

Australian Government

Department of Sustainability, Environment, Water, Population and Communities



Nationally Threatened Ecological Communities: Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and Southern Queensland, and

Natural Grasslands of the Queensland Central Highlands and the Northern Fitzroy Basin

A guide to the identification, assessment and management of nationally threatened ecological communities Environment Protection and Biodiversity Conservation Act 1999

Glossary

An asterisk (*) against a term, on its first mention within the text, indicates that it is defined in the Glossary at the back of this publication.

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WHAT IS THE PURPOSE OF THIS GUIDE?

This booklet is designed to assist land managers, owners and occupiers as well as environmental assessment officers, consultants and the general public to identify, assess and manage the Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and Southern Queensland and the Natural Grasslands of the Queensland Central Highlands and the Northern Fitzroy Basin. Both of these are nationally threatened ecological communities listed under Australia's national environment law, the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The natural grasslands

Throughout this document the ecological communities are collectively referred to as the *natural grasslands*.

- The Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and Southern Queensland ecological community is referred to as the southern grasslands in this document, and
- The Natural Grasslands of the Queensland Central Highlands and the Northern Fitzroy Basin ecological community is referred to as the *northern grasslands.*

This document accompanies the listing and conservation advice, which presents the definitive and detailed description of these two threatened ecological communities. The listing advice is a technical document that explains what an ecological community is, where it is known to occur, why it merits listing as nationally threatened and which conservation status applies to the ecological community. The conservation advice identifies priority management and conservation actions.

These documents can be found in the Australian Government's species profile and threats database (SPRAT) at: www.environment.gov.au/cgi-bin/sprat/public/ publiclookupcommunities.pl

At this website, click on the details link to download the documents for each ecological community.

This document does not provide specific advice on whether particular actions will trigger national environment law by having a significant impact on the ecological communities. This needs to be considered on



a case by case basis. However, a patch^{1*} of either of the ecological communities must meet a number of minimum condition thresholds in order to be considered for national law protection.

General guidance on significant impacts is found separately at: www.environment.gov. au/epbc/publications/nes-guidelines.html For what this listing means for approval authorities or land managers please see page 34.



Many wildflowers may occur amongst the grass tussocks in the natural grasslands

¹ Words with an asterisk* are defined in the Glossary at the back of this publication.



NATIONALLY THREATENED ECOLOGICAL COMMUNITIES

What is a nationally threatened ecological community?

An ecological community may also be called a nature community or wildlife community. It is a naturally occurring group of plants, animals and other organisms that are interacting in a unique habitat. Its structure, composition and distribution are determined by environmental factors such as soil type, position in the landscape, climate and water availability. Species within such wildlife communities interact and depend on each other - for example, for food or shelter. Types of ecological communities listed under national environmental law include grasslands*, woodlands*, shrublands, forests, wetlands, ground springs and cave communities.

Together with threatened species, threatened ecological communities listed under the EPBC Act* are protected as one of several matters of national environmental significance. Threatened ecological communities can be listed as vulnerable, endangered* or critically endangered*, categories that represent their decline and potential for extinction across their national extent. Extinction in this context generally means that the ecological community has been altered to such an extent that it would be unlikely that it could be re-established (including its ecological processes, species composition and community structure), even with positive human intervention.

The decision to list an ecological community as nationally threatened is made by the federal environment minister. It follows a rigorous process of consultation with stakeholders and the public, workshops and discussions with scientific experts, culminating in advice from the Threatened Species Scientific Committee. The committee is an independent scientific body that advises the minister on the threat status of native species and ecological communities.





Why does the Australian Government list threatened ecological communities?

The Australian Government is responsible for identifying and protecting matters of national environmental significance. These include world heritage properties, national heritage places, Ramsar wetlands (internationally important wetlands), listed migratory species, Commonwealth marine areas, the Great Barrier Reef Marine Park, nuclear actions and nationally listed threatened species and ecological communities. All of these matters of national environmental significance are subject to Australia's national environment law, the EPBC Act.

Many of Australia's ecological communities have been heavily cleared and fragmented since European settlement and continue to be degraded. Protection through the EPBC Act complements other conservation measures and is particularly vital for some ecological communities because many patches occur outside conservation reserves.

As well as being important because of their unique biodiversity and distinctive place within the Australian landscape, threatened ecological communities provide a range of ecosystem services. These include the natural management of air, water and soil nutrients, the reduction or control of erosion and salinity, and carbon storage.

In addition, threatened ecological communities can provide a form of landscape or systems level protection. They provide vital wildlife corridors and habitat refuges for many plant and animal species, including threatened species and other Australian plants and animals that are in decline. Threatened ecological communities can also provide a focus for tourism and recreation, have cultural significance, and contribute to the productivity of our farmlands. Benefits of protecting ecological communities can include facilitating pollination of agricultural plants, maintaining healthy soils leading to improved crop yields, and supporting soilborne microbes that release nutrients for plant uptake, as well as managing water tables and run-off. Woodlands, for example, also provide shelter and wind breaks, and native grassland ecological communities confer a degree of resilience and adaptability during periods of drought and longer-term climate change.

The listing of an ecological community under national environmental law recognises that its long-term survival is under threat. The aim of listing is to prevent further decline and to promote and assist recovery through landholder and community efforts. Listing increases awareness and may also lead to funding opportunities, such as through the Australian Government's Caring for our Country initiative, to help with recovery and conservation efforts.

More information on nationally threatened ecological communities can be found at: www.environment.gov.au/biodiversity/ threatened/index.html

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Why list these ecological communities?

The federal environment minister listed the Natural Grasslands on Basalt and Finetextured Alluvial Plains of Northern New South Wales and Southern Queensland as critically endangered, and the Natural Grasslands of the Queensland Central Highlands and the Northern Fitzroy Basin as endangered, in January 2009. These listings follow a review of the Bluegrass (Dichanthium spp.) Dominant Grasslands of the Brigalow Belt Bioregions (North and South) ecological community, which was previously listed as endangered under the EPBC Act. Further information on the relationship between that listing and the listing of the northern and southern grasslands is available on page 33.

The Threatened Species Scientific Committee found that the Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and Southern Queensland was critically endangered because it:

- had undergone a very severe decline in extent
- had a very restricted distribution
- had undergone a very severe reduction in integrity, and
- faced continued threats.

The Threatened Species Scientific Committee found that the Natural Grasslands of the Queensland Central Highlands and the Northern Fitzroy Basin was endangered because it:

- had undergone a substantial decline in extent
- had a restricted distribution
- had a severe rate of continuing detrimental change, and
- faced continued threats.

