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Pasture condition guide for the Kimberley


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Pasture condition guide for the Kimberley

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Rangelands NRM
Western Australia

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Pasture condition guide for the Kimberley

K. Ryan, E. Tierney, P. Novelly and R. McCartney



Australian Government



Rangelands NRM
Western Australia

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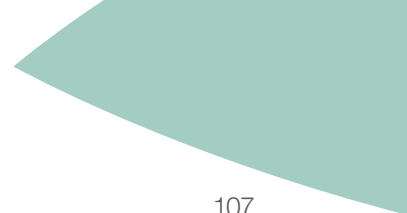
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Introduction

This guide has been produced as a tool for assessing pasture condition over a range of pasture types in the Kimberley. A pasture type is a distinctive mix of plant species, soil type and landscape position. For example, the Mitchell Grass Alluvial Plain Pasture type is a mixture of Mitchell grasses and other species occurring on black soil alluvial plains.

Pasture condition is an important factor affecting the potential of the rangelands for animal production and is a useful indicator for the sustainability of production.

Why use this condition guide?

Rangelands are complex and diverse and condition assessment may seem complex and cumbersome, but with practical experience it is possible to evaluate the pasture condition consistently. This guide provides a method, supported with photographic examples, that allows users to readily see changes in pasture condition. It provides some early indications of when management changes are needed and helps users ‘tune’ their eyes to some of the key indicators of pasture condition.

Who is this guide for?

This guide is for pastoralists, resource managers, department staff and others with an interest in the productivity and maintenance of rangeland plant communities. It can be used as a field reference for pasture condition assessments and as an aid to field training of interested people.

What is pasture condition?

Pasture condition describes the current condition of the vegetation compared with the optimal condition that could be expected taking the potential of the site into account. The term ‘health’ is sometimes used, meaning that all parts that make up the whole are present and working well together. Pasture condition is rated as good, fair or poor in this guide, depending on how close the current condition is to the optimal condition.

Assessment of pasture condition rates vegetation based on the degree of departure from optimal condition through to total vegetation removal; condition classes are therefore relative. If a pasture site is described as being in good condition, the description is relative to the kind and amount of native vegetation that particular site is capable of producing.

Pasture condition declines when:

- desirable species are replaced by less desirable species
- reduced plant cover increases the proportion of bare soil
- erosion accelerates
- production of palatable perennial species declines, or
- any combination of these effects occurs.

States and transitions—are changes in pasture condition reversible?

While a key assumption of pasture management is that all changes in condition are reversible given sufficient time, experience in the Kimberley and elsewhere shows that this may not always be the case. Changes in the composition of the rangeland as a consequence of various pressures (grazing, fire and drought) may not be directly reversible. Once the pressure eases, the perennial species that were lost when condition declined may be replaced by different perennial species (usually of a lower grazing value), and alternative stable situations (defined as 'states') may be established. Change from one state to another is referred to as a 'transition'. These new states can be relatively resistant to change, creating essentially permanently altered pasture types that usually have a lower grazing value than the original pasture.

When is the best time to assess pasture condition?

Pasture condition can be assessed at any time of the year, since it depends on the species present and their density rather than on grass bulk (biomass). However, it is usually easier to identify particular species early in the season; later in the season, fire or heavy grazing can make identification difficult.

How often should pasture condition assessments be done?

The frequency of assessments depends on how quickly the pasture condition is changing. Yearly assessments allow early changes to be detected; on the other hand, since change is sometimes gradual, it may be easier to detect change over intervals of several years.

Choosing sites for pasture condition assessment

When choosing sites to assess, consider your reasons for doing the assessment. Are you interested in a ‘hot’ spot where problems are evident and where you would like to judge change over time? If so, a single site monitored over a number of years would best serve your purpose. Alternatively, if you want to assess the ‘average’ condition of a paddock or management unit, you would be better to select a number of sites that are representative of the pasture types and conditions in that paddock.

Variability is normal in rangelands. No matter how hard you try to select a uniform site to assess, you will find variation in the species present compared to nearby areas, and variation in other aspects such as grazing pressure. Don’t worry about variation. What is important is that your assessment sites are representative of the pasture type and condition of that area.

If there are two or more distinct pasture types in the area you are interested in, consider selecting a site to assess within each type. Avoid sampling across the boundary between different pasture types (eg where Ribbon Grass Pasture grades into Hard Spinifex Pasture).

Keeping track of changes

Recording the pasture condition at the same site over a number of years will show whether condition is improving, declining or staying the same. In conjunction with stock management and climate records, monitoring pasture condition enables the impact of management practices and seasonal conditions to be examined. One of the simplest ways to keep track of changes is to photograph the site each time you assess its condition and note down the date, the pasture type, condition and the reasons for your decision.

Pasture quality

Plant species occurring in a pasture type fall into three classes depending on their relative pastoral (forage) value—desirable, intermediate and undesirable. It is the proportions of these three classes in a pasture that largely determine its condition.

Desirable species are usually perennial grasses. These live for more than one season, and they last through the dry season, providing feed and protection from erosion. Intermediate and undesirable species may be annual or perennial. Annual grasses generally live for one season only. They can provide short-term feed following a good wet season, but have little bulk. Annual grasses tend not to last beyond the dry season, so provide little protection from erosion.

General characteristics of desirable, intermediate and undesirable species

Desirable species	Intermediate species	Undesirable species
<ul style="list-style-type: none">• usually perennial• highly to moderately palatable, depending on the time of year and life stage of the plant• first choice grasses for stock• decrease under grazing (so are often referred to as decreaser species).	<ul style="list-style-type: none">• annual or perennial• moderately to slightly palatable, depending on the time of year and life stage of the plant• second choice grasses for stock• increase under grazing at first, then decrease once the first choice grasses are grazed out.	<ul style="list-style-type: none">• annual or perennial• mostly unpalatable, though seedlings or new shoots of some species may be grazed• choice of last resort for stock• increase under grazing (so are often referred to as increaser species).

Good pasture condition—what to look for



- Desirable species (for the pasture type you're in) are dominant, vigorous and evenly spaced.
- Some intermediate perennial and annual grasses may be present.
- Undesirable species are rare.
- Desirable species are reproducing; seedlings or young plants may be present.
- Ground cover is optimal for the site. Sites with good soils and higher rainfall can generally support a higher density of plants than sites with shallow stony soils or lower rainfall.
- Where plants have been grazed down or burnt, the butts of desirable species are frequent and evenly spaced.

Fair pasture condition—what to look for

Intermediate species make up 30 to 50% of the stand. Desirable and undesirable species take up roughly equal proportions of the remaining space.

or Intermediate species dominate, with only a few desirable and undesirable species.

or Only desirable species are present, but the density of plants is low, with substantial (or increasing) bare areas in between.



- Desirable species may show signs of reduced vigour, for example, smaller bases or fewer stems.
- Seedlings or young plants of desirable species may be hard to find.
- Ground cover is less than optimal for the site. There may be patches of annual grasses early in the season that dry up or are trampled and blow away, leaving areas of bare ground later in the year.

Poor pasture condition—what to look for

Undesirable and intermediate species dominate.

or Undesirable species dominate, as dense stands or with variable amounts of bare ground.

or Bare ground dominates, with occasional desirable species or other perennial plants spaced far apart.



- Desirable species are rare or absent.
- Any desirable species remaining are usually stunted and unproductive.
- Intermediate species may be present but are less frequent compared to fair condition.
- Ground cover may be sparse or patchy.
- Large bare areas may be evident, particularly later in the season when the annual grasses have dried up or been trampled and blown away.

Why pasture type is important in assessing pasture condition

Different pasture types feature different species mixes; what you would expect to see at a site in good, fair or poor condition depends on what pasture type occurs there. This guide provides descriptions and photographic examples of good, fair and poor pasture condition for 17 of the most common pasture types in the Kimberley. Correctly identifying the pasture type before you do the condition assessment ensures that you consult the descriptions and photos applicable to the site.

A short list of common species is provided for each pasture type, grouped into desirable, intermediate and undesirable species. This list tells you how desirable a particular species is considered to be for a given pasture type. It is the relative proportions of desirable, intermediate and undesirable species that largely determine pasture condition.

Appendix A provides a list of all the species referred to in this guide, arranged by common name.

Using 'identifier' grasses to help determine pasture type

Certain grasses (called 'identifier' grasses) are typically associated with (although not limited to) certain pasture types.

Identifier grasses are useful for determining pasture type because they tend to be present regardless of pasture condition. They will be easiest to find in good condition, and are usually still common in fair condition. As the pasture approaches poor condition, identifier grasses are sometimes present only as a few scattered plants or butts, and you may have to look hard to find them.

The key on the following pages uses soil type and position in the landscape, along with identifier grasses, to distinguish between the 17 pasture types included in this guide. Keep in mind that a grass which is an identifier for one pasture type can also be present as a component of other pasture types. For this reason it is important that you follow the sequence of the key to determine soil group and landscape position before you look for the identifier grasses listed.

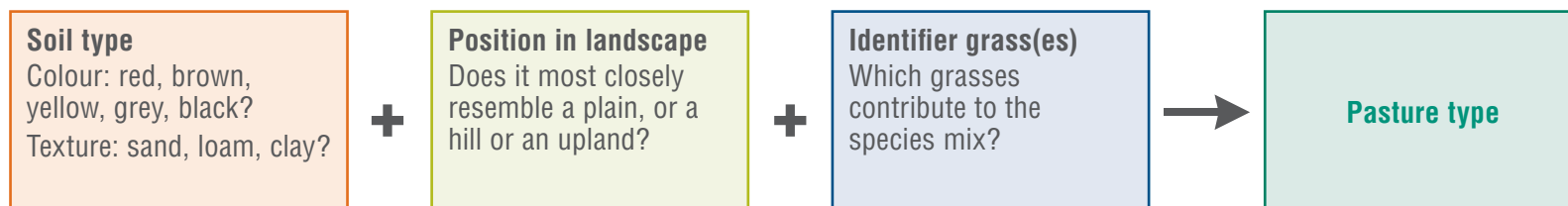
Key to determining pasture type



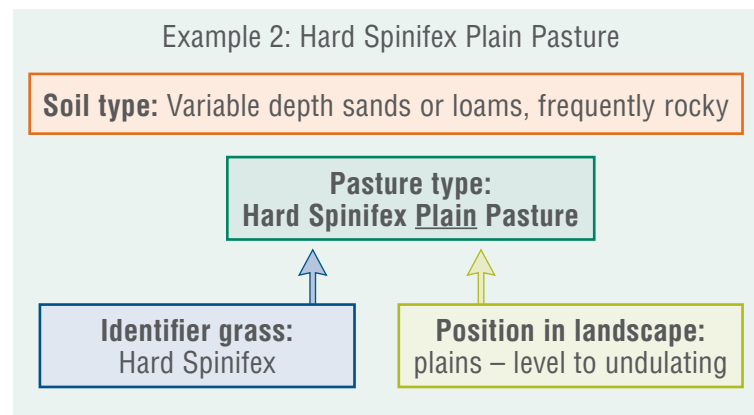
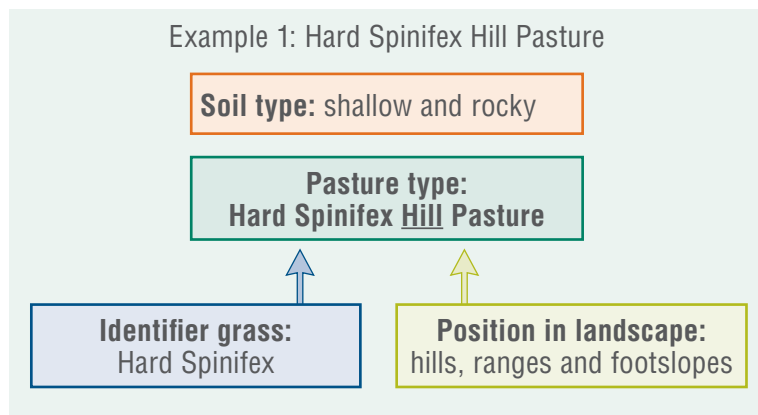
A pasture type is a distinctive mix of plant species, soil type and position in the landscape.

soil type + position in landscape + identifier grass(es) → pasture type

Working through a series of questions can help you determine the pasture type.

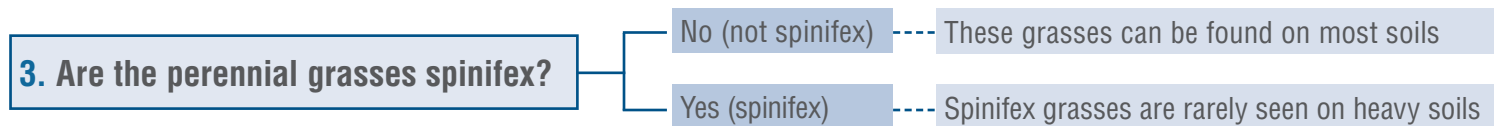
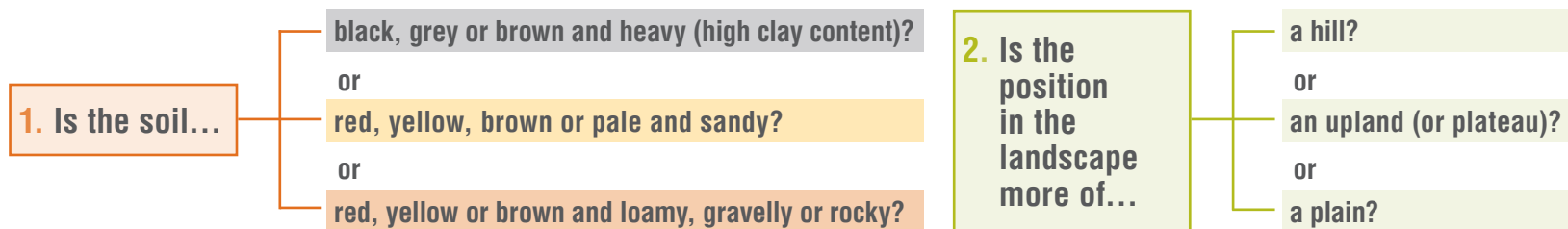


The pasture type name is given according to the identifier grass(es) and the position in the landscape.



Observe the features of the site

Go through steps one to four on this page, observing the features of the chosen site, then follow the key starting on the next page using your observations.



4. What grasses can you see?

Some commonly observed grasses:

Ribbon Grass, Mitchell Grass, Kangaroo Grass, White Grass, Black Speargrass, Wanderrie grasses, Citronella Grass, Bundle-Bundle, Silky Browntop, Plume Sorghum, Buffel Grass, Salt Water Couch, Native Millet, Lovegrasses, Soft spinifexes, Hard spinifexes, Threeawns, Speargrasses, Nineawn grasses, Kimberley Couch, Flinders grasses.

Note: these grasses are common examples; this list does not include all grasses that occur in the region.

Is the soil...

...black, grey or brown and heavy (high clay content)?

'Black' soil group

Page 13

- Mitchell Grass Upland Pastures
- Mitchell Grass Alluvial Plain Pastures
- Blue Grass Alluvial Plain Pastures
- Ribbon Grass Alluvial Plain Pastures

...red, yellow, brown or pale and sandy?

'Sandy' soil group

Page 14

- Salt Water Couch Pastures
- Curly Spinifex Plain Pastures
- Tippera Tall Grass Plain Pastures
- Soft Spinifex Pastures
- Pindan Pastures

...red, yellow or brown and loamy, gravelly or rocky?

