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Planned grazing management

This fact sheet has been prepared through the Land, Water & Wool Program and provides advice for woolgrowers in the mid north grasslands and shrublands of South Australia, on using planned grazing to optimise productivity and environmental outcomes on their property. Planned grazing is the use of a range of management tools, such as rest and graze periods, stock density and watering points, to create a particular landscape that meets the goals of the land manager.

Spear grass. Photo David Sloper.



Grasses are nature's selection of plants that are well adapted to grazing. Grasses can be perennial, which means they live for many years, or annual, which means they grow from a seed, flower and die, all in one growing season.

Annual plants respond quickly to rainfall and grow quickly before dying off, while slower growing perennial grasses provide a greater bulk of feed that can carry stock through dry periods and they can use water that falls at any time of the year, not just through winter.

Perennial grasses grow from a long lived base of roots and growing tips which can last for many years. The plant may have dead material standing above the ground with the growing tips at the base of the plant just waiting for moisture so that they can grow.

Removing the dead material through grazing allows sunlight to reach the base of the plant and enables rapid response of the new young growth

tips to moisture. Established perennials produce new leaf material more quickly after rain than annuals which have to grow from a seed.

The two most common perennial grasses found in pastoral country in the mid north of South Australia are Spear grass (*Austrostipa* species) and Wallaby grass (*Austrodanthonia* species).

There are different Spear grass species, all forming tussocks which range from 20–60 centimetres in height. The leaves are usually harsh to touch, with sharp tips, green to blue-green in colour. The Spear grass flowers and seeds in spring and seed heads are held above the grass and contain distinctive spear shaped seeds with long awns which have a corkscrew twist. The Spear grass species are well adapted to withstand the very dry conditions frequently experienced in the pastoral areas.

Above left: Planned grazing is the use of a range of management tools, such as rest and graze periods, stock density and watering points, to create a particular landscape that meets the goals of the land manager.

Photo Kylie Nicholls.

Above: The Spear grass species (*Austrostipa* species) are well adapted to withstand the very dry conditions frequently experienced in the pastoral areas.

Photo David Sloper.



Above: Wallaby grass (*Austrodanthonia* species) is a prolific seeder which enables it to quickly recolonise areas after favourable rainfall.

Right: The Wallaby grass flowers and seeds in spring and has an upright, fluffy seed head.

Photos David Sloper.

Wallaby grass species form a small tussock, ranging from 1–20 centimetres in height. They have green or blue-green, fine leaves which are usually hairy.

The Wallaby grass flowers and seeds in spring and has an upright, fluffy seed head. Wallaby grass is a prolific seeder which enables it to quickly recolonise areas after favourable rainfall.

Grazing perennial grasses

If a perennial grass plant is grazed — and to keep it healthy, grasses need to be grazed — it needs time to recover before it is grazed again.

When the top of the plant is eaten by an animal, the stores of starch in the roots provide the energy for new shoots to be produced. If the plant is grazed again before the roots have had time to recover, the whole plant is weakened because it does not have a renewed store of energy in its roots from which to fuel new leaf regrowth.

If this happens continually, as it does in a set stocked pasture, the perennial plants gradually get smaller and smaller and so weak that they eventually die. This is why planning for appropriate recovery (rest) periods is the most important part of successful grazing management.

Planned grazing management

Planned grazing is the use of a range of management tools to create a particular landscape that meets the goals of the land manager. For example, a goal might be to maintain ground cover at more than 80% year round.

There are a range of grazing management tools available to use including rest period, graze period, stock density, soil fertility, animal supplements, watering points and access, and fire.



Planned grazing relies on the understanding, and more importantly the acceptance, that the condition of the property or paddock is a direct consequence of the management being

applied and not simply a reflection of seasonal conditions. In practice, planned grazing differs from set stocking and rotational grazing systems in a number of important ways outlined below.