Grasslands occurring on fine-textured soils are considered to have once been among the most extensive tussock* grasslands in Australia. However, very few of these grasslands remain unploughed or in good condition. Tussock grasslands are among the most under-represented ecosystems in Australia's conservation estate, and are recognised nationally as among the most threatened vegetation types. The Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and Southern Queensland was formerly widespread in New South Wales and Queensland, but now less than five per cent of its original extent remains. Most known remnants are small-under 10 hectaresand comprise isolated fragments surrounded by a mostly cleared, agricultural landscape. Natural Grasslands of the Queensland Central Highlands and the Northern Fitzroy Basin has been reduced to less than 15 per cent of its original extent, with a severe rate of continuing detrimental change.





Many remaining patches of both these ecological communities require recovery efforts because they are so degraded due to weed invasion and loss of native biodiversity that their capacity to maintain ecosystem function is impaired. Considerable efforts have been made by farmers, governments and community and conservation groups. However, ongoing protection, management and recovery of remnants on public and private land is crucial to the future survival of these unique ecological communities. The ecological communities provide habitat to several nationally and state-listed threatened species as well as other native grassland species in decline. Listing under the EPBC Act helps protect and recover the remaining patches of these threatened ecological communities, and preserve their values as vital habitat.



Typical natural grassland dominated by native perennial tussock grasses on plains of Queensland Central Highlands and northern Fitzroy Basin

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THE NATURAL GRASSLANDS ECOLOGICAL COMMUNITIES

What are native grasslands?

Native grasslands are generally defined as areas of native vegetation in which the ground layer is dominated* by native grasses*, with few or no emergent woody species. Despite the usual dominance of native grass species, grasslands can be extremely rich in other herbaceous* plant species.

Both ecological communities are a type of native tussock grassland. Native tussock grasslands once occurred over a large area of Australia. These grasslands are dominated by native tussock-forming perennial grasses, interspersed with a mixture of forbs* (broadleaved herbs or wildflowers that are not grass-like*) and sometimes shrubs. Few, if any trees are present. The natural grasslands are typically dominated by tussock grasses such as bluegrass, kangaroo grass, spear grass, wallaby grass, plains grass, windmill grass and Mitchell grass.

Native grasslands are dynamic ecosystems. The mixture of species can vary, even across short distances, as well as changing seasonally and over the years. Factors affecting this variation include rainfall, temperature, soil composition and the history of the site (e.g. fire, grazing pressure and management).

Snapshot summaries of the natural grassland ecological communities are presented on pages 10–12 and 20–22.

How do I distinguish between the natural grasslands ecological communities?

Both of these ecological communities are grasslands dominated by native tussock grasses, with little or no other structural layers. The ecological communities are separated along climatic, geographic and floristic grounds. The Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and Southern Queensland ecological community has a more southern distribution than the Natural Grasslands of the Queensland Central





Highlands and the Northern Fitzroy Basin. Although both ecological communities may contain *Dichanthium sericeum* (Queensland bluegrass), the southern community exhibits a strong temperate species component whereas the northern community contains tropical plant species. For example, temperate grassland species such as *Austrostipa aristiglumis* (plains grass) are often present in the southern grassland but are largely absent in the northern grassland. The descriptions on pages 9 and 19 provide further detail about commonly occurring plant species in the grasslands. The decision flowcharts on the following pages are designed to help identify whether a patch of either of the listed grasslands is present on a property. Information in the flowcharts is drawn from the description and condition thresholds found in the listing advice for each of the ecological communities.



Dichanthium sericeum (Queensland bluegrass)





WHAT ARE THE SOUTHERN GRASSLANDS?

The Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and Southern Queensland ecological community is strongly reliant on soil type as it is associated with fine textured, often cracking clays* derived from either basalt or guaternary* alluvium. The ecological community generally occurs on flat to low slopes, of no more than 5% (or less than 1 degree) inclination. As slope increases, grassy woodlands dominated by trees such as Acacia pendula (weeping myall), Eucalyptus coolabah (coolibah), E. populnea (poplar box) or E. melliodora (yellow box) occur. The ground layer component of these woodlands may be similar to the grasslands but the soils are not generally the same cracking clays as on the plains.

In the Darling Downs component of the ecological community, *Dichanthium sericeum* (bluegrass) tends to be the dominant grass species. In the Liverpool Plains component of the ecological community, *Austrostipa aristiglumis* (plains grass) tends to dominate. However, the Darling Downs grasslands also include plains grass as a significant winter growing component. Drier sites of the ecological community may include a higher proportion of *Astrebla* spp. (Mitchell grass).

The ecological community also contains a variety of wildflowers such as daisies, lilies and orchids, occupying the spaces between tussocks. Many of these plants are only easily seen in the spring.

Shrubs are typically a very minor component of the grassland however in some small areas the cover of shrubs in the mid vegetation layer such as *Acacia farnesiana* (mimosa), can be quite thick. For a patch to be considered the listed ecological community, the projective foliage cover* of woody shrubs over 0.5 m tall can be up to 50% but is typically much less.

The upper, tree canopy layer is also typically absent but may comprise scattered trees (e.g. paddock trees) to less than 10% projective foliage cover*.

Snapshot: Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and Southern Queensland

A critically endangered national ecological community

What does it look like?



Typical natural grassland dominated by native perennial tussock grasses



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Cracking clay soils typical of the ecological community



Wildflowers occur amongst the grass tussocks.



Native grassland on plains of northern NSW and southern Qld.

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Why is it important to protect it?

- · Tussock grasslands are considered one of the most threatened ecosystems in Australia
- · Less than five percent of the grassland remains
- What remains continues to be threatened by conversion of native pastures to improved
 pastures and cropping and overgrazing by stock
- It is essential to apply the right land use and management practices to maintain and restore this community

What else is it known as?

Corresponds closest to these Regional Ecosystems in Queensland:

- 11.3.21 *Dichanthium sericeum* and/or *Astrebla* spp. Grassland on alluvial plains. Cracking clay soils
- 11.3.24 Themeda avenacea grassland on alluvial plains. Basalt derived soils.

Corresponds closest to these vegetation formations in NSW identified by Keith²:

- · Western Slopes Grasslands (easternmost occurrences around the Liverpool Plain)
- · Semi-arid Floodplain Grasslands (westernmost occurrences around the Moree Plain)

Corresponds closest to communities identified in NSW by Benson:

- Community ID 52 Queensland bluegrass- cup grass- Mitchell grass-native millet alluvial plains grassland³
- Community ID 102 Plains grass grasslands on basaltic black earth soils mainly on the Liverpool Plains in the Brigalow Belt South bioregion (Benson unpublished).