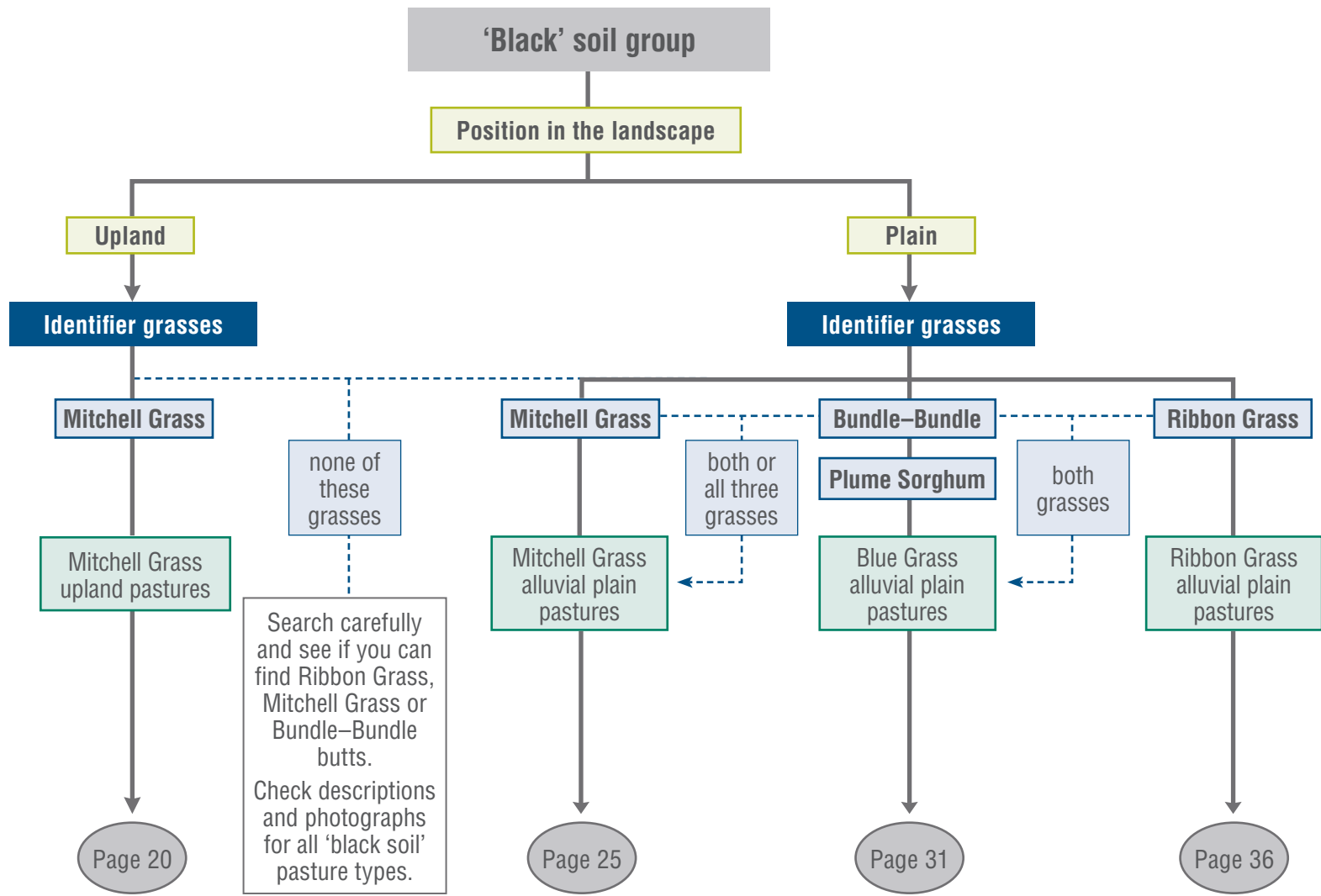
'Red' soil group

Page 16

- Curly Spinifex/Annual Sorghum Hill Pastures
- Hard Spinifex Hill Pastures
- Hard Spinifex Plain Pastures
- Soft Spinifex Pastures
- Curly Spinifex Plain Pastures
- Pindan Pastures
- Buffel Grass Pastures
- Ribbon Grass Pastures
- Arid Short Grass Pastures
- Black Speargrass Pastures
- White Grass/Bundle-Bundle Pastures

Spinifex

Not Spinifex



'Sandy' soil group

Position in the landscape

Upland

Hill

Plain

Pasture types that occur on uplands and hills with sandy soils have been included in the 'red' soil group in this guide.

Is it coastal country?

Yes (coastal)

No (not coastal)

Are there Pindan wattles present?

Yes

No

Identifier grasses

Identifier grasses

'Red' soil group

Soft Spinifex

Curly Spinifex

Pindan pastures

Page 16

Page 76

both grasses

Check descriptions and photographs for both

Buffel Grass

Buffel Grass pastures

Page 92

neither grass

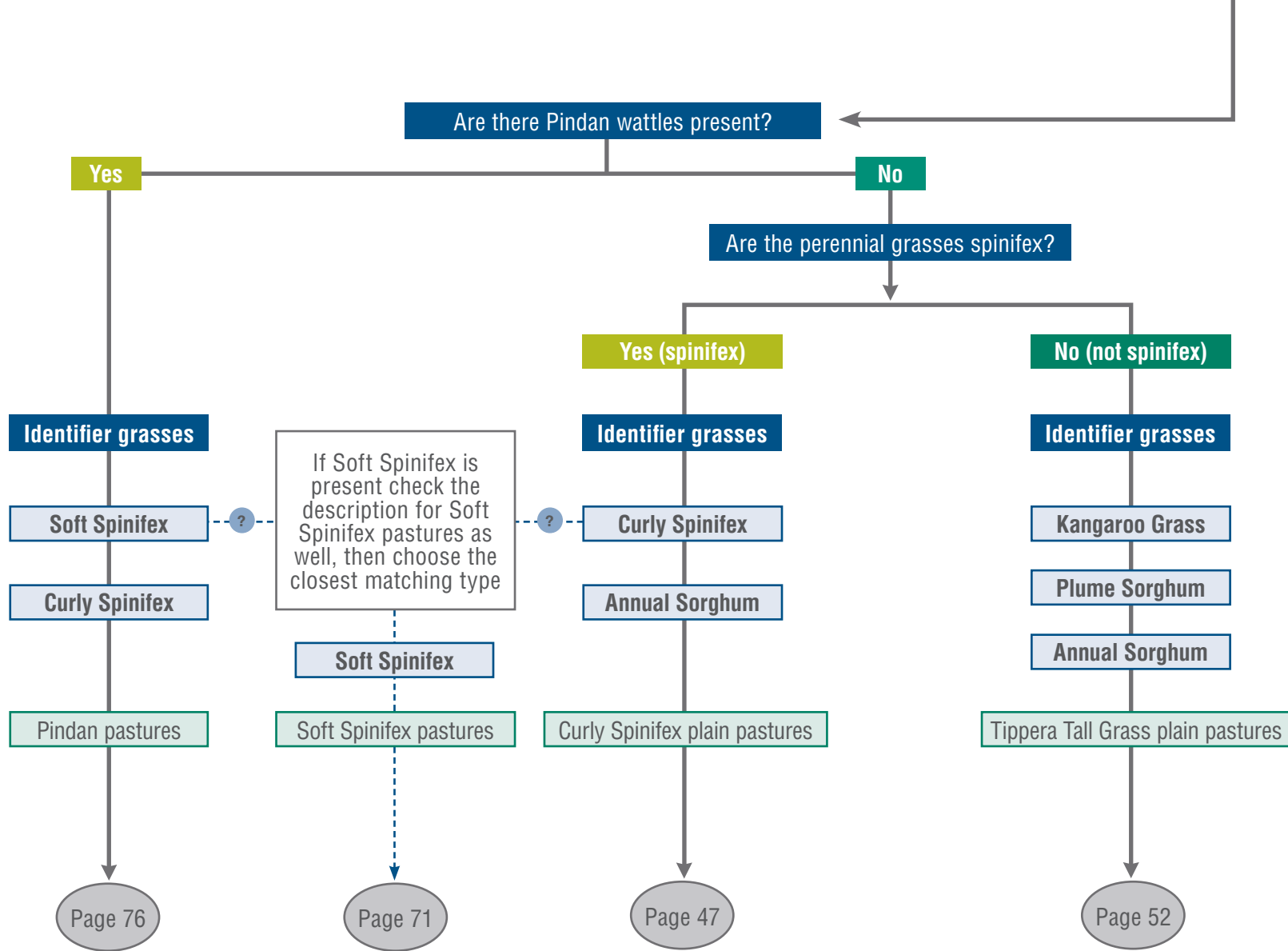
Check descriptions and photographs for both