Characteristics of set stocking, rotational grazing and planned grazing

Set stocking	Rotational grazing	Planned grazing
Grazing is not often planned to adjust to seasonal conditions.	Grazing may or may not be planned to adjust to seasonal conditions.	Grazing is planned up to 6 months in advance on the basis of required plant recovery periods and animal management needs are planned in advance.
Graze periods are based on feed availability or a set time period.	Graze periods may be based on a set time period, remaining biomass animal demand or pasture recovery periods (for example stock are moved every 20 days irrespective of pasture and seasonal conditions).	Graze periods are flexible based on required pasture recovery periods and animal feed demand.
Animals graze paddocks for long periods mostly until the feed runs out.	Animals may graze paddocks for longer periods but are removed before the pasture runs out.	Animals graze paddocks for short periods and are moved well before feed runs out.
Many mobs.	Few to many mobs.	Sheep combined to create few mobs.
Few paddocks per mob (e.g. 2–4).	Few to many paddocks per mob.	Many paddocks per mob (e.g. 15–40).
Stock density* is low (e.g. 2-4 times stocking rate).	Stock density* may be high or low.	Stock density* is high (e.g. 10–100 times stocking rate).
The possibility of drought is not actively planned.	The possibility of drought may or not be actively planned.	The possibility of drought is routinely planned.
The option of using the management of animals for the purpose of land regeneration is not considered.	The option of using the management of animals for the purpose of land regeneration may be considered.	The use of animals as a tool for land regeneration is implicit.
No or little monitoring of pasture quantity, quality or ground cover.	No or little monitoring of pasture quantity, quality or ground cover.	Periodic monitoring of pasture quantity, quality and ground cover and use of this information in grazing plans.

Source: Adapted from Savory 1999.

* Stocking rate is the number of animals per hectare across an area of land, or the property. Stock density is the number of animals per hectare in a paddock at a given time.

Planned grazing benefits

Planned grazing favours perennial plants, and has the potential to significantly increase animal production per hectare while improving condition of the land and pasture.

Graziers involved with the Land, Water & Wool project and the Mid North Grasslands Working Group have found that by using planned grazing management they can increase pasture productivity, stocking rates and water use efficiency and reduce bare ground.

For example, at 'Anama' 15 kilometres north of Clare, planned grazing kept ground cover above 90% over the period 2001–05 but ground cover fell to 60% with set stocking during the drought year of 2002 and only slowly increased thereafter. At the same time, stocking rate averaged 4.2 Dry Sheep Equivalents per hectare (DSE/ha) with planned grazing but only 2.4 DSE/ha with set stocking. Remarkably, rainfall infiltration rate increased over the 4-year period from 1–18 millimetres per minute (mm/min) with planned grazing but only from 1–4 mm/min with set stocking. This means that more of the rainfall can move quickly into the soil and be available for pasture growth, rather than running off the paddock as surface flow.

There are other benefits from planned grazing. Managers in pastoral country have fewer mobs and water points to check and are able to check animals and their condition and health more often.

A commonly reported benefit is that the grazing plan provides confidence about where the stock will be in the future and allows easier forward planning of other aspects of the farm and life. This reduces stress on the livestock and more importantly the people managing the stock.

By planning grazing, based on the recovery period required by desirable pasture species, the amount of quality feed produced can be maximised and the land manager has greater control and flexibility in deciding how to use the extra feed.



Photo courtesy Australian Wool Innovation.



Carrying capacity can potentially increase with appropriate utilisation of annual feed production. Utilisation refers to the proportion of yearly pasture production that is eaten by stock. In pastoral areas up to 50% is considered a sustainable level of pasture utilisation to enhance long term production potential.

Leaving at least 500 kilograms of dry matter per hectare (kg DM/ha) of standing feed provides a range of benefits including:

- cover to protect against soil erosion
- adds leaves and roots to the litter layer for nutrient recycling
- helps reduce weed invasion
- retains seed for new plants
- provides a base for new season pasture growth.

Some country may take a number of years of planned grazing to increase the standing feed to a point where this residual target can be met and maintained.

Planned grazing also allows the use of animal impact as a tool to actively improve land condition. For example, by creating soil disturbance or depositing faeces and urine on a bare or capped soil surface, or trampling areas where undesirable plants are present in high numbers. In smaller paddocks grazed at higher stock density the distribution of nutrients in the form of dung and urine is spread more evenly.



A typical riparian area in pastoral country near Burra. The vigorous weed Artichoke can invade when ground cover is not maintained and stock damage the soil surface — planned grazing management can reduce these impacts by moving stock before they cause damage.

As land condition improves with planned grazing so too does land productivity, allowing more animals to be run on the same area. Increasing stocking rate is a key driver for increasing enterprise profitability.

Planned grazing principles

The principles of planned grazing are to manage animals in a way that satisfies the goals of the manager. If the goals are to improve the productivity and health of the paddock and try and run more animals then the principles listed on the following pages may apply.