Part of the southern grasslands corresponds with the following ecological community listed under New South Wales legislation:

· Native vegetation on cracking clay soils of the Liverpool Plains



² 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).

³ Benson, J.S., Allen, C.B., Togher, C. and Lemmon, J. (2006). NSW Vegetation Classification and Assessment: Part 1 Plant communities of the NSW Western Plains. Cunninghamia 9(3).

Where do I find it?

- Occupies landforms that are typically flat to very low slopes (<5% or 1 degree) and occurrence mainly associated with fine textured, often cracking clay soils derived from either basalt or alluvium
- · Lies in a band extending from Chinchilla in Queensland to Dubbo in New South Wales
- Distribution concentrated in three major but disjunct occurrences where climate, soils and landform are conducive to the development of tussock grasslands: the Darling Downs west of Toowoomba in Queensland, the Liverpool Plains around Gunnedah in New South Wales, and the Moree Plains north-west of Moree in New South Wales. Small patches occur as outliers outside of these three major occurrences
- Occurs within the Brigalow Belt South Interim Biogeographic Regionalisation of Australia (IBRA*) bioregion but patches extend into the Nandewar, Sydney Basin and Darling Riverine Plains bioregions also





Panicum queenslandicum (yabila grass)

Themeda triandra (kangaroo grass)





How do I know if I am standing in a patch of the listed ecological community?

This section is designed to help you determine if a patch of native vegetation could be part of the listed southern grassland ecological community. The *description* and *condition thresholds* of the ecological community in the EPBC Act listing advice provide the definitive source of information for identifying the nationally threatened ecological community. Information from the listing advice (http://www.environment.gov.au/cgi-bin/sprat/ public/publiclookupcommunities.pl) is summarised and further explained in the following pages.

A patch of the listed ecological community is defined as a discrete and uniform area that comprises the ecological community. It does not include substantial elements of other ecological communities, such as grassy woodlands or derived grasslands*. However, a patch of the listed ecological community may include small-scale disturbances, such as tracks or breaks, that do not alter its overall functionality for instance the easy movement of wildlife or dispersal of plant spores and seeds, and may also include small-scale variations in vegetation that are noted in the description.

If a native vegetation remnant meets the description of the Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and Southern Queensland, then you are likely to be standing in a patch of a nationally significant ecological community. Help with the identification of species may be obtained from your local community Landcare groups, conservation management network, catchment management authorities, other relevant state agencies, or your local council.

Condition thresholds

Condition thresholds were established when the ecological community was listed to determine which patches of grassland are of particular conservation value and should receive full protection as a matter of national environmental significance under the EPBC Act. The decision flowchart on page 16 presents the description and condition thresholds in a way that can be used on site to assess a patch of native vegetation and determine if it is part of the listed grassland.

The condition thresholds are intended to focus protection on vegetation remnants in relatively good to excellent condition.

For more information about management of patches and funding available to restore degraded patches please refer to the section on managing threats and priority conservation actions on page 37.

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Other considerations to help with assessment

Below are other considerations to be taken into account when assessing a site for presence of a listed ecological community.

Variability in species composition

The ecological community's appearance can vary seasonally. This is because many native wildflowers are more visible when flowering during spring. Some wildflowers may not appear every year and may stay dormant, for instance during dry seasons. Some species are sensitive to particular disturbance regimes and may decline or disappear from disturbed sites. For example, highly palatable or grazing-sensitive native species may disappear from sites that have been intensively or repeatedly grazed.

For these reasons, unless exceptional circumstances apply, native plant species diversity must be assessed during a good season and after the site has not been disturbed (for example, by fire, overgrazing, mowing) for at least two months before sampling, and within two months of effective rain, to optimise the biodiversity assessment of a site. However, most features, such as minimum patch size and perennial* ground layer vegetation cover can be assessed at any time.

Notes for the flowchart:

The description of the ecological community and the snapshot provide an indication of when a patch is considered part of the ecological community. The flowchart on page 16 is intended to add to these, to help identify if the southern grassland ecological community is likely to be present. Key diagnostics and condition thresholds have been incorporated into the flowchart.

- Sampling should be based upon a quadrat size of 0.1ha (e.g. 50m x 20m) selected in an area with the most apparent native perennial grass species.
- 2. See page 17–18 for a list of indicator native perennial grass species for the southern grasslands.
- Note that there are two condition classes. The best quality class can have a smaller patch size, as small as 0.5ha (5000m²), but must have greater diversity, less weeds and less shrubs than the good quality class.
- 4. In the flowchart, shrub refers to woody plants greater than 0.5m tall that occupy the mid vegetation layer.



Flow chart to identify the Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and Southern Queensland ecological community





Indicator species – Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and Southern Queensland

The ground layer is typically dominated by perennial native grasses and contains at least **three** of the indicator species below and/or on the following page:



Aristida leptopoda (white speargrass)



Astrebla lappacea (curley Mitchell grass)



Austrodanthonia bipartita (wallaby grass)



Bothriochloa erianthoides (satin top grass)



Astrebla elymoides (hoop Mitchell grass)



Astrostipa aristiglumis (plains grass)



Bothriochloa biloba (lobed bluegrass)



Dichanthium sericeum (Queensland bluegrass)





Indicator species – Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and Southern Queensland *continued*...



Digitaria divaricatissima (umbrella grass)



Themeda triandra (kangaroo grass)



Eriochloa crebra (cup grass)



Elymus plurinervis (wheat grass)



Panicum decompositum (native millet)



Eulalia aurea (silky brown top)



Thellungia advena (coolabah grass)



Panicum queenslandicum (yabila grass)



Themeda avenacea (native oat grass)



Walwhalleya proluta (rigid panic)



WHAT ARE THE NORTHERN GRASSLANDS?

The Natural Grasslands of the Queensland Central Highlands and the Northern Fitzroy Basin ecological community usually occurs on flat ground or gently undulating rises. It occurs on fine-grained, cracking clay soils that are often deep and dark in colour, although soils may be shallower on ridges or sloping land. The soils either formed on fresh basalt, or on fine-grained sedimentary rocks, or where this material has been transported to form extensive alluvial plains along ancient and flood-prone watercourses.