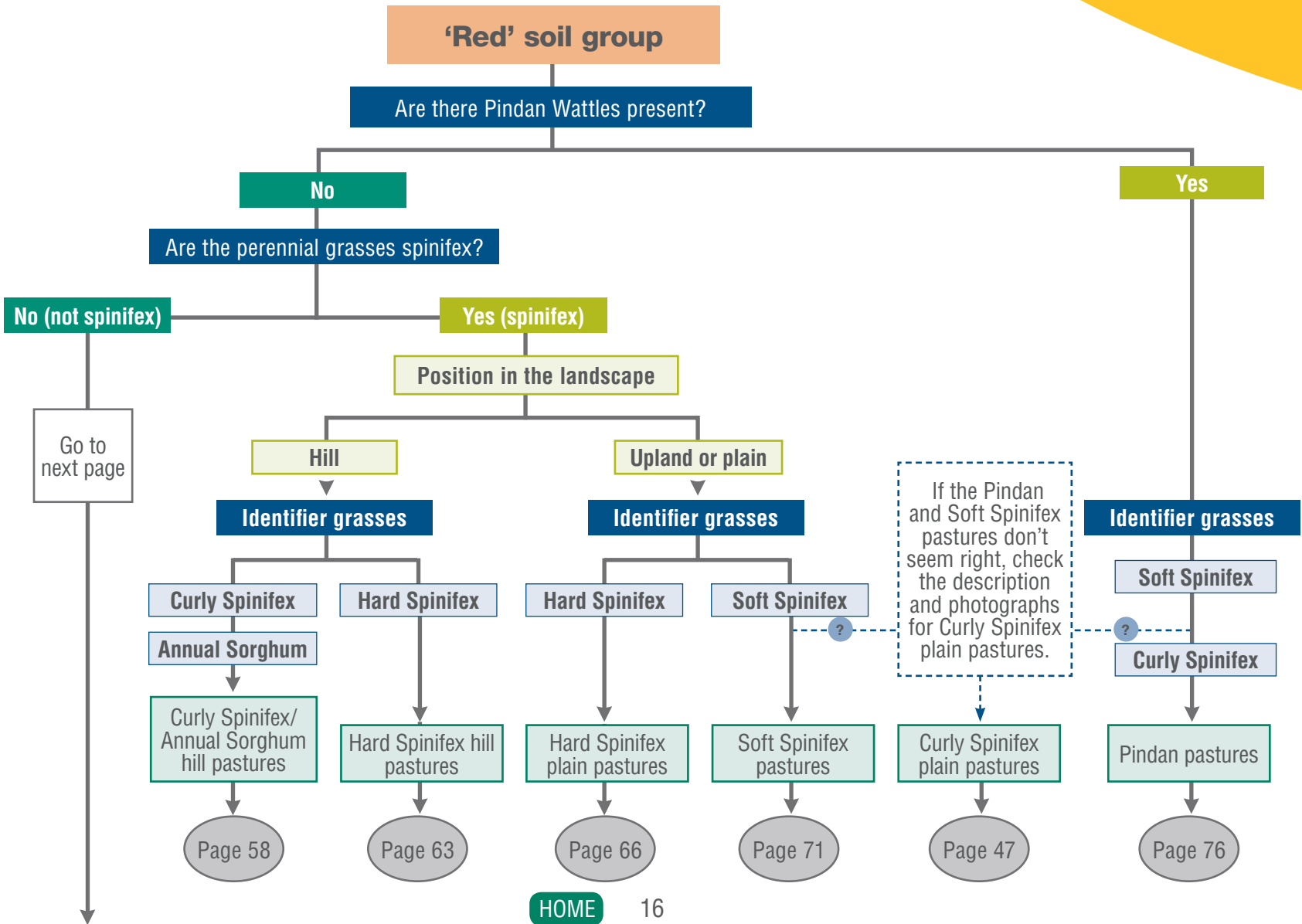
Salt Water Couch

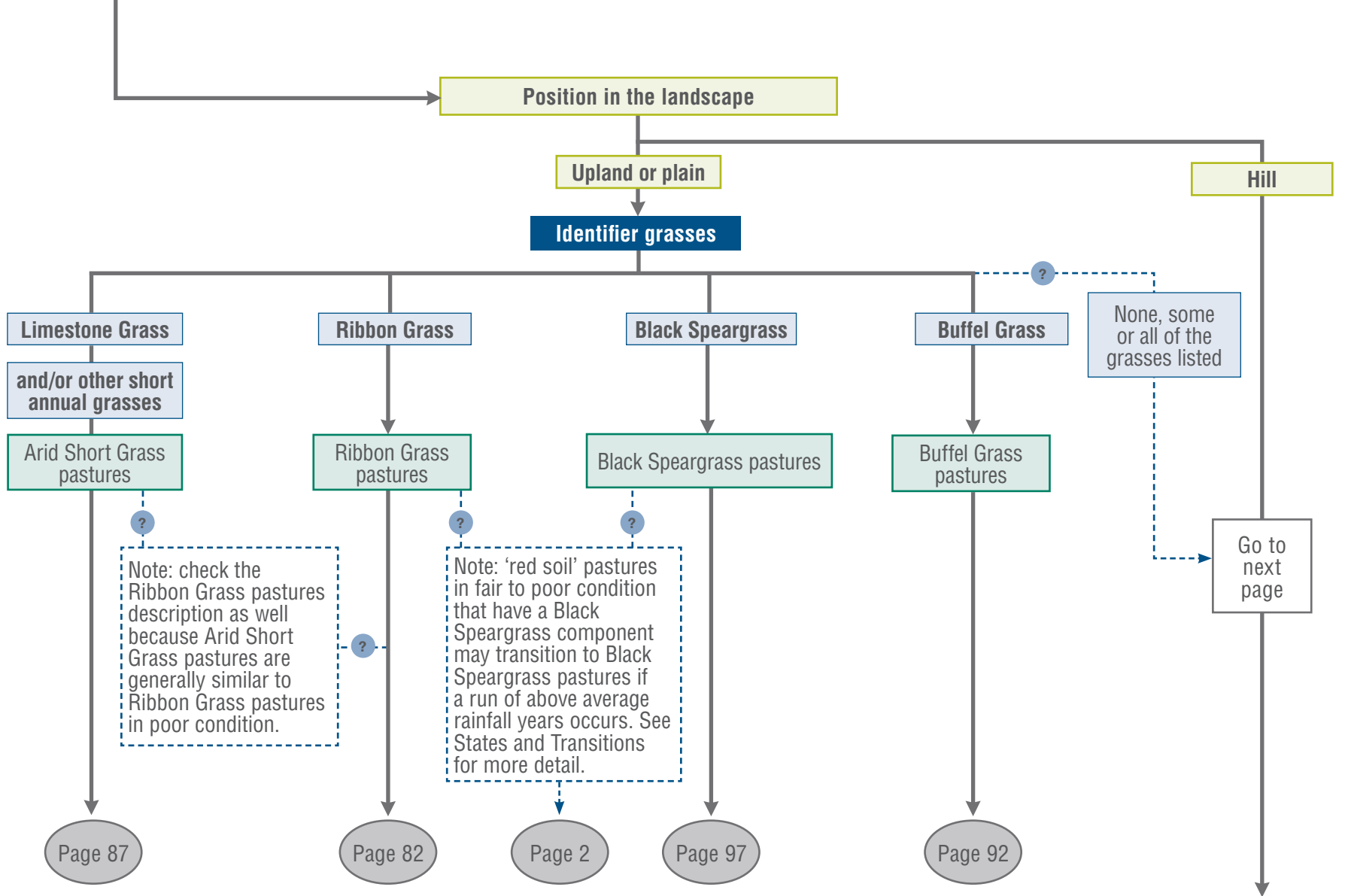
Salt Water Couch pastures

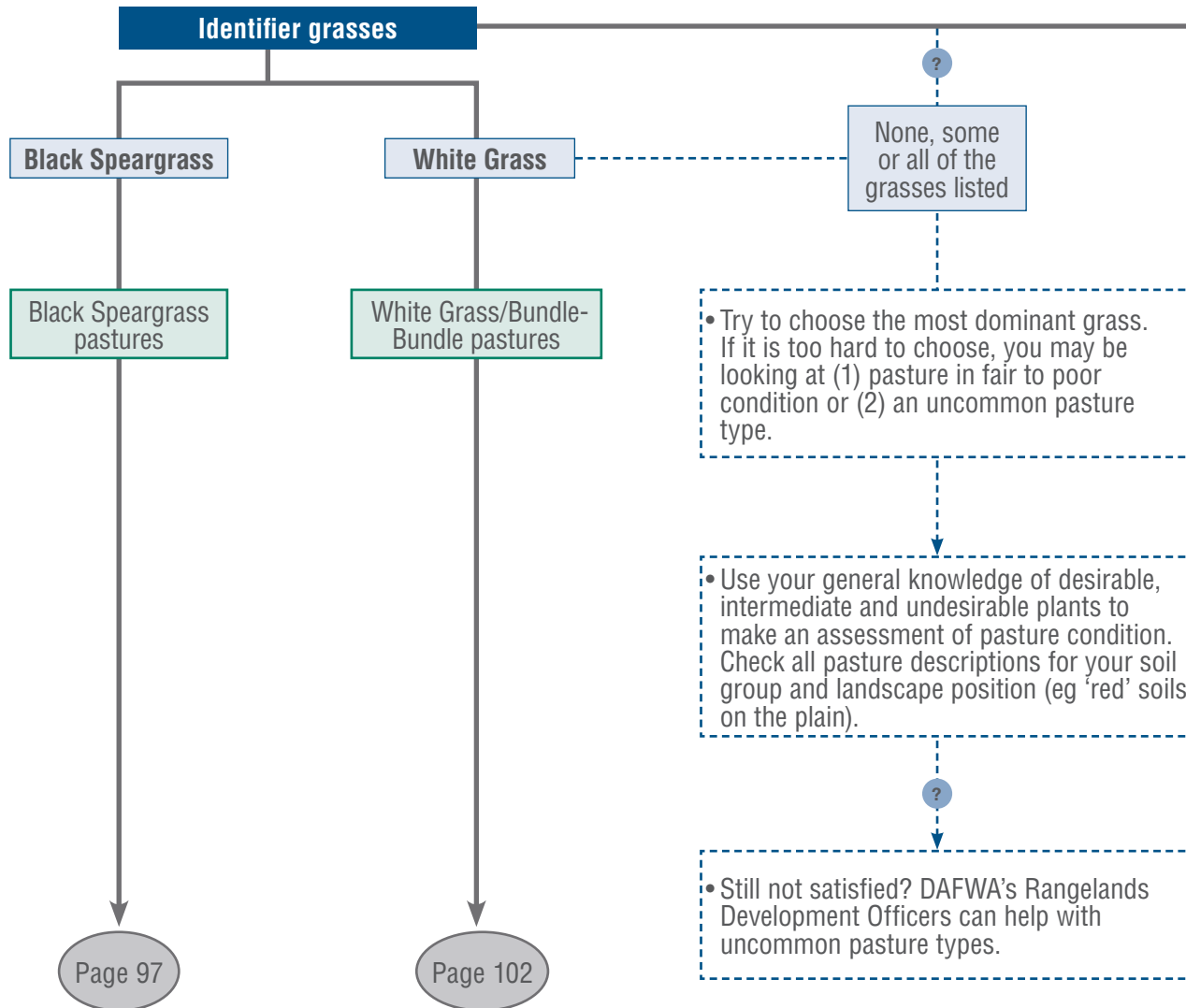
Page 42

Go to next page









Pasture condition descriptions and photos 'Black' soil group

Mitchell Grass Upland Pastures

Mitchell Grass Alluvial Plain Pastures

Blue Grass Alluvial Plain Pastures

Ribbon Grass Alluvial Plain Pastures



Mitchell Grass Upland Pastures

Occurrence

Mitchell Grass Upland Pastures are tussock grasslands with scattered small trees that occur on flat to undulating upland plains. The soils of the uplands are drier and stonier than those of black soil alluvial plains.

Pasture condition

Good—Desirable Mitchell grasses (Barley Mitchell and/or Hoop Mitchell) are usually dominant when this pasture type is in good condition. Mitchell Grass tussocks are healthy and evenly spaced. There may be small amounts of other desirable perennial grasses, such as Bundle-Bundle and Ribbon Grass. Isolated plants of Feathertop, an undesirable perennial grass, are usually present, even in good condition. Annual grasses and herbs will occupy the ground space between perennial tussocks in the late wet to early dry season. As grazing of palatable annual

species (such as Flinders grasses) progresses into the dry season, small bare areas are created between the perennial tussocks.

Fair—A reduction in density and vigour of Mitchell grasses and other desirable perennial grasses will occur as pasture condition declines from good to fair, and the tussocks will not provide an even cover. Less palatable perennial grasses, such as Native Millet, become more apparent, and the stand is likely to be dominated by this and other intermediate species such as Bull Mitchell Grass or Silky Browntop. Annual Sorghum can occupy the increased space between the perennial tussocks. Unpalatable perennial grasses, such as Feathertop, increase in frequency, and may occupy up to an equal amount of ground space as the desirable species present.

Poor—Further deterioration to poor condition results in the almost complete loss of Mitchell grasses and other desirables, and a significant increase in bare ground. The pasture is dominated by Feathertop or annual grasses, though some intermediate perennial grasses can still be present. Non-grass plants (woody and/or weedy species) may increase.

Pastoral value

Pastoral value is high when in good condition, although the uplands are slightly less productive than the alluvial plains. As Mitchell Grass presence declines, pasture value also declines because the desirable grasses are replaced by less palatable perennial grasses or undesirable species like Feathertop. Increased amounts of annual grasses can provide good feed for stock, particularly early in the year, but the bulk depends on the season. In below average rainfall years, the bulk and vigour of annual grasses will be much reduced.



**Mitchell Grass
Upland Pasture—
good condition
September 2006**

- A** There is a dense coverage of Mitchell Grass and other desirables.
- B** Red Flinders Grass (an intermediate species) and other annual grasses are growing in between the perennial grass tussocks.

Tussock density is optimal for the site.



Mitchell Grass Upland Pasture—fair condition May 1998

- A** There is a reduced density of desirable Mitchell grasses.
- B** Native Millet, an intermediate species is more apparent.
- C** Woody plants, in this case Rubber Bush, are taking up some of the ground space.

The increased space between perennial grass tussocks is occupied by annual grasses.

Mitchell Grass Upland Pasture—poor condition July 1996



- A** Undesirable Feathertop and annual species dominate.
- B** There are large areas lacking any perennial grass cover.
- C** Desirable species are not easy to find, and intermediate species, such as Native Millet, lack vigour.
- D** Prickle Bush, an indicator of heavily used black soils, is present.

Mitchell Grass Upland Pastures—species list

Common name	Scientific name	Life form	Other
Desirable species			
Barley Mitchell Grass	<i>Astrebla pectinata</i>	perennial	
Hoop Mitchell Grass	<i>Astrebla elymoides</i>	perennial	
Ribbon Grass	<i>Chrysopogon fallax</i>	perennial	see photos, page 120
Bundle-Bundle	<i>Dichanthium fecundum</i>	perennial	see photos, page 113
Intermediate species			
Bull Mitchell Grass	<i>Astrebla squarrosa</i>	perennial	see photos, page 111
Native Millet	<i>Panicum decompositum</i>	perennial	
Silky Browntop	<i>Eulalia aurea</i>	perennial	
Red Flinders Grass	<i>Iseilema vaginiflorum</i>	annual	
Annual Sorghum	<i>Sorghum stipoideum</i>	annual	see photos, page 108
Annual Sorghum	<i>Sorghum timorense</i>	annual	
Kimberley Couch	<i>Brachyachne convergens</i>	annual	see photos, page 118
Sensitive plants	<i>Neptunia</i> spp.	perennial	legume
Native Pea	<i>Rhynchosia minima</i>	perennial	sprawling or climbing legume
Undesirable species			
Feathertop	<i>Aristida latifolia</i>	perennial	see photos, page 115
Yellow Daisy	<i>Wedelia asperima</i>	annual	herb

Mitchell Grass Alluvial Plain Pastures

Occurrence

Mitchell Grass Alluvial Plain Pastures are tussock grasslands that occur on level plains with gilgai microrelief. Gilgai (crabhole country) has a markedly undulating surface caused by swelling and shrinking of the clay soil during alternating wet and dry seasons. There are sometimes scattered small trees, such as bauhinias, in these pastures.

Pasture condition

Good—Desirable Mitchell grasses (Barley and/or Hoop Mitchell) usually dominate in good condition, often with small amounts of other desirable perennial grasses, such as Bundle-Bundle and Ribbon Grass. Mitchell Grass tussocks are healthy and evenly spaced. Annual grasses, such as Red Flinders Grass and Kimberley Couch, and herbs may occupy the spaces between perennial tussocks early in the year. As the dry season progresses, the groundcover

between Mitchell Grass tussocks is reduced as annual grasses are grazed.

Fair—Density and vigour of desirable Mitchell grasses and other desirable perennial grasses fall as pasture condition declines from good to fair. Bull Mitchell Grass is considered an intermediate grass in this pasture type, and it or other intermediate species, such as Native Millet, may become prominent. Feathertop, an undesirable perennial Threeawn, may increase. Red Flinders Grass or less desirable annual plants may occupy the increased space between perennial grass tussocks.

Poor—Further deterioration to poor condition results in almost complete loss of the Mitchell grasses and other desirable species, and a significant increase in bare ground. Two things may happen: (a) the pasture may be dominated by non-grass plants (woody and/or weedy species); or

(b) the pasture may be completely dominated by Feathertop. Both situations are equally unproductive.

Pastoral value

Productive and resilient under grazing, good condition pastures dominated by Mitchell Grass have high pastoral value. As Mitchell Grass density declines, pastoral value falls because less productive perennial grasses (those with reduced pasture bulk and resilience) or undesirable species, like the unpalatable Feathertop, take over. Red Flinders Grass provides good feed for stock, particularly early in the year, but its bulk depends on the season. In below average rainfall years, little Red Flinders Grass may be produced.



Mitchell Grass Alluvial Plain Pasture— good condition (low utilisation)

May 2008

- A** There is a dense coverage of Barley Mitchell Grass and other desirable species.
- B** Red Flinders Grass, an intermediate annual grass, is growing vigorously in between the perennial grass tussocks.

Ground cover is optimal for the site.



Mitchell Grass Alluvial Plain Pasture— good condition (high utilisation)

May 2008

- A** There is a dense coverage of desirable Mitchell Grass tussocks, grazed down to about 60% utilisation.
- B** The annual grasses growing in between the perennial grass tussocks have been largely removed by grazing.

Tussock density is optimal for the site; however, year-in, year-out utilisation at this level would lead to an increase in bare ground and pasture condition decline.



Mitchell Grass Alluvial Plain Pasture— fair condition

May 2008

- A** The density of desirable Mitchell grasses is reduced.
- B** Intermediate perennial grasses, such as this Silky Browntop, are becoming more prominent.
- C** There is an increased presence of Feathertop, an undesirable perennial grass, and non-grass plants.



**Mitchell Grass
Alluvial Plain Pasture—
poor condition
May 2008**

- A** Desirable species, such as this Mitchell Grass, are not easy to find; they occur in small patches and lack vigour.
- B** Bare ground is frequent, with some large patches.
- C** The relative frequency of non-grass plants has increased.
- D** The remaining grasses are mostly annual species, such as Kimberley Couch; they are patchy and lack vigour.

Mitchell Grass Alluvial Plain Pastures—species list

Common name	Scientific name	Life form	Other
Desirable species			
Barley Mitchell Grass	<i>Astrebla pectinata</i>	perennial	
Hoop Mitchell Grass	<i>Astrebla elymoides</i>	perennial	
Bundle-Bundle	<i>Dichanthium fecundum</i>	perennial	see photos, page 113
Ribbon Grass	<i>Chrysopogon fallax</i>	perennial	see photos, page 120
Queensland Bluegrass	<i>Dichanthium sericeum</i>	annual or short-lived perennial	
Intermediate species			
Bull Mitchell Grass	<i>Astrebla squarrosa</i>	perennial	see photos, page 111
Silky Browntop	<i>Eulalia aurea</i>	perennial	
Native Millet	<i>Panicum decompositum</i>	perennial	
Red Flinders Grass	<i>Iseilema vaginiflorum</i>	annual	
Annual Sorghum	<i>Sorghum timorense</i>	annual	
Annual Sorghum	<i>Sorghum stipoideum</i>	annual	see photos, page 108
Kimberley Couch	<i>Brachyachne convergens</i>	annual	see photos, page 118
Ray Grass	<i>Sporobolus actinocladus</i>	perennial	
Sensitive plants	<i>Neptunia</i> spp.	perennial	legume
Undesirable species			
Feathertop	<i>Aristida latifolia</i>	perennial	see photos, page 115
Speedy Weed	<i>Flaveria trinervia</i>	annual	herb
Goathead Burr	<i>Sclerolaena bicornis</i>	annual or short-lived perennial	woody herb
Yellow Daisy	<i>Wedelia asperima</i>	annual	herb

Blue Grass Alluvial Plain Pastures

Occurrence

Blue Grass Pastures occur on areas of black soil plains in the higher rainfall areas of the Kimberley. They are found on some of the floodplains of major rivers and in isolated pockets of black soil in basalt country of volcanic origin in the north Kimberley.

Pasture condition

Good—in good condition Blue Grass Pastures will be dominated by Bundle-Bundle or co-dominated with Ribbon Grass or Perennial Sorghum (on basalt). Other grasses may include Native Millet and Feathertop, and Black Speargrass is likely to be present on basalt. There is very little bare ground visible unless the pasture is heavily grazed, and the plants appear vigorous.

Fair—Prolonged heavy grazing reduces the density of desirable species. Intermediate species are more prominent and may make up one-third or more of the stand. The lower density and smaller size of desirable plants allows undesirable species, such as Feathertop, to increase. Shrubs, such as Prickle Bush, may also increase. Some bare ground will be evident and loss of soil may occur on basalt country.

Poor—Blue Grass Pastures in poor condition have few desirable species. Bare ground will be obvious, and erosion may be evident. Undesirable species, such as Feathertop, may become a significant part of the stand.

Pastoral value

Blue Grass Pastures in good condition are highly productive and can be used in conjunction with lower quality feeds to provide year-round grazing. Wet season and post-fire spelling is recommended. Overstocking may result in soil erosion which will have long-term and significant adverse impacts on pasture condition and pastoral productivity.



Blue Grass Alluvial Plain Pasture—good condition

April 2010

A The area is dominated by dense, vigorous clumps of Bundle-Bundle.

No undesirable species are obvious.
There is almost complete soil cover.



**Blue Grass Alluvial Plain
Pasture—fair condition**
April 2010

- A** The density of desirable grasses, such as Bundle-Bundle, has decreased.
 - B** The undesirable perennial, Feathertop, makes up a significant proportion of the pasture.
- Soil cover is becoming patchy.



Blue Grass Alluvial Plain Pasture—poor condition July 2009

- A** Desirable grasses, such as Bundle-Bundle, are widely spaced and lack vigour.
- B** Bare ground is common, with some large patches.
- C** Annual grasses and forbs are patchy and lack vigour.

