoring, Challenges and Direction* (eds. Lindenmayer D., Burns E., Thurgate N. and Lowe A.) pp. 479 - 518. CSIRO, Victoria.

Data sources

Interim Biogeographic Regionalisation for Australia (IBRA), Version 7.

National Vegetation Information System, Version 4.2.

Collaborative Australian Protected Areas Database – CAPAD 2014 – Terrestrial.

© Commonwealth of Australia, 2017.

This fact sheet is licensed by Commonwealth of Australia under a Creative Commons Attribution 4.0 International licence.

The views and opinions expressed in this publication are those of the authors and do not necessarily reflect those of the Australian Government or the Minister for the Environment and Energy.