The grasslands of the Queensland Central Highlands are mostly dominated* by bluegrasses (*Dichanthium* species). Tropical three-awned grasses (*Aristida* species) and panic grasses (*Panicum* species) are also a major part of the grasslands. Drier sites may have more Mitchell grasses (*Astrebla* species). Shrubs are typically sparse. However, in some areas, the cover of shrubs, such as sally wattle (*Acacia salicina*) and mimosa (*Acacia farnesiana*), can be more extensive. A list of common forbs, and trees that may be present as scattered individuals, is given in the Listing Advice; along with more comprehensive species lists included as Appendices.



Snapshot: Natural Grasslands of the Queensland Central Highlands and the Northern Fitzroy Basin

An endangered national ecological community

What does it look like?



Typical natural grassland dominated by native perennial tussock grasses on plains of Queensland Central Highlands and Northern Fitzroy Basin



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Wildflowers may occur amongst the grass tussocks



Aristida leptopoda (white speargrass) dominated grassland



Bluegrass dominated grassland

Why is it important to protect it?

- · Tussock grasslands are considered one of the most threatened ecosystems in Australia
- The Brigalow Belt North and South bioregions are recognised as one of Australia's national biodiversity hotspots
- It continues to be threatened by conversion of native pastures to improved pastures and cropping and overgrazing by stock
- It is essential to apply the right land use and management practices to maintain and restore this community
- It provides habitat for threatened species such as the bridled nail tail wallaby and king bluegrass
- Its protection provides support for native biodiversity and ecosystem services across a large region of Australia.

What else is it known as?

Corresponds closest to these Regional Ecosystems in Queensland:

- 11.3.21 *Dichanthium sericeum* and/or *Astrebla* spp. grassland on alluvial plains. Cracking clay soils
- 11.4.4 Dichanthium spp., Astrebla spp. Grassland on Cainozoic clay plains
- 11.4.11 *Dichanthium sericeum, Astrebla* spp. and patchy *Acacia harpophylla, Eucalyptus coolabah* on Cainozoic clay plains
- 11.8.11 Dichanthium sericeum grassland on Cainozoic igneous rocks
- 11.9.3 Dichanthium spp., Astrebla spp. grassland on fine-grained sedimentary rocks
- 11.9.12 *Dichanthium sericeum* grassland with clumps of *Acacia harpophylla* on finegrained sedimentary rocks
- 11.11.17 *Dichanthium sericeum* grassland on old sedimentary rocks with varying degrees of metamorphism and folding



Where do I find it?

- Occurs on flat ground or gently undulating rises. Soils have formed either in situ on the fresh basalt or on fine-grained sedimentary rocks or where this material has been transported to form extensive alluvial plains along ancient and flood-prone watercourses
- It is endemic to Queensland and broadly occurs where the Fitzroy River Basin and the Brigalow Belt North bioregion coincide. It was formerly extensive in this area but now occurs as smaller remnants within this range
- Extends from Collinsville in the north to Carnarvon National Park in the south. It is bounded to the south by the Expedition, Carnarvon, Great Dividing, Drummond and Narrien ranges; and to the north by the Clark, Denham, Connors and Broadsound ranges
- Occurs within the Brigalow Belt North and Brigalow Belt South, IBRA bioregions. The ecological community mostly occurs within the Fitzroy River Basin, but its distribution does extend part way into adjoining catchments, for example where five of the subregions extend into the Burdekin River Basin and where one extends into the Warrego River Basin



Astrebla squarrosa (bull Mitchell grass)



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Thellungia advena (coolabah grass)





How do I know if I am standing in a patch of the listed ecological community?

This section is designed to help you determine if a patch of native vegetation could be part of the northern grassland ecological community. The *description* and *condition thresholds* of the ecological community in the EPBC Act listing advice provide the definitive source of information for identifying the nationally threatened ecological community. Information from the listing advice (http://www.environment.gov.au/cgi-bin/sprat/ public/publiclookupcommunities.pl) is summarised and further explained in the following pages.

A patch of the listed ecological community is defined as a discrete and uniform area that comprises the ecological community. It does not include substantial elements of other ecological communities, such as grassy woodlands or derived grasslands*. However, a patch of the listed ecological community may include small-scale disturbances, such as tracks or breaks, that do not alter its overall functionality for instance the easy movement of wildlife or dispersal of plant spores and seeds, and may also include small-scale variations in vegetation that are noted in the description.

If a native vegetation remnant meets the description of the Natural Grasslands of the Queensland Central Highlands and the Northern Fitzroy Basin, then you are likely to be standing in a patch of a nationally significant ecological community. Help with the identification of species may be obtained from your local community Landcare groups, conservation management network, catchment management authorities, other relevant state agencies, or your local council.

Condition thresholds

Condition thresholds were established when the ecological community was listed to determine which patches of grassland are of particular conservation value and should receive full protection as a matter of national environmental significance under the EPBC Act. The decision flowchart on page 26 presents the description and condition thresholds in a way that can be used on site to assess a patch of native vegetation and determine if it is part of the listed grassland.

The condition thresholds are intended to focus protection on vegetation remnants in relatively good to excellent condition.

For more information about management of patches and funding available to restore degraded patches please refer to the section on managing threats and priority conservation actions on page 37.

Other considerations to help with assessment

Below are other considerations to be taken into account when assessing a site for presence of a listed ecological community.

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Variability in species composition

The ecological community's appearance can vary seasonally. This is because many native wildflowers are more visible when flowering during spring. Some wildflowers may not appear every year and may stay dormant, for instance during dry seasons. Some species are sensitive to particular disturbance regimes and may decline or disappear from disturbed sites. For example, highly palatable or grazing-sensitive native species may disappear from sites that have been intensively or repeatedly grazed.

For these reasons, unless exceptional circumstances apply, native plant species diversity must be assessed during a good season and after the site has not been disturbed (for example, by fire, overgrazing, mowing) for at least two months before sampling, and within two months of effective rain, to optimise the biodiversity assessment of a site. However, most features, such as minimum patch size and perennial* ground layer vegetation cover can be assessed at any time.