Blue Grass Alluvial Plain Pastures—species list

Common name	Scientific name	Life form	Other
Desirable species			
Bundle-Bundle	<i>Dichanthium fecundum</i>	perennial	see photos, page 113
Ribbon Grass	<i>Chrysopogon fallax</i>	perennial	see photos, page 120
Plume Sorghum	<i>Sorghum plumosum</i>	perennial	
Native Millet	<i>Panicum decompositum</i>	perennial	
Intermediate species			
Silky Browntop	<i>Eulalia aurea</i>	perennial	
Pan Wanderrie Grass	<i>Eriachne glauca</i>	perennial	
Wire Grass, Northern Wanderrie Grass	<i>Eriachne obtusa</i>	perennial	see photos, page 127
Black Speargrass	<i>Heteropogon contortus</i>	perennial	see photos, page 109
White Grass	<i>Sehima nervosum</i>	perennial	see photos, page 126
Flemings Bush	<i>Flemingia parviflora</i>	annual	forb
Undesirable species			
Feathertop	<i>Aristida latifolia</i>	perennial	see photos, page 115
Prickle Bush	<i>Acacia farnesiana</i>	perennial	shrub

Ribbon Grass Alluvial Plain Pastures

Occurrence

Ribbon Grass Alluvial Plain Pastures occur on level alluvial plains throughout the Kimberley. They are found on deep grey or brown cracking clays and occur as tussock grasslands, sometimes with a variable cover of trees, such as eucalypts and bauhinias. These pastures occupy a similar niche to Mitchell Grass Alluvial Plain Pastures. The main difference is that here Mitchell grasses are totally absent; additionally, some tree cover is a little more likely and gilgai microrelief is not always evident.

Pasture condition

Good—When in good condition, these pastures are dominated by Ribbon Grass. Bundle-Bundle is also often present. Isolated plants of intermediate species, such as Native Millet (more common in higher rainfall areas), Silky Browntop or Annual Sorghum, may be present. There is little bare ground visible unless the pasture is heavily grazed, and the plants appear vigorous.

Fair—Prolonged heavy grazing on the preferred Ribbon Grass and Bundle-Bundle plants reduces their density and in fair condition the intermediate species are more prominent. The lower density and smaller size of desirable plants allow an increase in undesirable plants, such as Feathertop and Rubber Bush. Bare patches may become more obvious.

Poor—In poor condition, Ribbon Grass and Bundle-Bundle plants are infrequent, often stunted and lacking vigour. Sometimes undesirable perennial species, such as Feathertop, can dominate. Alternatively, there may be significant bare areas or large areas with annual grasses, such as Kimberley Couch. Intermediate species have declined or may have been grazed out and grazing may even be evident on Feathertop and Rubber Bush, species of low palatability.

Pastoral value

Ribbon Grass Alluvial Plain Pastures have a high pastoral value when in good condition. Ribbon Grass plants can be killed by repeated prolonged heavy grazing, especially during dry years.



Ribbon Grass Alluvial Plain Pasture— good condition

May 2008

- A** High density and even spacing of Ribbon Grass plants, which appear healthy.
- B** Only a small amount of undesirable species, such as Feathertop.
- C** The Prickle Bush growing in the background is an indicator of the heavy soils on which this pasture type is found.

Mitchell grasses are not evident, confirming the pasture type determination.

This pasture is lightly grazed; however, the high density of desirable species would still be obvious under a higher utilisation rate, so the condition would still be assessed as good.



**Ribbon Grass
Alluvial Plain Pasture—
fair condition**
June 2008

- A** The density and vigour of desirable perennial grasses are reduced.
- B** There is an increased number of undesirable plants such as Feathertop.
- C** There are more patches with no perennial grass cover.

Mitchell Grass butts are not evident, confirming the pasture type determination.



**Ribbon Grass
Alluvial Plain Pasture—
poor condition
May 2008**

- A** Ribbon Grass is sparse and stunted, showing evidence of heavy grazing.
- B** The undesirable perennial, Feathertop, remains.
- C** There are large areas of bare ground.

Mitchell Grass butts are not evident, confirming the pasture type determination.

Ribbon Grass Alluvial Plain Pastures—species list

Common name	Scientific name	Life form	Other
Desirable species			
Ribbon Grass	<i>Chrysopogon fallax</i>	perennial	see photos, page 120
Bundle-Bundle	<i>Dichanthium fecundum</i>	perennial	see photos, page 113
Queensland Bluegrass	<i>Dichanthium sericeum</i>	annual or short-lived perennial	
Native Millet	<i>Panicum decompositum</i>	perennial	
Intermediate species			
Silky Browntop	<i>Eulalia aurea</i>	perennial	
Flinders grasses	<i>Iseilema</i> spp.	annual	
Wire Grass, Northern Wanderrie Grass	<i>Eriachne obtusa</i>	perennial	see photos, page 127
Black Speargrass	<i>Heteropogon contortus</i>	perennial	see photos, page 109
White Grass	<i>Sehima nervosum</i>	perennial	see photos, page 126
Neverfail	<i>Eragrostis setifolia</i>	perennial	
Nineawns, Bottlewashers, Limestone grasses	<i>Enneapogon</i> spp.	annual or short-lived perennial	see photos, page 119
Kimberley Couch	<i>Brachyachne convergens</i>	annual	see photos, page 118
Annual Sorghum	<i>Sorghum stipoideum</i>	annual	see photos, page 108
Sensitive plants	<i>Neptunia</i> spp.	perennial	legume
Undesirable species			
Feathertop	<i>Aristida latifolia</i>	perennial	see photos, page 115
Threeawn grasses	<i>Aristida</i> spp.	annual or perennial	see photos, pages 112, 115, 125
Yellow Daisy	<i>Wedelia asperima</i>	annual	herb

'Sandy' soil group

Salt Water Couch Pastures

Curly Spinifex Plain Pastures

Tippera Tall Grass Plain Pastures



Salt Water Couch Pastures

Occurrence

Salt Water Couch Pastures are tussock grasslands with some halophytic shrubs, dominated by Salt Water Couch. These pastures occur on broad, flat, saline, coastal plains located above the tidal influence or cut off by coastal dunes. They are found on areas of saline, clay soils on the marine plains from the Broome area south. Small areas also occur on marine plains along the northern coastline.

Pasture condition

Good—Salt Water Couch dominates these pastures in good condition. Other grasses include Rice Grass and Native Millet, and some samphire may be present. Some bare ground may be visible, but the sprawling nature of the vegetation in these pastures creates the effect of

a carpeted landscape when in good condition. With increasing salinity, pure Salt Water Couch Pastures grade into Salt Water Couch/Samphire Pastures. Bare areas will increase along the same salinity gradient so bear this in mind when assessing pasture condition.

Fair—Overuse decreases the proportion of Salt Water Couch in the pasture, and other species, such as samphire, may initially increase. If grazing pressure remains heavy, the samphire will also decrease as it is trampled, and more bare ground will be exposed. In fair condition, the proportion of the intermediate grasses, such as Rice Grass, will increase along with other intermediate species, such as Speedy Weed, and undesirable species, such as Lippia.

Poor—In poor condition there may be isolated desirable grasses present, but samphire and bare ground make up a large proportion of the surface. Intermediate grasses, such as Chloris, Sickle Lovegrass, Rice Grass and Woollybutt Grass, may be present. The bare soil surfaces will be vulnerable to wind erosion late in the dry season under grazing.

Pastoral value

Salt Water Couch Pastures are highly productive pastures that are resilient under grazing when in good and fair condition but should be spelled over the wet season. If possible, cattle should be moved to the less productive Pindan Pastures or Soft Spinifex Pastures during this time.



**Salt Water Couch
Pasture—good condition
May 2010**

A The Salt Water Couch plants are dense, matted and vigorous, creating a ‘carpeted’ look and springy feel underfoot.
No undesirable species are present.



Salt Water Couch Pasture— fair condition

May 2010

- A** Salt Water Couch plants are present, but lack density and vigour.
- B** Intermediate plants, such as samphire, make up a significant proportion of the pasture.

Bare ground is visible.



Salt Water Couch Pasture—poor condition May 2010

- A** Speedy Weed dominates the stand. This annual will die off as the season progresses, leaving large areas of exposed soil late in the dry.
- B** Quena, an undesirable forb, is present.
- C** Desirable grasses, such as Salt Water Couch, are isolated and lack vigour.



Salt Water Couch Pastures—species list

Common name	Scientific name	Life form	Other
Desirable species			
Salt Water Couch, Marine Couch	<i>Sporobolus virginicus</i>	perennial	see photos, page 122
Buffel Grass	<i>Cenchrus ciliaris</i>	perennial	see photos, page 110
Native Millet	<i>Panicum decompositum</i>	perennial	
Coastal Bluegrass	<i>Bothriochloa ewartiana</i>	perennial	
Intermediate species			
Sickle Lovegrass	<i>Eragrostis falcata</i>	perennial	
River Couch	<i>Cynodon dactylon</i>	perennial	
Boat Panic	<i>Whiteochloa cymbiforme</i>	annual	
Speedy Weed	<i>Flaveria trinervia</i>	annual	herb
Samphires	<i>Tecticornia</i> spp.	perennial	halophyte
Frankenias	<i>Frankenia</i> spp.	perennial	halophyte
Undesirable species			
Lippia	<i>Phyla nodiflora</i>	perennial	herb
Quena	<i>Solanum esuriale</i>	annual	shrub

Curly Spinifex Plain Pastures

Occurrence

Curly Spinifex Plain Pastures are widespread on level to undulating plains throughout the East Kimberley. They are found on a range of sandy or stony soils. In the north, they occur in eucalypt woodlands. In the drier southern areas they occur with scattered wattles and eucalypts, or as treeless hummock grasslands.

Pasture condition

Good—In good condition, Curly Spinifex dominates and is evenly distributed. Ribbon Grass may also be common; its presence is largely influenced by moisture availability and past stock grazing pressure. A range of other desirable and intermediate perennial species may be present, with palatable annual grasses often occurring in the spaces between the perennial grasses. Desirable species are vigorous and seedlings or young plants of Curly Spinifex and Ribbon

Grass are often present, depending on the seasonal conditions and time of year.

Fair—In fair condition, the Curly Spinifex stand is uneven, with larger bare areas developing between plants. Ribbon Grass may be well grazed and infrequent. Desirable perennial grasses show some loss of vigour and there is an increase in the presence of less palatable perennial species, such as Wire Grass.

Poor—In poor condition, desirables (eg Curly Spinifex and Ribbon Grass) are rare. The pasture may still be quite dense but is dominated by undesirable species, such as Threeawns, and intermediate annual grasses, such as Kimberley Couch and Annual Sorghum. Some intermediate perennial grasses, such as Wire Grass, may be present.

Pastoral value

Curly Spinifex Plain Pastures have a low pastoral value, although value is increased if there is a high density of Ribbon Grass in the stand. These pastures can also provide a valuable drought reserve. Too frequent burning, burning at the wrong time, or heavy grazing following fire causes desirable species, such as Curly Spinifex and Ribbon Grass, to decrease or disappear.



Curly Spinifex Plain Pasture— good condition May 2008

- A** Curly Spinifex, a desirable species in this pasture type, is dominant; individual adult plants are healthy and some younger plants can be seen.
- B** Only small, evenly spaced areas of bare ground are evident.



**Curly Spinifex Plain
Pasture—fair condition**
August 2008

- A** Curly Spinifex is present, but the density is reduced and coverage is patchy.
- B** Patches of bare ground are uneven and large.
- C** Some undesirable species are present, such as Threeawns.



Curly Spinifex Plain Pasture—poor condition May 2008

- A** Curly Spinifex plants are infrequent.
- B** Undesirables, such as Threeawns, make up about half the stand.
- C** Patches of bare ground are larger.
- D** Rice Grass, a coloniser of bare areas, is present.

Curly Spinifex Plain Pastures—species list

Common name	Scientific name	Life form	Other
Desirable species			
Curly Spinifex	<i>Triodia bitextura</i>	perennial	see photos, page 114
Soft Spinifex	<i>Triodia pungens</i>	perennial	see photo, page 123
Ribbon Grass	<i>Chrysopogon fallax</i>	perennial	see photos, page 120
Silky Browntop	<i>Eulalia aurea</i>	perennial	
White Grass	<i>Sehima nervosum</i>	perennial	see photos, page 126
Intermediate species			
Wire Grass, Northern Wanderrie Grass	<i>Eriachne obtusa</i>	perennial	see photos, page 127
Black Speargrass	<i>Heteropogon contortus</i>	perennial	see photos, page 109
Citronella Grass	<i>Cymbopogon bombycinus</i>	perennial	
Annual Sorghum	<i>Sorghum stipoideum</i>	annual	see photos, page 108
Undesirable species			
Threeawn grasses	<i>Aristida</i> spp.	annual or perennial	see photos, pages 112, 115, 125
Hard spinifexes	<i>Triodia</i> spp.	perennial	see photos, page 116

Tippera Tall Grass Plain Pastures

Occurrence

Tippera Tall Grass Plain Pastures occur on level to gently undulating plains in wetter areas of the Ord–Victoria Plain. They occur as grasslands in eucalypt woodlands on red to yellow sandy and loamy soils. There may be patches of heavier soil within the typical sands and loams.

Pasture condition

Good—In good condition, dominant species can include Kangaroo Grass, Plume Sorghum, White Grass and Ribbon Grass. Other perennial grasses, such as Black Speargrass and Bundle-Bundle, may be present in small patches and can be scattered throughout the stand.

Fair—As the palatable grasses are grazed out, intermediate species, such as Wire Grass, become more obvious and may dominate the stand in fair condition. Threeawns and Annual Sorghum (both considered undesirable species in this pasture type) may begin to increase.

Poor—In poor condition, the space between perennial grass tussocks increases due to grazing and the stand is usually dominated by annual grasses, particularly Annual Sorghum. Annual Sorghum is only palatable when very young, and it has little bulk and very low nutritional value after it has hayed off. Other undesirable species, such as Threeawns, are often present. There may be significant areas of bare ground.

Pastoral value

Tippera Tall Grass Plain Pastures are considered to have moderate pastoral value when in good condition. Kangaroo Grass has been reported to decline quickly under heavy grazing; however, these pastures appear to be quite resilient under low stocking rates in the East Kimberley. Annual grasses are considered only marginally more productive than bare ground in this pasture type.



**Tippera Tall Grass
Plain Pasture—
good condition
June 2008**

- A** There is a dense coverage of Kangaroo Grass, a desirable perennial in this pasture type.



**Tippera Tall Grass
Plain Pasture—
fair condition**
June 2008

- A** Kangaroo Grass, a desirable species, is still present, making up about one third of the stand.
- B** Annual Sorghum and Threeawns, both undesirable species, are becoming prominent.
- C** Pan Wanderrie Grass, an intermediate species, has increased.



**Tippera Tall Grass
Plain Pasture—
poor condition
November 2008**

- A** The desirable Kangaroo Grass is still present, but infrequent.
- B** The undesirable Annual Sorghum has increased and is now dominant.



Tippera Tall Grass Plain Pastures—species list

Common name	Scientific name	Life form	Other
Desirable species			
Kangaroo Grass	<i>Themeda triandra</i>	perennial	see photos, page 117
Plume Sorghum	<i>Sorghum plumosum</i>	perennial	
Ribbon Grass	<i>Chrysopogon fallax</i>	perennial	see photos, page 120
Bundle-Bundle	<i>Dichanthium fecundum</i>	perennial	see photos, page 113
White Grass	<i>Sehima nervosum</i>	perennial	see photos, page 126
Intermediate species			
Wire Grass, Northern Wanderrie Grass	<i>Eriachne obtusa</i>	perennial	see photos, page 127
Pan Wanderrie Grass	<i>Eriachne glauca</i>	perennial	
Curly Spinifex	<i>Triodia bitextura</i>	perennial	see photos, page 114
Undesirable species			
Threeawn grasses	<i>Aristida</i> spp.	annual or perennial	see photos, pages 112, 115, 125
Annual Sorghum	<i>Sorghum stipoideum</i>	annual	see photos, page 108

'Red' soil group—Spinifex

Curly Spinifex/Annual Sorghum Hill Pastures

Hard Spinifex Hill Pastures

Hard Spinifex Plain Pastures

Soft Spinifex Pastures

Pindan Pastures



Curly Spinifex/Annual Sorghum Hill Pastures

Occurrence

These pastures are a mixture of Curly Spinifex and Annual Sorghum, occurring with a tree layer of eucalypts and small terminalias. They are found in various locations north of Halls Creek, and are most common on stony hillslopes with shallow soils.

Pasture condition

Good—In good condition, these pastures are dominated by Curly Spinifex and Annual Sorghum. Curly Spinifex is quite obvious among the taller sorghum plants, and a small amount of other perennial grasses may be present.