Notes for the flowchart:

The description of the ecological community and the snapshot provide an indication of when a patch is considered part of the ecological community. The flowchart on page 26 is intended to add to these, to help identify if the northern grassland ecological community is likely to be present. Key diagnostics and condition thresholds have been incorporated into the flowchart. The ecological community occurs within eight subregions, as identified by the Interim Biogeographic Regionalisation for Australia (IBRA). The subregions are:

Brigalow Belt North subregions

- BBN 6 Northern Bowen Basin
- BBN 9 Anakie Inlier
- BBN 10 Basalt Downs
- BBN 11 Isaac-Comet Downs
- BBN 12 Nebo-Connors Range
- BBN 13 South Drummond Basin

Brigalow Belt South subregions

- BBS1 Claude River Downs
- BBS 9 Buckland Basalts
- Sampling should be based upon a quadrat size of 0.1ha (e.g. 50m x 20m) selected in an area with the most apparent native perennial grass species.
- 3. See page 27 for a list of indicator native perennial grass species for the northern grasslands.
- 4. Note that there are two condition classes. The best quality class can have a smaller patch size, as small as 1ha (10,000m²), but must have greater diversity, less weeds and less shrubs than the good quality class.
- 5. In the flowchart, shrub refers to woody plants greater than 0.5m tall that occupy the mid vegetation layer.



Flow chart to identify the Natural Grasslands of the Queensland Central Highlands and the Northern Fitzroy Basin ecological community





Indicator species- Natural Grasslands of the Queensland **Central Highlands and the Northern Fitzroy Basin**

The ground layer is typically dominated by perennial* native grasses* and contains at least three of the indicator species below:



Aristida leptopoda (white speargrass)



Astrebla elymoides (hoop Mitchell grass)



Astrebla squarrosa (bull Mitchell grass)



Dichanthium queenslandicum (king bluegrass)



Eriochloa crebra (cup grass)



Panicum queenslandicum (yabila grass)



Thellungia advena (coolabah grass)



Aristida latifolia (feather-top wiregrass)



Astrebla lappacea (curley Mitchell grass)



Bothriochloa erianthoides (satin top grass)



Dichanthium sericeum (Queensland bluegrass)



Panicum decompositum (native millet)



Paspalidium globoideum (shot grass)







OTHER KEY FLORA SPECIES FOR THE NATURAL GRASSLANDS

The following photos show some of the key plant species (other than those indicator native perennial grasses listed on pages 17–18 and 27 of the natural grassland ecological communities.

A fuller discussion of key plants and animals, with longer species lists, can be found in the listing advice for each ecological community at: www.environment.gov.au/cgi-bin/sprat/public/ publiclookupcommunities.pl Note that not all the native species mentioned will be present and other native species not mentioned may occur, at any given site. Scientific names can change, but were current at the time of listing.

Shrub Layer (if present)



Acacia salicina Sally wattle Northern grasslands



Scleroleana spp. Copper burrs Northern and southern grasslands



Pimelea spp. Rice flowers Northern and southern grasslands



Ground Layer Wildflowers and Other herbs



Rhynchosia minima Rhyncho Northern and southern grasslands



Carex inversa Knob sedge Southern grasslands



Commelina ensifolia Scurvy grass Northern grasslands



Hibiscus trionum Bladder ketmia Northern and southern grasslands



Geranium solanderi var. *solanderi* Geranium Southern grasslands



Brunoniella australis Blue trumpet Northern grasslands

Tree Layer (only scattered)



Eucalyptus coolabah Coolibah Northern and southern grasslands



Acacia pendula Weeping myall Southern grasslands



Corymbia erythrophloia Gum-topped bloodwood Northern grasslands





THREATENED SPECIES IN THE NATURAL GRASSLANDS

Both grassland ecological communities may provide habitat for animal and plant species that are listed as nationally threatened under the EPBC Act.

The following pictures show some of the nationally threatened flora and fauna species that have been recorded in or near to the listed ecological communities.

More information on these species may be found at the species profile and threats database (SPRAT) available through the department's website: www.environment.gov. au/biodiversity

Birds



Geophaps scripta scripta Squatter pigeon (southern) Vulnerable Occurs on inland slopes of the Great Dividing Range. Found in both northern and southern grasslands



Neochima ruficauda ruficauda Star finch (eastern) Endangered Feeds mainly on grass seeds. Found in both northern and southern grasslands.

Mammals



Onychogalea fraenata Bridled nail-tail wallaby Endangered Occurs in the northern grasslands and brigalow habitats. Feeds on herbs, grasses and shrubs



Nyctophilus corbeni South-eastern Iong-eared bat Vulnerable Found in inland woodlands. May use southern grasslands for foraging.



Reptiles



Anomalopus mackayi Five-clawed worm-skink Vulnerable Found in grasslands and grassy woodlands. Occurs in tussock bases in the southern grasslands



Typanocryptis pinuicolla Grassland earless dragon Endangered Known from tussock grasslands

on basalt soils, preferring sites with both taller tussock and shorter grasses. Occurs in the southern grasslands.



Lerista allanae Retro slider, Allan's lerista Endangered A burrowing skink which may occur in the northern grasslands.

Plants



Picris evae Hawkweed Vulnerable Found in open woodlands and Dichanthium spp. grassland. Occurs in the southern grasslands.



Thesium australe Austral toadflax Vulnerable Grows in grassland or woodland, often in damp sites. Flowers mostly in spring or summer. Occurs in the southern grasslands



Digitaria porrecta Finger panic grass Endangered Found in four disjunct occurrences in the Brigalow Belt South bioregion. Occurs in the northern and southern grasslands.



Dichanthium queenslandicum King bluegrass Vulnerable Found in closed tussock grasslands in black cracking clay soils. Occurs in the northern grasslands.





ARE THE LISTED NATURAL GRASSLAND COMMUNITIES KNOWN BY OTHER NAMES?

Vegetation may be identified in different ways among regions, states and territories, depending on the vegetation classification system and environmental legislation that are applied. The grassland ecological communities relate to, or may be known as other vegetation types.

The National Vegetation Information System (NVIS) is a hierarchical system for classifying vegetation across the Australian continent. It ranges from broad Major Vegetation Groups and Subgroups to more fine-scale floristic sub-associations. The grassland communities fall within the Major Vegetation Group 19: tussock grasslands.

Similar ecological communities

Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and southern Queensland

Other grassland communities that occur outside the southern grassland range may show similarities in their species composition but do not contain the driving processes that define this ecological community. This ecological community differs from the natural temperate grassland communities that occur throughout south-eastern Australia as the northern component of the ecological community has a summer rainfall regime and has a significant presence of subtropical and/or semi-arid genera (e.g. *Astrebla*, *Dichanthium, Eulalia*).

Natural Grasslands of the Queensland Central Highlands and the Northern Fitzroy Basin

South-west of the Fitzroy Basin, around Charleville and Roma, the majority of the grasslands are mapped as Queensland RE 11.9.3. These grasslands are part of the south-eastern Mitchell grasslands. Grasslands extend further to the north, to around Tambo and some parts have been mapped as Queensland RE 11.3.21. Where they occur outside the defined area of the northern grasslands as defined on the map on page 23, they are considered to be part of the south-eastern Mitchell grasslands. West of the area containing the ecological



community are grasslands around Surbiton and Frankfield. These are part of the more arid Central Mitchell grasslands which continue to the west.

The Bluegrass (*Dichanthium* spp.) Dominant Grasslands of the Brigalow Belt Bioregions (North and South) ecological community

This ecological community was previously listed as endangered under the EPBC Act. The listing was reviewed in 2008 through technical workshops and discussions with relevant experts. The two key outcomes from the review were that the listed ecological community be split into two separately listed grassland ecological communities (the northern and southern grasslands which are the subject of this document) and that their definition not be limited to grasslands dominated by bluegrass. The review recognised separate northern and southern grassland communities divided on climatic, geographic and floristic grounds. The northern community is centred on the Queensland Highlands and Fitzroy River Basin within the Brigalow Belt North bioregion. The southern ecological community occurs on the Darling Downs, Liverpool Plains and Moree Plains, mostly in the Brigalow Belt South and Darling **Riverine Plains bioregions of Queensland** and New South Wales. Temperate grassland species, for example Austrostipa aristiglumis, are present in the southern grassland but are largely absent in the northern grassland.





MANAGEMENT OF THE LISTED ECOLOGICAL COMMUNITIES

What does the EPBC Act listing of the ecological community mean for land managers or developers?

If you have a patch of the natural grassland ecological communities on your property then adequate protection and appropriate land management are vitally important if the listed ecological communities are to persist for the benefit of future generations.

Appropriate management and restoration of patches that do not meet the condition thresholds (and thus do not qualify for protection under the EPBC Act) is recommended, as these patches may still play an important ecological role, especially where they are providing valuable habitat or connectivity. For example: patches that link native vegetation remnants in the landscape are particularly important as wildlife habitat and to the viability of listed patches of the ecological community.

The listing of the natural grassland ecological communities under the EPBC Act will not prevent land managers from continuing

current land management practises or activities, providing that these practises or activities do not significantly change or intensify, or are unlawful.

Which activities might require consideration?

National protection provided by the EPBC Act means any new or intensified activities that **may be likely to have a significant adverse impact** on one or more of a listed ecological community should be referred to the environment minister for assessment and approval.

Most day to day land use activities are not likely to have significant impacts or otherwise require consideration under the EPBC Act; however activities that are likely to require approval and should be referred include, but are not restricted to:

- permanently clearing large areas of the ecological community
- changing or intensifying ongoing grazing or horticulture activities

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- introducing grazing to an area that has not been previously grazed or has not been grazed for some time
- substantially changing or intensifying methods of weed control or fertiliser use in or adjacent to the ecological community
- renovating or improving pasture by introducing exotic plant species, mechanical disturbance or cultivation, and the addition of irrigation
- new infrastructure, plantings, pasture improvement or land/vegetation clearing etc. near to a patch of the ecological community that may have a significant impact, such as mechanical disturbance, exotic plant species influx or the alteration of drainage patterns.

On the other hand, activities that are unlikely to require approval include routine maintenance of buildings and properties, maintenance of existing firebreaks and routine weed management (with minimal or positive impacts on the ecological community).

Also note that even if a native vegetation remnant on your land does not meet the criteria for the listed ecological communities, there may be threatened plant or animal species within the remnant that are individually protected under the EPBC Act (see *Threatened Species* on pages 30–31). The process for making a referral under the EPBC Act can be done online. The EPBC Act allows for some exemptions to the requirement for assessment and approval. This means some activities may not need assessment or approval under certain situations. Generally, exemptions refer to existing permission to legally undertake an action or to routine actions that are carried out over a long time. However, failure to refer an action that is not exempt and likely to have a significant impact on the listed ecological community may have legal consequences such as financial penalties or remediation orders.

If you are considering an activity that may have an impact on either of the ecological communities, you are encouraged to contact the department (1800 803 772) about your options.

Further information is also available from the department's website:

Exemptions:

www.environment.gov.au/epbc/about/ exemptions.html

Referrals:

www.environment.gov.au/epbc/assessments/ referral-form.html

Approvals:

www.environment.gov.au/epbc/approval.html







Austrostipa aristiglumis (plains grass), found in the southern grasslands

You should also check with relevant authorities whether any state or local government approvals are required in addition to EPBC Act requirements. If you have a patch of either of the listed ecological communities on your property and would like advice, then farmers can contact the department's out posted **Environment Liaison Officer** at the National Farmer's Federation (NFF) either by phone (1800 704 520) or by email: environment@nff.org.au.



MANAGING THREATS AND PRIORITY CONSERVATION ACTIONS

The key threats faced by both the natural grassland ecological communities are conversion of native pastures to improved pastures, and cropping and overgrazing by stock. Other threats include ploughing, grading, weed invasion, salinity, herbicide and fertiliser spraying, over grazing by native herbivores, trampling and inappropriate management regimes of mowing, burning, tree regeneration and planting, rehabilitation and ecosystem recreation.

Survey work is encouraged to help identify more remnants of the natural grasslands, to further assist in the protection of the listed communities. Monitoring to identify key threats as well as protecting known sites through the development of conservation agreements and covenants may also help to protect these communities. Conservation advice has been prepared for both ecological communities, which is designed to provide management guidance for key threats and is available in SPRAT. A number of additional publications offer more specific advice for the management of the grassland ecological communities. Both the SPRAT information and a range of additional publications are listed in Where Can I Go For Further Information? on page 42. The following table summarises some of the key management issues associated with the grassland ecological communities. This list is not exhaustive. These suggestions are only a guide and some management actions may not necessarily apply to specific land management practices or sites.





Action Issues Management Survey & Understanding your site is essential to Record what species occur in your Monitoring managing it. patch. The best time to survey is spring or early summer - you can get help identifying species from your local NRM agency. Use the information collected to develop a management plan for your site. Keep records of actions taken and monitor regularly. Grazing Heavy grazing can remove palatable Promoting native vegetation may species reducing biodiversity, as well lead to healthier soils and improved water retention in the long term. as compact the soil, decrease water uptake of plants and accelerate weed Prevent trampling and excessive grazing pressure at known grassland invasion. sites. Develop strategic grazing regimes that minimise excess grazing to your site. Fire Fire is necessary for the maintenance Get advice from your local NRM of some grasslands especially those agency to develop strategic ecological fire regimes for your dominated by Kangaroo Grass. Dense grass can smother wildflowers, and patch. Make sure any controlled result in a loss of habitat for some burning is appropriately managed native animals. and undertake monitoring to ensure the burning program has met management aims. Soil Soil disturbance can displace native Avoid activities that result in Disturbance plants and animals and create excessive soil disturbance such as opportunities for weeds to invade. It ploughing, earth works, vehicles and can also remove an important crust of machinery, stockpiling, rock removal algae, lichens or mosses that are etc in or near patches of the important for soil health. ecological community.