Fair—Condition decline in this pasture type is marked by a reduction in frequency of Curly Spinifex plants, with Annual Sorghum becoming far more obvious in fair condition as a result. Other perennial grasses, such as White Grass and Black Speargrass, may also become more apparent in fair condition.

Poor—In poor condition there are few Curly Spinifex plants left. Annual Sorghum, an intermediate, and undesirable species, such as Hard Spinifex or Threeawns, make up the bulk of the stand.

Pastoral value

This pasture type is of low forage value and a decline in condition reduces the value even further. However, the relative inaccessibility of this pasture type means that it is unlikely to be heavily grazed under most circumstances. Excessive pressure on these pastures, due to frequent fire or hot fire in conjunction with grazing, reduces the frequency of Curly Spinifex plants. The amount of Annual Sorghum varies in response to rainfall and fire history, and its height varies in response to rainfall—it usually grows much taller in the higher rainfall areas in the north than it does further south.



Curly Spinifex/Annual Sorghum Hill Pasture—good condition
May 2008

- A** Curly Spinifex, a desirable species, is dominant.
- B** Annual Sorghum, an intermediate species, is growing among the Curly Spinifex.
- C** Only a few other perennial grasses are present, in this case, Black Speargrass.

Ground cover is optimal for the site, considering the poor soil and slope.



Curly Spinifex/Annual Sorghum Hill Pasture—fair condition

March 2009

- A** Annual Sorghum, an intermediate species, dominates.
- B** The desirable Curly Spinifex remains scattered among the Annual Sorghum.



**Curly Spinifex/Annual
Sorghum Hill Pasture—
poor condition**
March 2009

Intermediate and undesirable grasses dominate at this site. The desirable Curly Spinifex is present only as isolated plants.

- A** Annual Sorghum, an intermediate species, is prominent.
- B** Hard Spinifex, an undesirable species, makes up a high proportion of the stand.



Curly Spinifex/Annual Sorghum Hill Pastures—species list

Common name	Scientific name	Life form	Other
Desirable species			
Curly Spinifex	<i>Triodia bitextura</i>	perennial	see photos, page 114
Plume Sorghum	<i>Sorghum plumosum</i>	perennial	
Ribbon Grass	<i>Chrysopogon fallax</i>	perennial	see photos, page 120
White Grass	<i>Sehima nervosum</i>	perennial	see photos, page 126
Intermediate species			
Annual Sorghum	<i>Sorghum stipoideum</i>	annual	see photos, page 108
Wire Grass, Northern Wanderrie Grass	<i>Eriachne obtusa</i>	perennial	see photos, page 127
Black Speargrass	<i>Heteropogon contortus</i>	perennial	see photos, page 109
Undesirable species			
Threeawn grasses	<i>Aristida</i> spp.	annual or perennial	see photos, pages 112, 115, 125
Hard spinifexes	<i>Triodia</i> spp.	perennial	see photos, page 116

Hard Spinifex Hill Pastures

Occurrence

Hard Spinifex Hill Pastures occur as hummock grasslands on hills and ranges in the Kimberley. They are found on shallow, rocky soils. Scattered shrubs and trees, such as Snappy Gum, may be present.

Pasture condition

Good—In good condition, there is an even coverage of Hard Spinifex plants. A few palatable perennial grasses, annual grasses and herbs may be scattered among the spinifex clumps, but tend to be concentrated along the drainage lines.

Fair—Hard Spinifex Hill Pastures are not commonly seen in fair condition away from the creeklines. Grazing pressure is concentrated along creeklines in this pasture type and therefore deterioration in pasture condition will be most noticeable there. The coverage of spinifex plants away from the creeklines may appear patchy. Palatable perennial species show reduced frequency and vigour, and undesirables make up an increased proportion of the non-spinifex species present.

Poor—Hard Spinifex Hill Pastures are rarely seen in poor condition away from the creeklines. Palatable perennial species are likely to be absent in poor condition. The risk of erosion in the creeklines is increased and only a few undesirable perennial and scattered annual grasses remain. There may be large bare areas between spinifex plants away from the creeklines.

Pastoral value

Pastoral value is very low. Hard Spinifex is unpalatable at most stages of growth, and palatable plants are too infrequent to support grazing for any length of time. The upper slopes of these pastures are largely inaccessible to stock. Condition decline due to grazing is most likely to be seen in the more accessible areas of the pasture, such as shallow drainage lines where the more palatable plants tend to occur.



Hard Spinifex Hill Pasture—good condition

May 2008

- A** There is an even coverage of Hard Spinifex plants, considering how steep and stony the site is.
- B** Bare areas are small and evenly distributed between spinifex hummocks.

Hard Spinifex Hill Pasture—fair and poor condition

As Hard Spinifex Hill Pastures are usually only seen in good condition, no photos of fair or poor condition are included in this guide.

Hard Spinifex Hill Pastures—species list

Common name	Scientific name	Life form	Other
Desirable species			
Hard spinifexes	<i>Triodia intermedia</i> , <i>Triodia wiseana</i> and other hard <i>Triodia</i> spp.	perennial	see photos, page 116
Curly Spinifex	<i>Triodia bitextura</i>	perennial	see photos, page 114
Ribbon Grass	<i>Chrysopogon fallax</i>	perennial	see photos, page 120
Silky Browntop	<i>Eulalia aurea</i>	perennial	
White Grass	<i>Sehima nervosum</i>	perennial	see photos, page 126
Intermediate species			
Black Speargrass	<i>Heteropogon contortus</i>	perennial	see photos, page 109
Wire Grass, Northern Wanderrie Grass	<i>Eriachne obtusa</i>	perennial	see photos, page 127
Citronella Grass	<i>Cymbopogon bombycinus</i>	perennial	
Lovegrasses	<i>Eragrostis</i> spp.	annual or perennial	
Annual Sorghum	<i>Sorghum stipoideum</i>	annual	see photos, page 108
Undesirable species			
Threeawn grasses	<i>Aristida</i> spp.	annual or perennial	see photos, pages 112, 115, 125

Hard Spinifex Plain Pastures

Occurrence

Hard Spinifex Plain Pastures occur on level to undulating plains in drier areas of the Kimberley. They are found on loamy and sandy soils which are generally shallow or stony. They occur as hummock grasslands, with occasional trees or shrubs.

Pasture condition

Good—In good condition, there is an even coverage of Hard Spinifex plants. A few palatable perennial grasses, such as Silky Browntop, Ribbon Grass and Soft Spinifex, may occur in low numbers between spinifex hummocks but will tend to be concentrated along the drainage lines or under trees. A variable cover of palatable intermediate annual grasses, such as Limestone Grass, may also be found for a short time following a good wet season.

Fair—Hard Spinifex is generally ignored by stock, so it is mainly the in-between species that cattle will graze when on these pastures. For this reason, a decline from good to fair condition is usually accompanied by reduced frequency and vigour of the palatable species. The coverage of spinifex plants may appear patchy or uneven, with the areas in between supporting a sparse cover of annual and undesirable perennial grasses, such as Threeawns. Poor post-fire grazing management can cause an uneven appearance in this pasture type.

Poor—In poor condition, larger bare patches occur among the spinifex. Palatable grasses lack vigour or are absent. Any non-spinifex species present tend to be undesirable perennial grasses, or annuals with low fodder value. The abundance of annual grasses is dependent on the season.

Pastoral value

Hard Spinifex Plain Pastures have a very low pastoral value. Hard Spinifex is unpalatable at most stages of growth, although cattle may sometimes graze spinifex plants regenerating after fire. Frequent burning of small areas off tracks can lead to a concentration of stock on the regenerating pasture and a decline in condition. Stocking rates also need to be managed to prevent the few palatable species present being grazed out. Despite its low palatability, Hard Spinifex is considered desirable in this pasture type because it helps control erosion.



**Hard Spinifex
Plain Pasture—
good condition
May 2008**

- A** There is an even coverage of Hard Spinifex, a desirable species, with only small spaces between hummocks.
- B** The palatable perennial Silky Browntop is present and appears vigorous.



Hard Spinifex Plain Pasture— fair condition May 2008

- A** There is an uneven coverage of Hard Spinifex.
- B** There are increased spaces between spinifex plants with only annual species present, in this case an undesirable annual Threeawn.

There is a lack of palatable species growing between spinifex hummocks.



Hard Spinifex Plain Pasture— poor condition May 2008

- A** There is a low coverage of Hard Spinifex.
- B** Other plants are undesirable species with low fodder value.
- C** There are large areas of bare ground.
- D** Some areas of the soil surface are actively eroding.



Hard Spinifex Plain Pastures—species list

Common name	Scientific name	Life form	Other
Desirable species			
Hard spinifexes	<i>Triodia intermedia</i> , <i>Triodia wiseana</i> and other hard <i>Triodia</i> spp.	perennial	see photos, page 116
Soft Spinifex	<i>Triodia pungens</i>	perennial	see photos, page 123
Ribbon Grass	<i>Chrysopogon fallax</i>	perennial	see photos, page 120
Silky Browntop	<i>Eulalia aurea</i>	perennial	
White Grass	<i>Sehima nervosum</i>	perennial	see photos, page 126
Intermediate species			
Citronella Grass	<i>Cymbopogon bombycinus</i>	perennial	
Black Speargrass	<i>Heteropogon contortus</i>	perennial	see photos, page 109
Limestone Grass	<i>Enneapogon polyphyllus</i>	annual or short-lived perennial	see photos, page 119
Wire Grass, Northern Wanderrie Grass	<i>Eriachne obtusa</i>	perennial	see photos, page 127
Slender Wanderrie Grass	<i>Eriachne ciliata</i>	annual	
Rice Grass	<i>Xerochloa laniflora</i>	annual or short-lived perennial	
Undesirable species			
Threeawn grasses	<i>Aristida</i> spp.	annual or perennial	see photos, pages 112, 115, 125

Soft Spinifex Pastures

Occurrence

Soft Spinifex Pastures are hummock grasslands with scattered trees and acacia shrubs. They occur on level to gently undulating plains, and occasionally hills, throughout the Kimberley. Soils are usually well-drained sands and loams, and are sometimes rocky.

Pasture condition

Good—The dominant grass is Soft Spinifex when this pasture type is in good condition. Other perennial grasses, including Ribbon Grass, Silky Browntop, Curly Spinifex and Woollybutt Grass, may occur in low numbers among the spinifex. Annual grasses, such as Limestone Grass, may also be present. Plants are vigorous, productive and evenly spaced. The size and density of plants in the stand is dependent on the length of time since fire, seasonal conditions, grazing pressure and time of year.

Fair—As pasture condition declines from good to fair, less desirable species such as Threeawns and Wire Grass become more prominent, though Soft Spinifex is still dominant. Soft Spinifex plants may be less vigorous and other desirable species are hard to find. Turpentine Bush and other acacias may increase, making it difficult for stock to access the grass.

Poor—Soft Spinifex Pasture that has declined to poor condition will most likely be dominated by undesirable Threeawns and Wire Grass, an intermediate species. There may be thick Turpentine Bush, making it difficult for stock to access the grass, and bare areas may have increased. Where Soft Spinifex Pasture in poor condition is adjacent to Hard Spinifex pastures, bare areas may be colonised by Hard Spinifex.

Pastoral value

Soft Spinifex Pastures are of moderate grazing value under low stocking rates when in good condition. Soft Spinifex Pastures are the most useful of the spinifex pastures, and are also regarded as a useful drought reserve. Heavy grazing, or grazing too soon after fire, can remove the Soft Spinifex plants and cause condition decline. Turpentine Bush and other acacias may increase after fire, making it difficult for stock to access the grass. Late season burning on a four-to six-yearly rotation is considered to be good practice, as it allows new seedlings to establish. The country should be spelled after burning until the grass seed has dropped.



Soft Spinifex Pasture— good condition

May 2008

- A** There is a high density of the desirable Soft Spinifex, and the plants appear healthy.
- B** Young Soft Spinifex plants are present.

There is a good coverage of Soft Spinifex, given that this photo was taken about two years after the site was burnt.



Soft Spinifex Pasture— fair condition

May 2008

- A** The density of desirable Soft Spinifex is reduced, though it is still the dominant grass.
- B** Other desirable grasses, such as Silky Browntop, are infrequent.
- C** Undesirable Threawn grasses can be seen in the stand.
- D** Turpentine Bush has increased, reducing stock access to the grass.

The soil surface still has good groundcover.



Soft Spinifex Pasture— poor condition May 2008

- A** The desirable Soft Spinifex plants are sparse and lack vigour.
- B** Hard Spinifex, an undesirable, has invaded the pasture; the undesirable annual Threeawn is also present.
- C** There are large bare areas.
- D** There is a very thick stand of Halls Creek Wattle and Turpentine Bush, reducing stock access to the grass and suppressing grass growth.

Soft Spinifex Pastures—species list

Common name	Scientific name	Life form	Other
Desirable species			
Soft Spinifex	<i>Triodia pungens</i>	perennial	see photo, page 123
Ribbon Grass	<i>Chrysopogon fallax</i>	perennial	see photos, page 120
Silky Browntop	<i>Eulalia aurea</i>	perennial	
Intermediate species			
Curly Spinifex	<i>Triodia bitextura</i>	perennial	see photos, page 114
Woollybutt Grass	<i>Eragrostis eriopoda</i>	perennial	
Wire Grass, Northern Wanderrie Grass	<i>Eriachne obtusa</i>	perennial	see photos, page 127
Limestone Grass	<i>Enneapogon polyphyllus</i>	annual or short-lived perennial	see photos, page 119
Undesirable species			
Threeawn grasses	<i>Aristida</i> spp.	annual or perennial	see photos, pages 112, 115, 125
Hard spinifexes	<i>Triodia intermedia</i> , <i>Triodia wiseana</i> and other hard <i>Triodia</i> spp.	perennial	see photos, page 116

Pindan Pastures

Occurrence

Pindan Pastures are tussock, hummock or mixed grasslands with an overstorey of acacias, occurring on sandplains, dune fields and swales. Soils are deep red sands, reddish sandy soils and occasionally yellowish sandy soils. The distribution of these pastures includes the Dampier Peninsula, Fitzroy valley and extending south from Broome; small areas of Pindan Pastures are also found near Halls Creek.

Pasture condition

Good—Pindan Pastures in good condition are dominated by Curly Spinifex and Ribbon Grass. Other grasses likely to occur are Perennial Sorghum, White Grass and Soft Spinifex. There is little bare ground visible and the plants appear vigorous.

Fair—Overgrazing reduces the vigour and density of the desirable species, as evident by the increasing distance between desirable grasses, and having few seedlings of Ribbon Grass and Curly Spinifex. Intermediate species, such as Wire Grass, Woollybutt Grass, and Annual Sorghum, are more prominent and may make up one-third or more of the stand. Undesirable species, such as Unequal Threeawn and Erect Kerosene Grass, will increase.

Poor—In poor condition, the desirable grasses are absent or reduced to isolated butts amongst the dominant intermediate and undesirable species. Wire Grass, Woollybutt Grass, Annual Sorghum, Unequal Threeawn or Erect Kerosene Grass will dominate or co-dominate the stand. The acacia overstorey may become dense enough to reduce pasture growth.

It may be almost impossible to reverse the declining trend in Pindan Pastures that have degraded to poor condition. Where Pindan Pastures were historically overgrazed by sheep, recovery has been very slow (more than 100 years) and the pastures were still dominated by annual plants and undesirable grasses in 2012.

Pastoral value

Pindan Pastures have moderate pastoral value and can be grazed over the wet season when more productive country is inaccessible. Cattle grazing only Pindan Pastures will require supplements.



Pindan Pasture—good condition

April 2010

A Curly Spinifex and Ribbon Grass are abundant and vigorous.

Sickle-leaf Wattle is a minor component.

There are no undesirable plants.

Perennial grass density is optimal for Pindan country.



Pindan Pasture—fair condition

April 2010

- A** Curly Spinifex and Ribbon Grass are present, but less vigorous than in good condition.
- B** Sickle-leaf Wattle dominates the shrub layer.
- C** Undesirable Threawn grasses are present.

The density of the desirable grasses has decreased.



Pindan Pasture—poor condition

April 2010

- A** Erect Kerosene Grass dominates the grass layer.
- B** Broome Pindan Wattle dominates the shrub layer.
- C** Large areas of bare soil are visible.

Desirable grasses are absent.

Pindan Pastures—species list

Common name	Scientific name	Life form	Other
Desirable species			
Ribbon Grass	<i>Chrysopogon fallax</i>	perennial	see photos, page 120
Curly Spinifex	<i>Triodia bitextura</i>	perennial	see photos, page 114
Soft Spinifex	<i>Triodia pungens</i>	perennial	see photo, page 123
Oat-eared Spinifex	<i>Triodia schinzii</i>	perennial	
Buffel Grass	<i>Cenchrus ciliaris</i>	perennial	see photo, page 110
Birdwood Grass	<i>Cenchrus setigerus</i>	perennial	see photo, page 110
Plume Sorghum	<i>Sorghum plumosum</i>	perennial	
Intermediate species			
Woollybutt Grass	<i>Eragrostis eriopoda</i>	perennial	
Wire Grass, Northern Wanderrie Grass	<i>Eriachne obtusa</i>	perennial	see photos, page 127
Black Speargrass	<i>Heteropogon contortus</i>	perennial	see photos, page 109
Limestone Grass	<i>Enneapogon polyphyllus</i>	annual	see photos, page 119
Undesirable species			
Unequal Threeawn, Feathertop Threeawn	<i>Aristida inaequiglumis</i>	perennial	see photos, page 125
Boat Panic	<i>Whiteochloa cymbiforme</i>	perennial	
Cockroach Bush	<i>Senna notabilis</i>	perennial	shrub
Kimberley Walkabout	<i>Crotalaria crispata</i>	annual	herb
Pindan Poison	<i>Velleia panduriformis</i>	perennial	shrub

‘Red’ soil group—not spinifex

Ribbon Grass Pastures

Arid Short Grass Pastures

Buffel Grass Pastures

Black Speargrass Pastures

White Grass/Bundle-Bundle Pastures



Ribbon Grass Pastures

Occurrence

Ribbon Grass Pastures occur on level to gently sloping plains throughout the Kimberley. They are found on sands, loams and occasionally clays. They grow as open grasslands, or as grassy woodlands with bauhinias, eucalypts, beefwood and other tree species.

Pasture condition

Good—In good condition, Ribbon Grass is dominant or co-dominant. Other co-dominants can be White Grass and Plume Sorghum in the higher rainfall areas, or Soft Spinifex and Curly Spinifex in the lower rainfall areas. Isolated intermediate species, such as Black Speargrass, may also be seen. There is uniform tussock spacing and all plants are vigorous.

Fair—Cattle preferentially graze Ribbon Grass and other palatable perennial species, so heavy continuous grazing will lead to a gradual decline in the size and vigour of desirables. Species in the pasture that are less preferred by cattle, such as Black Speargrass and Limestone Grass increasingly dominate in fair condition. Small patches of bare ground may be present and the proportion of undesirable species, such as Threeawns, in the pasture increases.

Poor—As the pasture condition declines towards poor condition, desirable perennial grasses become small, stunted and sparse, or may even disappear completely with only dead butts remaining. Few, if any, seedlings or young plants of desirables are seen. Intermediate species are scattered, having been exposed to higher grazing pressure in the absence of more palatable species. Undesirable species, such

as Threeawns, and annual grasses become more frequent. Limestone Grass often dominates Ribbon Grass Pastures in poor condition. There may be large patches with little or no perennial grass cover, and the risk of erosion is increased, particularly if the annual grasses dry out and blow away.

Pastoral value

Ribbon Grass Pastures can include a wide variety of species, so the pastoral value can vary depending on which species are dominant. Ribbon Grass is a resilient and productive plant, with very high palatability early in the season. It is also sometimes eaten late in the season. Where it dominates, the pastoral value of good condition Ribbon Grass Pastures is high. As the condition declines, carrying capacity declines because of the increased proportion of annual and undesirable species in the pasture.



Ribbon Grass Pasture— good condition

June 2008

- A** Dense, vigorous Ribbon Grass tussocks dominate the stand.
- B** Only a few patches of Black Speargrass, an intermediate species, can be seen.

No undesirables are obvious in the pasture.

This pasture is lightly grazed; however, the high density of desirable species would still be obvious under a higher utilisation rate, so the condition would still be assessed as good.



Ribbon Grass Pasture— fair condition

May 2008

- A** Desirable perennial grasses (Ribbon Grass in this photo) are present but are not dominant.
- B** Intermediate species, such as this Black Speargrass, make up 30 to 50% of the stand.
- C** Some larger areas have annual grass cover only.



**Ribbon Grass Pasture—
poor condition**
May 2008

- A** There are large patches of undesirable perennial grasses, such as Threeawns.
- B** Large areas have patchy annual grass cover only, with bare areas developing.
- C** Intermediate species, such as Black Speargrass, are sparse.

Ribbon Grass Pastures—species list

Common name	Scientific name	Life form	Other
Desirable species			
Ribbon Grass	<i>Chrysopogon fallax</i>	perennial	see photos, page 120
Plume Sorghum	<i>Sorghum plumosum</i>	perennial	
Kangaroo Grass	<i>Themeda triandra</i>	perennial	see photos, page 117
Native Millet	<i>Panicum decompositum</i>	perennial	
Intermediate species			
Wire Grass, Northern Wanderrie Grass	<i>Eriachne obtusa</i>	perennial	see photos, page 127
Black Speargrass	<i>Heteropogon contortus</i>	perennial	see photos, page 109
Curly Spinifex	<i>Triodia bitextura</i>	perennial	see photos, page 114
Soft Spinifex	<i>Triodia pungens</i>	perennial	see photo, page 123
White Grass	<i>Sehima nervosum</i>	perennial	see photos, page 126
Annual Sorghum	<i>Sorghum stipoides</i>	annual	see photos, page 108
Nineawns, Bottlewashers, Limestone grasses	<i>Enneapogon</i> spp.	annual or short-lived perennial	see photos, page 119
Kimberley Couch	<i>Brachyachne convergens</i>	annual	see photos, page 118
Undesirable species			
Unequal Threeawn, Feathertop Threeawn	<i>Aristida inaequiglumis</i>	perennial	see photos, page 125
Erect Kerosene Grass	<i>Aristida holathera</i>	annual	
Northern Kerosene Grass	<i>Aristida hygrometrica</i>	annual	
Bunched Kerosene Grass	<i>Aristida contorta</i>	annual or short-lived perennial	see photo, page 112

Arid Short Grass Pastures

Occurrence

Arid Short Grass Pastures are grasslands dominated by short-lived perennial or annual grasses with scattered eucalypt trees. They occur on level to undulating plains. Soils are variable depth loams (sometimes calcareous) and the surface may be stony. The occurrence of Arid Short Grass Pastures is often the consequence of a transition (see Page 2) within Ribbon Grass Pastures following sustained overgrazing.

Pasture condition

Good—Limestone Grass is usually dominant when this pasture type is in good condition. Purple Nineawn, an intermediate annual grass, may also be common. Plants are robust and vigorous, and bare ground is minimal unless pasture is grazed down. Some perennial grasses, such as Ribbon Grass, Wire Grass, White Grass and Black Speargrass, may be present as sparse, isolated plants or scattered small patches.

Fair—As pasture condition declines from good to fair, intermediate annual grasses, such as Bunched Kerosene Grass, become more common. Limestone Grass is still prominent, although the plants are likely to be less vigorous and bare areas may be visible. Less palatable perennial species, such as Wire Grass, White Grass and Black Speargrass, may still persist.

Poor—Further decline towards poor condition is signalled by large areas of bare ground and increased presence of unpalatable annual grasses, such as Threeawns. Remaining perennial grasses are much reduced in vigour. In areas adjacent to Hard Spinifex pastures, Hard Spinifex may colonise the bare areas.

Pastoral value

The true extent of Arid Short Grass Pasture is the subject of current debate. Evidence suggests that many areas once considered to be Arid Short Grass Pasture are capable

of supporting healthy stands of perennial grasses more characteristic of Ribbon Grass Pasture, if spelled to allow recovery. Ribbon Grass Pasture is a more resilient and a more productive pasture type than Arid Short Grass Pasture.

Pastoral value for Arid Short Grass Pasture is moderate, but resilience is low. Though annual grasses, such as Limestone Grass and Kimberley Couch, can provide good feed for stock early in the year while still green, their bulk is variable. In below average rainfall years, very little annual grass may be produced. The small patches of the long-lived perennial grasses supply the bulk of the feed for the rest of the year. Limestone Grass and some other robust annual grasses can act as short-lived perennials under optimal conditions (a run of good seasons).



Arid Short Grass Pasture— good condition May 2008

- A** There is a dense coverage of Limestone Grass (a desirable species) and other annual grasses.
- B** Undesirable species, such as Threeawn, are sparse.
- C** Desirable perennial grasses, such as Ribbon Grass, may be found.

Ground cover is optimal for the site.



Arid Short Grass Pasture—fair condition May 2008

- A** The desirable Limestone Grass is still common, though its vigour and density are reduced; here it makes up about one-third of the stand.
- B** Intermediate annual grasses, such as Kimberley Couch, make up at least one-third of the stand.
- C** Undesirable species, such as Threawn, are increasing.
- D** Black Speargrass, a less palatable perennial grass, persists.

Arid Short Grass Pasture—poor condition May 2008



- A** There are large areas of bare ground developing. Desirable annual grasses are absent.
- B** The remaining perennial grasses are isolated and show poor vigour.
- C** There is an increased presence of Rice Grass, a coloniser of degraded areas.

Arid Short Grass Pastures—species list

Common name	Scientific name	Life form	Other
Desirable species			
Limestone Grass	<i>Enneapogon polyphyllus</i>	annual or short-lived perennial	see photos, page 119
Perennial lovegrasses	<i>Eragrostis</i> spp.	perennial	
Ribbon Grass	<i>Chrysopogon fallax</i>	perennial	see photos, page 120
White Grass	<i>Sehima nervosum</i>	perennial	see photos, page 126
Curly Spinifex	<i>Triodia bitextura</i>	perennial	see photos, page 114
Intermediate species			
Purple Nineawn	<i>Enneapogon purpurascens</i>	annual or short-lived perennial	
Kimberley Couch	<i>Brachyachne convergens</i>	annual	see photos, page 118
Bunched Kerosene Grass	<i>Aristida contorta</i>	annual or short-lived perennial	see photos, page 112
Wire Grass, Northern Wanderrie Grass	<i>Eriachne obtusa</i>	perennial	see photos, page 127
Black Speargrass	<i>Heteropogon contortus</i>	perennial	see photos, page 109
Annual Sorghum	<i>Sorghum stipoideum</i>	annual	see photos, page 108
Rice Grass	<i>Xerochloa laniflora</i>	annual or short-lived perennial	
Undesirable species			
Erect Kerosene Grass	<i>Aristida holathera</i>	annual	
Northern Kerosene Grass	<i>Aristida hygrometrica</i>	annual	
Unequal Threeawn, Feathertop Threeawn	<i>Aristida inaequiglumis</i>	perennial	see photos, page 125
Winged Spinifex, Lobed Spinifex	<i>Triodia intermedia</i>	perennial	see photo, page 116
Limestone Spinifex	<i>Triodia wiseana</i>	perennial	see photo, page 116

Buffel Grass Pastures

Occurrence

Buffel (and Birdwood) Grass Pastures have colonised many previously degraded areas along the river banks of the Kimberley, especially around Fitzroy Crossing and the Nelson Land System near Halls Creek. These pastures thrive in well watered areas, such as creek lines, sandy alluvial plains and river levee banks. They are also well established along the coastal plain margins and landward margins of the coastal dunes in the West Kimberley. Soils are usually red earthy sands, calcareous loams, or calcareous sands on the low dunes.

Pasture condition

Good—Buffel Grass Pastures in good condition are dominated by Buffel or Birdwood Grass. Other grasses include Ribbon Grass and Bundle-Bundle. There is little bare ground visible and there is an even cover of vigorous plants.

Fair—Where Buffel Grass is colonising degraded country and basal cover is patchy, the pasture may be in fair or poor condition. Frequent fire and heavy grazing can also cause good pasture condition to decline. In fair condition, desirable grass cover has decreased and intermediate grasses, such as Wire Grass, White Grass, Woollybutt Grass and Annual Sorghum, have increased. Undesirable species, such as Threeawns, will be present. Shrubs, such as Prickle Bush, may increase.

Poor—In poor condition, a few desirable grass plants with poor vigour will be present. Annual grasses, such as Rice Grass and annual Threeawns, may make up a significant proportion of the stand. Areas of bare ground will be visible and sheet erosion or pedestalling may occur. Undesirable species, such as Threeawns, may dominate.

Shrubs, such as Prickle Bush, may increase.

Pastoral value

Buffel Grass Pastures are highly productive. They have the ability to respond quickly to even small amounts of rain. Buffel Grass does best on lighter soils of at least moderate fertility. Buffel Grass can quickly become rank and less palatable if ungrazed for too long. Areas of useful pasture can be maintained by grazing heavily and then spelling to allow regrowth.



**Buffel Grass Pasture—
good condition
(moderate utilisation)
September 2008**

A Buffel Grass dominates; plants are vigorous with relatively uniform spacing between.

The soil surface has been disturbed by trampling but there is plenty of litter and minimal bare ground.

There are no signs of erosion.



Buffel Grass Pasture— fair condition

September 2008

- A** Buffel Grass density has decreased, and plants are less uniformly spaced.
- B** There are some undesirable Rubber Bush plants.
- C** Pedestalling of grass tussocks is occurring.

The large bare areas are vulnerable to erosion and less palatable plants have increased.



Buffel Grass Pasture— poor condition

September 2008

- A** Some of the remaining Buffel Grass plants lack vigour; others are rank and unpalatable.
- B** Shrubs, such as grevilleas and annual plants, form a relatively large part of the stand.
- C** There is a lot of bare ground; and sheet erosion is occurring.

Buffel Grass Pastures—species list

Common name	Scientific name	Life form	Other
Desirable species			
Buffel Grass and/ or Birdwood Grass	<i>Cenchrus</i> spp.	perennial	see photos, page 110
Ribbon Grass	<i>Chrysopogon fallax</i>	perennial	see photos, page 120
Bundle-Bundle	<i>Dichanthium fecundum</i>	perennial	see photos, page 113
Soft Spinifex	<i>Triodia pungens</i>	perennial	see photo, page 123
Intermediate species			
Woollybutt Grass	<i>Eragrostis eriopoda</i>	perennial	
Wire Grass, Northern Wanderrie Grass	<i>Eriachne obtusa</i>	perennial	see photos, page 127
Black Speargrass	<i>Heteropogon contortus</i>	perennial	see photos, page 109
Limestone Grass	<i>Enneapogon polyphyllus</i>	annual	see photos, page 119
Undesirable species			
Feathertop	<i>Aristida latifolia</i>	perennial	see photos, page 115
Unequal Threeawn Feathertop Threeawn	<i>Aristida inaequiglumis</i>	perennial	see photos, page 125
Erect Kerosene Grass	<i>Aristida holathera</i>	annual	
Rubber Bush	<i>Calotropis procera</i>	perennial	shrub
Kimberley Walkabout	<i>Crotalaria crispata</i>	annual	herb

Black Speargrass Pastures

Occurrence

Black Speargrass Pastures occur on plains and lower hillslopes throughout the East and North Kimberley. They are found on a variety of sandy to loamy soils and usually occur as grassy, open eucalypt woodlands.

Pasture condition

Good—In good condition, these pastures are almost completely dominated by Black Speargrass. The plants are robust and, unless the pasture is regrowing after a fire, there is virtually no bare ground. Small amounts of other desirable perennial grasses, such as White Grass and Ribbon Grass, may be present, but generally do not comprise more than 20% of the stand.