Key management issues associated with the natural grasslands ecological communities.





Action	Issues	Management
Exotic plant invasion	Introduced plants compete with native plants for space, water and nutrients and may lead to pasture degradation.	Weed management is a priority to stopping degradation to remnant patches of the ecological communities. Weed cover can be variable according to the time of year, climate, recent and past management or disturbance history, and site conditions and weeds may require year-round attention. Some weeds have more impact on the health of grassy communities that others and should be prioritised for control.
Herbicide application	Herbicides can kill native grassland plants and can also injure grassland animals such as insects and frogs.	Take care that chemical applications don't adversely affect the ecological community. Use a combination of weed removal techniques, such as spot-spraying, hand removal and burning in your management plan.
Fertiliser addition	Native grassland plants prefer low nutrient soils. The application of fertilisers can kill native plants and favour weed species.	Promoting native grassland on your property will save you applying fertiliser. When fertiliser use is required, ensure it is not used in or near the native grassland or grassy woodland.
Revegetation	Revegetation can include allowing natural regeneration of native species into new areas, planting of tube stock and sowing or direct seeding.	Revegetation may be appropriate to extend and buffer the ecological community on your site, or to manage any large weed patches that have been treated with herbicide. Use only native local species appropriate to the ecological community at your site.

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Is funding available to protect listed grassland and grassy woodland ecological communities?

If you have either of the listed ecological communities on your property, you may be eligible for funding to help preserve or restore remnants.

Patches that do not currently meet the condition thresholds may be eligible for funding to help restore them to good condition.

National funds

Funding through Caring for our Country and the Biodiversity Fund may be available for activities that have environmental benefits. For more details visit www.environment.gov. au/cleanenergyfuture/biodiversity-fund/ index.html or talk to a local Caring for our Country

regional officer: www.nrm.gov.au.

The Environmental Stewardship Program

is part of the Caring for our Country initiative and aims to maintain and/or improve the condition and extent of targeted matters of National Environmental Significance under the EPBC Act. The program offers funding rounds, through which eligible private land managers can apply to provide a range of agreed management activities to protect, rehabilitate and improve particular ecological communities. Eligible land managers include farmers, Indigenous communities, and other managers of private freehold and leasehold land. For more details visit www.nrm.gov.au/ funding/stewardship/index.html.

The National Reserve System (NRS) has an important role in protecting biodiversity values on private land in agricultural and pastoral regions. Building the NRS is one of the priorities under Caring for our Country. Interested organisations can apply for assistance from the Australian Government to help landholders voluntarily establish protected areas to be managed for nature conservation as part of the NRS. This allows landholders to permanently protect all or part of their property's biodiversity for future generations. This emphasis is on land with high biodiversity values and connectivity. For more details visit www.environment.gov.au/ parks/nrs/getting-involved/index.html.

State funds

Information about vegetation conservation incentive schemes can be obtained from your local catchment management authority or council.

New South Wales

Funding to protect patches of the ecological community may also be available from the New South Wales Government and agencies through BioBanking and vegetation conservation incentive schemes. For further information see www.environment.nsw.gov. au/biobanking/



Landholders who wish to provide permanent protection for native vegetation or special features on their land may also enter into conservation agreements with the NSW Government. Further information is available at: www.environment.nsw.gov.au/cpp/ ConservationAgreements.htm

Queensland

Incentives may be available for landholders to implement on-ground works and practices that contribute to sustainable use of land. These include incentives for controlling pests and weeds and rehabilitating degraded areas. Further information is available at: www.derm.qld.gov.au/land/management/ incentives.html Landholders who wish to establish a nature refuge, or extend an existing nature refuge, can apply through NatureAssist for funds to help manage the area. Further information is available at: www.derm.qld.gov.au/wildlifeecosystems/nature_refuges/natureassist/ index.html





WHERE CAN I GO FOR MORE INFORMATION?

The listing advice for the natural grasslands ecological communities

These are the definitive sources of information about the nationally-listed ecological communities and can be downloaded from: www.environment.gov.au/cgi-bin/sprat/public/

publiclookupcommunities.pl

Click on the details link against the name of the ecological community then follow the link to the listing and conservation advice.

Information about other matters of national environmental significance

- other EPBC-listed threatened ecological communities www.environment.gov.au/cgi-bin/sprat/ public/publiclookupcommunities.pl
- Individually-listed threatened species under the EPBC Act www.environment.gov.au/cgi-bin/sprat/ public/sprat.pl

- Internationally significant Ramsar wetlands www.environment.gov.au/water/topics/ wetlands
- Australia's heritage places www.environment.gov.au/heritage/index. html

Useful resources

- Goodland, A (2003). More than meets the eye. Your guide to managing the native grasslands of Queensland's Darling Downs. WWF Australia, Brisbane.
- Namoi CMA (2010). Natural grasslands on basalt and fine textured alluvial plains. Information Brochure. Namoi Catchment Management Authority. www.namoi.cma.nsw.gov.au/grasslands_ final_brochure_2010_1.pdf
- Eddy, D (2002). Managing native grassland- A guide to management for conservation, production and landscape protection. WWF Australia, Canberra.

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- Partridge, I (1992). Managing native pastures- A grazier's guide. Department of Primary Industries, Brisbane.
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- Menkins, I (1999). Developing a sharper eye- A field guide to the identification of native and naturalised grasses on the Darling Downs. Toowoomba Field Naturalist Club Inc., Toowoomba.
- Roberts, BR and Silcock, RG (1993).
 Western grasses- A grazier's guide to the grasses of south west Queensland. USQ Press, Toowoomba.
- Kahn, L and Heard, B (1997). Pasture plants of the slopes and tablelands of New South Wales. Department of Land and Water Conservation, Armidale.

Useful websites

- EPBC Act web site: www.environment.gov.au/epbc
- EPBC Act Administrative Guidelines on Significance: www.environment.gov.au/ epbc/assessmentsapprovals/guidelines/ index.html
- Information about nationally threatened ecological communities and species: www.environment.gov.au/cgi-bin/sprat/ public/sprat.pl
- Relevant Catchment Management Authorities:
- Border Rivers-Gwydir: www.brg.cma.nsw.gov.au
- Namoi: www.namoi.cma.nsw.gov.au
- Border Rivers and Maranoa-Balonne: www.qmdc.org.au
- Fitzroy: www.fba.org.au
- Caring for our Country What can I do?: www.nrm.gov.au/resources/best-practices/ landowners.html
- Department of Agriculture, Fisheries and Forestry: www.daff.gov.au/
- National Farmers' Federation: www.nff.org.au/
- Stipa Native Grasses Association: www.stipa.com.au/index.html
- Queensland Department of Environment and Resource Management: www.derm.qld.gov.au
- New South Wales Office of Environment and Heritage: www.environment.nsw.gov.au





Additional copies of this document

For further information or additional copies of this publication please contact the department's Community Information Unit:

- Telephone: 1800 803 772
- Email: ciu@environment.gov.au
- Mail: Community Information Unit Department of Sustainability, Environment, Water, Population and Communities GPO Box 787 Canberra 2601.





Comelina ensifolia (scurvy grass)





GLOSSARY

Bioregion: A unique area with characteristic soils, landforms, climates (environmental conditions), and flora and fauna, and which is bounded by natural rather than artificial borders. See also 'IBRA'.

Cracking clay: fine-textured soils which expand when wet and contract when dry, often causing deep cracks.

Critically endangered: A category of listing under the EPBC Act. It is applied to threatened species and ecological communities showing an extremely high risk of extinction in the wild in the immediate future.

Derived grasslands: Areas that were previously woodlands or grassy woodlands where trees have been cleared and grassland remains.

Dominant: a dominant species represents at least 50% of all species present in a particular context, for example native grasses may be a dominant feature of grassland ground cover.

Endangered: A category of listing under the EPBC Act. It is applied to threatened species and ecological communities showing a high risk of extinction in the wild in the near future.

EPBC Act: The *Environment Protection and Biodiversity Conservation Act 1999.* This is the Australian Government's national environment law.

Forb: a non-woody plant other than a grass, rush or sedge.

Grass(es): Any plant that is a member of the plant family Poaceae.

Grass-like: A plant that may superficially resemble a grass but is a member of a plant family other than Poaceae. Examples include sedges and rushes. The shoots of some lilies, orchids and mat-rushes (*Lomandra* spp.) may also appear grass-like, especially when not in flower.

Grassland: A vegetation type characterised by the absence or scarcity of trees and large shrubs and where a ground layer of grasses is the dominant vegetation feature.

Herb, herbaceous: Any seed plant that never produces a woody stem.

IBRA: Interim Biogeographical Regionalisation of Australia. Under IBRA version 6.1. Australia is classified into 85 bioregions, each of which is a large geographically distinct area of similar climate, geology, landform, vegetation and animal communities.





Patch(es): A patch of the listed ecological community is a discrete and uniform area that comprises the ecological community. It does not include substantial elements of other ecological communities, such as other types of grasslands. However, a patch of the listed ecological community may include small-scale variations in vegetation, and small-scale disturbances, such as tracks or breaks, that do not alter its overall functionality—including the easy movement of wildlife or dispersal of plant spores and seeds.

Perennial: A plant whose life span extends over more than two growing seasons.

Projective foliage cover: Is the percentage of area covered by the leaves, twigs and branches, excluding any gaps between these. For example, projective foliage cover correlates to the amount of shadow that would be cast on the ground if a light source was shining directly overhead.

Quaternary: relating to the present period of earth history, forming the latter part of the Cenozoic Era, originating about 2 million years ago and including the Recent and Pleistocene Epochs. **Remnant:** Patch of native vegetation remaining after an area has been cleared or modified. For the purposes of this information brochure remnants also include naturally regenerating areas as well as areas that have undergone revegetation.

Tussock: A plant growth form where the shoots form compact tufts. Common in many species of grasses, but also occurs in other grass-like plant species.

Woodland: A vegetation type in which a tree canopy is present but does not form a dense or closed canopy, as in forest systems. In woodlands, the tree canopy typically has a foliage cover of 10 to 30 per cent, and individual trees are often more widely spaced, and shorter, with a spreading canopy. Open woodlands have a tree foliage cover of less than 10 per cent. Grassy woodlands have an understorey dominated by grasses, interspersed with other herbs.



IMAGE CREDITS

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Hibiscus trionium (bladder ketmia) © L. Vallee, Australian National Botanic Gardens

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Native grassland on plains of northern New South Wales and Southern Queensland © Alison Goodland

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- 29 *Geranium solanderi* var. *solanderi* (geranium) © A.N. Schmidt-Lebuhn, Centre for Australian National Biodiversity Research
- 29 Brunoniella australis (blue trumpet) © M. Fagg, Australian National Botanic Gardens
- 29 Eucalyptus coolabah (coolibah) © M. Fagg, Australian National Botanic Gardens
- 29 Acacia pendula (weeping myall) © Rod Fensham
- 29 Corymbia erythrophloia (gum-topped bloodwood) © Brooker & Kleinig, Australian National Botanic Gardens
- 30 Geophaps scripta scripta (squatter pigeon (southern)) © Steve G Wilson DSEWPaC
- 30 Neochmia ruficauda ruficauda (star finch (eastern)) © Brian Furby Collection
- 30 Onychogalea fraenata (bridled nail-tail wallaby) © M. Evans
- 30 Nyctophilus corbeni (south-eastern long-eared bat) © Terry Reardon





Internal (L to R, top to bottom) (page # on left)

- 31 Anomalopus mackayi (five-clawed worm-skink) © Steve Wilson
- 31 Tympanocryptis pinuicolla (grassland earless dragon) © Steve Wilson
- 31 Lerista allanae (retro slider) © Steve Wilson
- 31 Picris evae (hawkweed) © Rod Fensham
- 31 Thesium australe (austral toadflax) © Nev Fenton
- 31 Digitaria porrecta (finger panic grass) © D. Sharp, Queensland Herbarium
- 31 Dichanthium queenslandicum (king bluegrass) © Rod Fensham
- 36 Austrostipa aristiglumis (plains grass) © Rod Fensham
- 44 Wildflowers in southern grasslands © Barbara Bell
- 44 Wildflowers in northern grasslands © Rod Fensham