Fair—As pasture condition declines from good to fair, Black Speargrass remains dominant but its density is reduced, with gaps visible in the stand. Intermediate species, such as Wire Grass, and undesirable species, such as Threeawns, become more prominent. Palatable perennial grasses, for example Ribbon Grass, are all but absent.

Poor—Poor condition is characterised by increasingly large areas with little or no perennial grass cover between the Black Speargrass plants. These areas may support annual grasses early in the season, but often become bare later in the year as the annual grasses are grazed, trampled or dry up and blow away. While undesirable perennial grasses and a few scattered intermediate species may be present, Black Speargrass remains the dominant perennial grass.

Pastoral value

Black Speargrass can be heavily grazed when young, especially when regenerating after fire. However, mature Black Speargrass is not preferred by cattle and so the value of the pasture largely depends on the other species growing with it. When condition declines and undesirable or unpalatable species become more dominant, the carrying capacity of Black Speargrass Pastures is quite low.

It is possible that some Black Speargrass Pastures have become established on previously degraded red-soil areas that used to carry more productive pasture types.



Black Speargrass Pasture— good condition May 2008

- A** Black Speargrass, a desirable species in this pasture type, is dominant and forms a dense stand.
- B** Only a few undesirable species, such as perennial Threeawn, can be seen.

Ground cover is very high.

Black Speargrass Pasture—fair condition June 2008



- A** The desirable perennial, Black Speargrass, is still dominant, but the stand is less dense.
- B** Small areas with no perennial grass cover are visible.
- C** There is an increased amount of the undesirable perennial Threeawn.

Black Speargrass Pasture—poor condition July 2008



- A** Black Speargrass is still the dominant perennial grass, but the stand is broken up into smaller clumps.
- B** Large areas with no perennial grass cover are visible.
- C** Undesirable species, such as perennial Threeawn, are scattered throughout the Black Speargrass.

Black Speargrass Pastures—species list

Common name	Scientific name	Life form	Other
Desirable species			
Black Speargrass	<i>Heteropogon contortus</i>	perennial	see photos, page 109
White Grass	<i>Sehima nervosum</i>	perennial	see photos, page 126
Ribbon Grass	<i>Chrysopogon fallax</i>	perennial	see photos, page 120
Intermediate species			
Wire Grass, Northern Wanderrrie Grass	<i>Eriachne obtusa</i>	perennial	see photos, page 127
Nineawns, Bottlewashers, Limestone grasses	<i>Enneapogon</i> spp.	annual or short-lived perennial	see photos, page 119
Annual Sorghum	<i>Sorghum stipoideum</i>	annual	see photos, page 108
Undesirable species			
Unequal Threeawn, Feathertop Threeawn	<i>Aristida inaequiglumis</i>	perennial	see photos, page 125
Threeawn grasses	<i>Aristida</i> spp.	annual	see photo, page 112

White Grass/Bundle-Bundle Pastures

Occurrence

White Grass/Bundle-Bundle Pastures occur on gently sloping plains and lower hillslopes throughout the East Kimberley. They are found on shallow to deep red loamy earths, often with stony surfaces. They occur as grasslands, or grassy woodlands with eucalypts, bauhinias and other tree species.

Pasture condition

Good—In good condition, White Grass is dominant. Bundle-Bundle, Ribbon Grass and the intermediate species, Black Speargrass, may occur on pockets of heavier soil. The desirable perennial grasses are robust and vigorous, forming a dense groundcover where grazing is light. There may be a few intermediate annual grasses present, such as Annual Sorghum, and a small number of undesirable species, such as perennial Threeawns.

Fair—Under continued heavy grazing, the more palatable desirable species, such as Bundle-Bundle, Ribbon Grass and Plume Sorghum, decline in frequency as condition approaches fair. The less palatable White Grass remains dominant but may appear patchy. Some intermediate annual grasses may be present, but are often grazed out by the end of the growing season, leaving patches of bare ground. Annual Sorghum may increase, particularly after a run of good wet seasons. Undesirable species, such as the unpalatable annual and perennial Threeawns, appear vigorous and make up an increased proportion of the stand.

Poor—In poor condition, larger patches of bare ground are visible. White Grass is still one of the most common species, though its density is reduced. Other desirable species, such as Ribbon Grass or Bundle-Bundle, are absent or occur only as isolated butts. There is a high proportion of undesirable species, such as Threeawns, that stand out because of the lack of other species, rather than forming dense stands. A few scattered annual grasses may remain.

Pastoral value

White Grass/Bundle-Bundle Pastures have a moderate pastoral value. They are often surrounded by inaccessible country which may result in them carrying high concentrations of stock. In the East Kimberley, Bundle-Bundle can be hard to find, even when the pasture is in good condition.



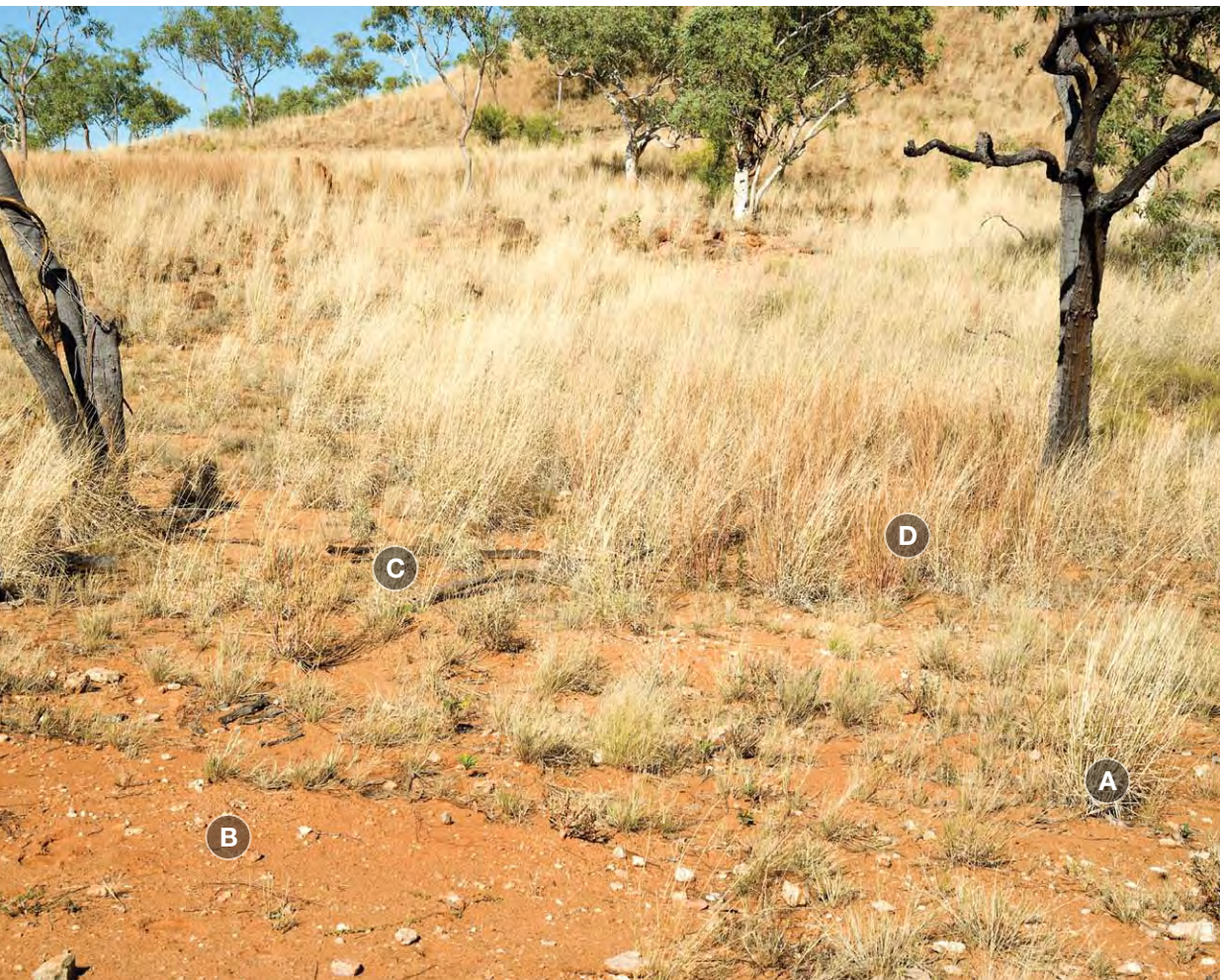
**White Grass/Bundle-Bundle Pasture—
good condition**
May 2008

- A** White Grass, a desirable species, is dominant.
- B** Bare patches are small and infrequent.
- C** Only a few intermediate plants are present, in this case Black Speargrass.



White Grass/Bundle-Bundle Pasture— fair condition June 2008

- A** The desirable White Grass is still dominant, but appears patchy.
- B** Larger areas with no perennial grass cover can be seen.
- C** The proportion of intermediate species in the stand, in this case Black Speargrass, has increased.



White Grass/Bundle-Bundle Pasture— poor condition June 2008

A The desirable White Grass is still common, but its density is reduced.

The site is dominated by:

B large areas of bare ground

C undesirable species, such as Threeawns

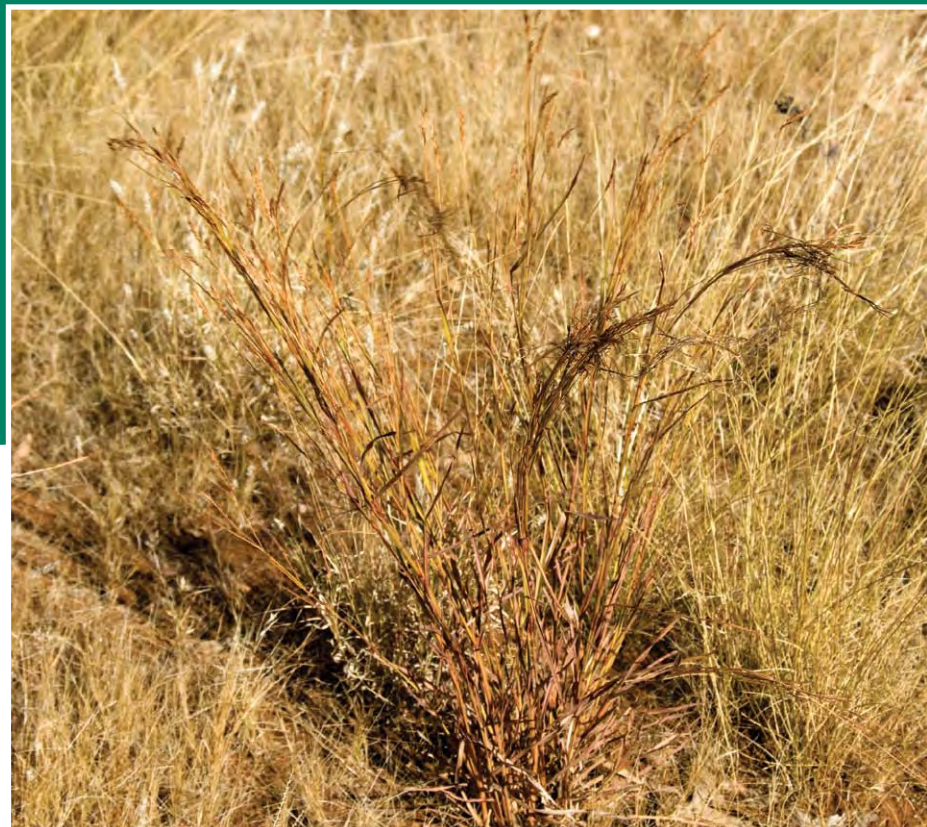
D intermediate species, such as this Black Speargrass.



White Grass/Bundle-Bundle Pastures—species list

Common name	Scientific name	Life form	Other
Desirable species			
White Grass	<i>Sehima nervosum</i>	perennial	see photos, page 126
Plume Sorghum	<i>Sorghum plumosum</i>	perennial	
Ribbon Grass	<i>Chrysopogon fallax</i>	perennial	see photos, page 120
Bundle-Bundle	<i>Dichanthium fecundum</i>	perennial	see photos, page 113
Intermediate species			
Black Speargrass	<i>Heteropogon contortus</i>	perennial	see photos, page 109
Citronella Grass	<i>Cymbopogon bombycinus</i>	perennial	
Wire Grass, Northern Wanderrie Grass	<i>Eriachne obtusa</i>	perennial	see photos, page 127
Annual Sorghum	<i>Sorghum stipoideum</i>	annual	see photos, page 108
Undesirable species			
Unequal Threeawn, Feathertop Threeawn	<i>Aristida inaequiglumis</i>	perennial	see photos, page 125
Threeawn grasses	<i>Aristida spp.</i>	annual or perennial	see photos, pages 112

Photographs of common species





Annual Sorghum (*Sorghum stipoideum*)



Annual Sorghum (hayed off)

Annual Sorghum is palatable when young and green, and can be highly productive, but it hays off very quickly.



Base with stilt roots



Seedheads: early stage (top), later stage (bottom)



Black Speargrass (*Heteropogon contortus*)



Black Speargrass has corkscrew-like seeds that form distinctive tangles (pictured on right) as the plant matures. The inset photograph shows the seedhead at an early stage of growth. Black Speargrass is nutritious when young or regenerating after fire, but becomes unpalatable as it matures.

Buffel and Birdwood Grass (*Cenchrus ciliaris* and *C. setigerus*)



Buffel Grass seeds generally have soft bristles, giving the seedhead a fluffy appearance.



Birdwood Grass is a close relative of Buffel Grass, and is usually distinguished by the hard bristles on the seed head.

Bull Mitchell Grass (*Astrebla squarrosa*)

Bull Mitchell Grass is the least palatable of the Mitchell grasses and has coarser leaves than those of Barley Mitchell Grass.



Bull Mitchell Grass seedhead

Bunched Kerosene Grass (*Aristida contorta*)



Bunched Kerosene Grass is also known as Wind Grass and has a windswept appearance.



Long awns are attached to the seed spike by a spirally twisted column.

Bundle-Bundle (*Dichanthium fecundum*)



Bundle-Bundle is also known as Curly Bluegrass. The inset shows the distinctive 'rabbit ears' that are left behind after the seed has dropped.



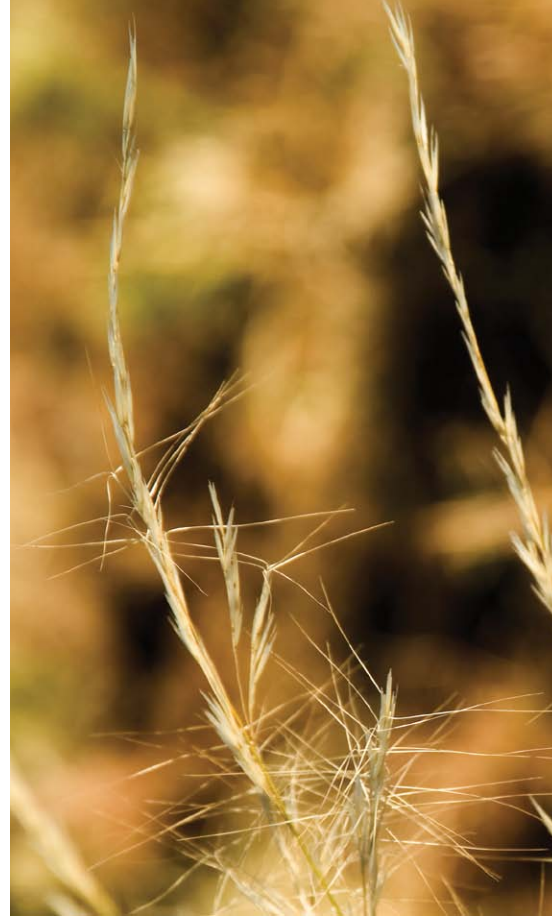


Curly Spinifex (*Triodia bitextura*)



Curly Spinifex is grazed in association with more desirable grasses, despite its low palatability.

Feathertop (*Aristida latifolia*)



Feathertop is an unpalatable, perennial threeawn that occurs mainly on heavier soils. If you look at an individual seed, you will see that the column that joins the three awns to the pointed seed is twisted. The twisted column helps distinguish Feathertop from Unequal Threeawn (*Aristida inaequiglumis*), which does not have a twisted column.

Hard Spinifexes (*Triodia intermedia* and *Triodia wiseana*)

Right: Winged or Lobed Spinifex (*Triodia intermedia*) is often found with a sparse low tree cover, including Snappy Gum (*Eucalyptus brevifolia*).

Below: Limestone Spinifex (*Triodia wiseana*) is often associated with limestone and is widespread on rocky ridges and gravelly slopes.



Kangaroo Grass (*Themeda triandra*)



Kangaroo Grass is palatable and nutritious when young and green, becoming fairly coarse at maturity.



Kimberley Couch (*Brachyachne convergens*)



Kimberley Couch has distinctive upright seedheads (above) with three to five thin branches. It is palatable early in the season, but shatters and blows away as the season progresses.

Limestone Grass (*Enneapogon polyphyllus*)



Limestone Grass responds quickly to rain, and is nutritious fodder prior to flowering. It is usually an annual plant, but some individuals may survive for more than one season under optimal conditions. It may be dwarfed in poor soils or in below average rainfall years.

Ribbon Grass (*Chrysopogon fallax*)



Ribbon Grass is also sometimes called Golden Beard Grass. This example has only been lightly grazed.



A smaller, heavily grazed Ribbon Grass plant.

Pindan Wattle (*Acacia tumida*)



Pindan Wattle, also known as Sickle-leaf Wattle, is relatively short-lived and is usually the main wattle associated with Pindan vegetation.



Salt Water Couch (*Sporobolus virginicus*)



Salt Water Couch plants mat together, forming a thick and springy carpet which protects the soil surface.



The leaves of Salt Water Couch have sharply pointed ends.

Soft Spinifex (*Triodia pungens*)



Soft Spinifex is regarded by pastoral grazing enterprises as the most useful of the spinifexes. It is the most palatable of the spinifexes, as the leaf blades are flattened when young. Other spinifexes have tightly rolled or folded leaf blades that are less attractive to stock. It is drought resistant because of its deep root system.



Turpentine Bush (*Acacia lysiphloia*)



Turpentine Bush is often found in association with Soft Spinifex Pastures and may increase following fire. Its pods are very sticky when green.

Unequal Threeawn (*Aristida inaequiglumis*)



An unpalatable, perennial threeawn, with a close-up of the characteristic three-awned seedhead on the right. If you look at an individual seed, you will see that the column that joins the three awns to the pointed seed is not twisted. This feature helps distinguish Unequal Threeawn from Feathertop (*Aristida latifolia*), which has a twisted column.



White Grass (*Sehima nervosum*)



White Grass is fairly coarse with low palatability, but may be grazed at all stages in some pasture types as grazing pressure increases.

Wire Grass (*Eriachne obtusa*)



Wire Grass, also known as Northern Wanderrie Grass, has limited palatability in most situations and is considered a species of intermediate value.



Appendices



Appendix A: List of plant species referred to in this guide

Common name used in the guide ¹	Alternative common name(s) ²	Scientific name
Annual Sorghum	Speargrass, Canegrass	<i>Sorghum stipoideum</i>
	Downs Sorghum, Black Soil Canegrass	<i>Sorghum timorense</i>
Barley Mitchell Grass		<i>Astrebala pectinata</i>
Birdwood Grass		<i>Cenchrus setigerus</i>
Black Speargrass	Bunch Speargrass	<i>Heteropogon contortus</i>
Buffel Grass		<i>Cenchrus ciliaris</i>
Bull Mitchell Grass		<i>Astrebala squarrosa</i>
Bunched Kerosene Grass		<i>Aristida contorta</i>
Bundle-Bundle	Curly Bluegrass	<i>Dichanthium fecundum</i>
Citronella Grass	Silky Oilgrass	<i>Cymbopogon bombycinus</i>
Curly Spinifex		<i>Triodia bitextura</i>
Erect Kerosene Grass		<i>Aristida holathera</i>
Feathertop		<i>Aristida latifolia</i>
Flinders grasses		<i>Iseilema</i> spp.
Goathead Burr		<i>Sclerolaena bicornis</i>
Halls Creek Wattle		<i>Acacia elachantha</i>
		<i>Acacia cowleana</i>
Hard spinifexes		<i>Triodia intermedia</i>
		<i>Triodia wiseana</i>
		other hard <i>Triodia</i> spp.
Hoop Mitchell Grass	Weeping Mitchell Grass	<i>Astrebala elymoides</i>

Common name used in the guide ¹	Alternative common name(s) ²	Scientific name
Kangaroo Grass		<i>Themeda triandra</i>
Kimberley Couch		<i>Brachyachne convergens</i>
Limestone Grass	Leafy Nineawn	<i>Enneapogon polyphyllus</i>
Limestone Spinifex		<i>Triodia wiseana</i>
Lippia		<i>Phyla nodiflora</i>
Lobed Spinifex	Winged Spinifex	<i>Triodia intermedia</i>
Lovegrasses		<i>Eragrostis</i> spp.
Native Millet		<i>Panicum decompositum</i>
Native Pea		<i>Rhynchosia minima</i>
Neverfail		<i>Eragrostis setifolia</i>
Nineawns	Bottlewashers, Limestone grasses	<i>Enneapogon</i> spp.
Northern Kerosene Grass		<i>Aristida hygrometrica</i>
Pan Wanderrie Grass	Pan Wanderrie Grass	<i>Eriachne glauca</i>
Perennial Lovegrasses		<i>Eragrostis</i> spp.
Pindan Wattles	Broome Wattle	<i>Acacia eriopoda</i>
	Sickle-leaf Wattle	<i>Acacia tumida</i>
Plume Sorghum		<i>Sorghum plumosum</i>
Prickle Bush	Prickly Mimosa, Mimosa Bush	<i>Acacia farnesiana</i>
Purple Nineawn		<i>Enneapogon purpurascens</i>
Queensland Bluegrass		<i>Dichanthium sericeum</i>
Ray Grass	Katoora	<i>Sporobolus actinocladius</i>
Red Flinders Grass		<i>Iseilema vaginiflorum</i>

Common name used in the guide ¹	Alternative common name(s) ²	Scientific name
Ribbon Grass	Golden Beard Grass	<i>Chrysopogon fallax</i>
Rice Grass		<i>Xerochloa laniflora</i>
Salt Water Couch	Marine Couch	<i>Sporobolus virginicus</i>
Samphire		<i>Tecticornia</i> spp.
Sensitive plants		<i>Neptunia</i> spp.
Silky Browntop		<i>Eulalia aurea</i>
Slender Wanderrrie Grass	Slender Wandarrie Grass	<i>Eriachne ciliata</i>
Soft Spinifex	Gummy Spinifex	<i>Triodia pungens</i>
Speedy Weed		<i>Flaveria trinervia</i>
Threeawn grasses		<i>Aristida</i> spp.
Turpentine Bush	Turpentine Wattle	<i>Acacia lysiphloia</i>
Unequal Threeawn	Feathertop Threeawn	<i>Aristida inaequiglumis</i>
Wanderrrie Grasses	Wandarrie Grasses	<i>Eriachne</i> spp.
White Grass		<i>Sehima nervosum</i>
Wire Grass	Northern Wandarrie Grass, Northern Wanderrrie Grass	<i>Eriachne obtusa</i>
Woollybutt Grass		<i>Eragrostis eriopoda</i>
Yellow Daisy		<i>Wedelia asperrima</i>

1 Common names are sourced from FloraBase (Western Australian Herbarium, 1998–), except where local usage differs (eg Bundle-Bundle).

2 Alternative common names are sourced from FloraBase (Western Australian Herbarium, 1998–), Australian Biological Resources Study (2005), Flora of Australia (2005) and Petheram and Kok (2003).

Appendix B: Further information and resources

Department of Agriculture and Food, WA

Advice and assistance on grazing land management is available from Rangelands Development Officers at your local district office. Kununurra District Office can be contacted on (08) 9166 4000, Broome District Office can be contacted on (08) 9194 1400.

Advice and assistance on identifying plants is available at your local district office, or when Rangelands staff visit your lease.

- Take a photo if you have a camera handy.
- If you collect specimens and bring or send them in to us:
 - try to include culms (stems), leaves, seedheads and seeds (seeds are not always essential) for each grass specimen you collect
 - dry and press specimens between sheets of newspaper prior to sending (preferred method), or, if bringing specimens in straight after collecting, keep them fresh in a sealed plastic bag in a cold esky or fridge.

Guidelines and policies are available on a range of subjects from agric.wa.gov.au, including best management practice guidelines for grazing cattle in the northern pastoral areas of WA and fire management for Kimberley pastoral rangelands.

Pastoral Lands Board

Pastoral lease reports for each lease are available to the lessee from the Pastoral Lands Board.

Department of Parks and Wildlife (formerly Department of Environment and Conservation)

FloraBase is a useful resource for help with identifying plants, florabase.dpaw.wa.gov.au.

Books and publications	Uses	Region
Chilcott, CR, Jeffery, MR, Huey, AM, Fletcher, M and Whyatt, S 2009, <i>Grazing land management—Kimberley version</i> , workshop notes, Meat & Livestock Australia.	land types, pastoral potential, land condition, grazing management	Kimberley
Milson, J 2000, <i>Pasture plants of north-west Queensland</i> , information series Q100015, Department of Primary Industries, Queensland.	plant identification and pastoral value	western Queensland
Moore, P 2005, <i>A guide to plants of inland Australia</i> . Reed New Holland.	plant identification	inland Australia
Payne, AL, Kubicki, A and Wilcox, DG 1974, <i>Range condition guides for the west Kimberley area, WA</i> , Western Australian Department of Agriculture, Perth.	pasture types, pastoral potential, pasture condition	developed for the West Kimberley, used throughout the Kimberley
Payne, AL and Mitchell, AA 2002, <i>Pasture condition guides for the Pilbara</i> , miscellaneous publication 19/2002, Department of Agriculture, Perth.	pasture types, pastoral potential, pasture condition	Pilbara (some pasture types are similar to those of the Kimberley)
Payne, AL and Schoknecht, N 2011, Tech. bulletin No. 98, <i>Land systems of the Kimberley region</i> , Western Australia, Department of Agriculture and Food, Perth.	land systems, pastoral potential, pasture types	Kimberley
Petheram, RJ and Kok, B 2003, <i>Plants of the Kimberley region of Western Australia</i> , revised edition, University of Western Australia Press, Perth.	plant identification and pastoral value	Kimberley
Smith, NM 2002, <i>Weeds of the wet/dry tropics of Australia - a field guide</i> , The Environment Centre NT, Darwin.	weed identification	wet/dry tropics of Australia
Stewart, GA, Perry, RA, Paterson, SJ, Traves, DM, Slatyer, RO, Dunn, PR, Jones, PJ and Sleeman, JR 1970, <i>Lands of the Ord–Victoria area, Western Australia and Northern Territory</i> , CSIRO Land research series no.28, CSIRO, Melbourne.	land systems, pastoral potential, some information on pasture types	Ord, Keep and Victoria River catchments
Wheaton, T (ed.) 1994, <i>Plants of the northern Australian rangelands</i> , Department of Lands, Housing and Local Government, Darwin.	plant identification and pastoral value [out of print]	northern Australia
Wheeler, JR (ed.), Rye, BL, Koch, BL and Wilson, AGJ 1992, <i>Flora of the Kimberley region</i> , Department of Conservation and Land Management, Perth.	plant identification [out of print]	developed for the Kimberley, used throughout northern Australia

Appendix C: Glossary

Alluvial plain: a plain formed by the repeated deposition of sediment from a river when it floods.

Annual: a plant which grows from seed and completes its life cycle, including flowering and seeding, within one growing season. Some annuals can live longer than one year if growth conditions are favourable (see short-lived perennial).

Awn: a fine, hair-like structure that is attached to the flowering parts of many grasses. Threeawns are so named because of the three awns that are attached to the seed.

Calcareous: containing lime or limestone.

Carrying capacity: the number of stock units a paddock or management area can carry over the long term while maintaining or improving land condition.

Coastal: on or near the coast.

Co-dominant: a species equally dominant with one or more other species in a pasture.

Density: the number of individuals of a certain species per unit area.

Desirable species: those species in a given pasture type that are usually productive, highly palatable and perennial. Desirables generally decrease in frequency as grazing pressure increases because they are preferentially grazed by cattle.

Grazing pressure: the number of stock units grazing in relation to the amount of feed available.

Halophytes: salt tolerant plants such as saltbushes, bluebushes and samphires.

Herb: a plant which does not produce a woody stem.

Hummock grass: spinifexes that grow together as large rounded mounds or 'hummocks' that can be up to several metres across, often forming rings around a central dead or decaying patch.

Intermediate species: those species in a given pasture type that include moderately or slightly palatable perennial grasses and palatable annuals. These species may increase under heavy grazing at first, as stock concentrate on the more palatable desirable species. However, if grazing pressure continues and the desirable species are grazed out, intermediate species will also start to decline.

Palatability: the degree to which a grazing animal finds a plant attractive to eat. This can vary with the age of the plant.

Pastoral value: the value of a pasture or an individual species for pastoralism, based on the quality and quantity of stock feed it provides.

Pasture condition: describes the current condition of the vegetation compared with the optimal condition which could be expected considering the potential of the site. Pasture condition is rated as 'good', 'fair' or 'poor' depending on how close the current condition is to the optimal condition.

Pasture type: a distinctive mix of plant species, soil type and landscape position.

Perennial: a plant which lives for three or more years. Plants that complete their life cycle over two years are biennial.

Preferential grazing: where stock selectively graze more palatable species before less palatable species. This can lead to the more palatable species being grazed out of a pasture.

Resilience: the ability of a plant, pasture or ecosystem to withstand disturbance.

Short-lived perennial: annual species that are able to live for more than one year if growth conditions are favourable. Also called a biennial.

spp.: abbreviation of species (plural), referring to more than one different species of the same genus; for example, *Triodia* spp. includes all kinds of spinifex grass.

Tussock grass: bunch grass, where the stems of the grass are bunched together forming a grass clump or 'tussock'.

Undesirable species: those species in a pasture type that are generally unpalatable. Undesirable species include woody weeds and other weedy, prickly or toxic species which invade overgrazed pasture. Largely ignored by stock, undesirable species tend to increase under prolonged heavy grazing, and in large numbers are an indication of poor pasture condition.

Upland: an area of land elevated above the plain.

Utilisation: the percentage of pasture grown in a year that is eaten by grazing stock.

Appendix D: References used in compiling this guide

Australian Biological Resources Study 2005, *Flora of Australia* volume 44B, ABRS and CSIRO Publishing, Melbourne.

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Chilcott, CR, Jeffery, MR, Huey, AM, Fletcher, M and Whyatt, S 2009, *Grazing land management—Kimberley version*, workshop notes, Meat & Livestock Australia.

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Quick start guide

Step 1: Choose site(s) for assessment—see page 3.

Step 2: Determine the pasture type at the site—see pages 9–18.

Step 3: Look up the pasture condition description and photos for the relevant pasture type—see pages 19–106.

Step 4: Ask yourself the following questions:

- Q1. What is the site's potential to store rainfall and grow grass (consider slope, aspect, soil type, rainfall zone)? The potential determines what the optimal pasture condition at the site could be. Pasture condition is rated as good, fair or poor depending on how close it is to optimal condition.
- Q2. What species are present? See photos of common species, starting from page 107, or use a field guide that includes pasture plants (see Appendix B).
- Q3. What proportion of the species that you can see are desirable, intermediate and undesirable for that pasture type?
Refer to the species list for the relevant pasture type.
- Q4. How healthy do the desirable species look? Consider plant size and growth, leaf size and colour, number and size of seed heads and presence of young plants or seedlings.
- Q5. How much bare ground, or ground with no perennial cover, is there?

Step 5: Rate the pasture condition of the site as good, fair or poor—refer to the relevant pasture condition description and photos (pages 19–106). Which pasture condition statement (good, fair or poor) best describes your site?

Step 6: Record the pasture condition so you can monitor change over time—see page 3.