“I can see that our management, particularly cropping, is not the most productive and environmentally friendly way of managing our land, especially with the money we have invested we are not getting the returns and issues such as erosion and weeds are becoming more and more of a problem. By changing our grazing management we hope to see a significant improvement in the condition of our land, along with increases in indicators such as ground cover and perennial species and numbers.”

As part of the Land, Water & Wool – Rivers sub-program, Simon Eberhard's plans for 'Mullaby' have focused on best practice weed control with livestock grazed according to plant growth rates. Mullaby was sold during the project to the Rowe family, no further grazing work has been carried out on the property.

Photos this page and opposite Kylie Nicholls.

The principles are:

1. Match stocking rate to carrying capacity. No matter what grazing management is used, if the property is overstocked then damage to the paddock and animals will follow. Experience suggests that as land condition improves the surest way to reach the potential stocking rate is to keep increases to carrying capacity slightly behind the increase in land productivity.
2. Minimise the number of mobs while accounting for animal needs. This will increase the ability to provide rest to the paddock and improve the utilisation of pasture across the paddock.
3. Create a grazing plan to ensure recovery periods are those required by the plants, and focus particularly on the most desirable species present. The length of the recovery period will vary throughout the year being greatest during periods of slow or nil growth and shortest during periods of high growth. If in doubt slow down.



- Plan ahead of the growing and non-growing periods of the year and make sure the plans are written down on paper.
4. Use the grazing plan to ensure the graze period minimises repeated grazing of the same plant. The most desirable/palatable plants will be the first plants grazed when stock enter a paddock and these are the plants that the land manager will likely want to encourage in the pasture. When plants are growing rapidly, sheep can graze them repeatedly every five to seven days if allowed to do so, leading to eventual weakening and loss of the most productive plants.
 5. Remember that the grazing plan has to work for the land manager and their family. It needs to be a plan that fits their needs socially and results in improved outcomes in terms of land condition and productivity and financial considerations.
 6. Plan conservatively at every stage, tending to underestimate the amount of feed available or the grazeable area of the paddock will build in a safety margin.
 7. If there are fewer than 15 paddocks per mob then consider creating more paddocks by subdivision. The final number of paddocks per mob will depend on the number of mobs, stocking rate and the degree of flexibility that management requires. The more paddocks per mob the

greater the flexibility in management that can be achieved and the greater control the land manager has over the grazing process.

8. Monitor the performance of the paddock and animals to determine if the plan is meeting the specific goals. For example, periodically assess ground cover, available feed, proportion of perennials, condition scores of animals, extent of stock tracks, pasture growth rate and rate of pasture utilisation.

How to get started

Keep the grazing plan simple in the early stages. The easiest way to get started is to minimise the number of separate mobs that are run.

Understand and acknowledge that running a large number of separate mobs in a set stocked way will be reducing pasture productivity and ground cover. Think about how best to combine mobs, for example many people successfully run mixed age group ewes while keeping hoggets and maidens separate, and the same principal holds with cattle.

Of course, the number of mobs and mob size can vary throughout the year, with flexibility depending on the number of paddocks and stock. For example, more mobs of fewer ewes can be created before lambing and the movement of animals stopped or slowed until lamb

marking to promote mothering success. An intermediate number of mobs may follow until weaning when a single mob of ewes may be sufficient.

Many people make the mistake of thinking the first step to planned grazing is making new paddocks and more watering points, all of which are costly. The simple act of combining mobs using existing infrastructure may be sufficient to start the process.

Then, when some experience has been gained in planned grazing, the areas where greatest benefits can be achieved through paddock subdivision become clearer and more complexity can potentially be built into the planning process.

Management issues

Timing of the recovery period

The land manager's experience will be the best guide in determining the length of time required for the most desirable pasture species to regrow sufficient leaf area to indicate recovery following a grazing event. As a guide, in periods of rapid growth in pastoral country, as little as 40–45 days recovery may be required. In periods where pasture growth is slow recovery periods of 150–200 days may be more appropriate in pastoral country. Under some circumstances up to 365 days may be necessary for plants to regrow following grazing. Actual recovery

periods will vary among paddocks and farms. Paddocks will need to be monitored to determine the optimum length of recovery period required.

Rest period is not the same as recovery period

There is an important distinction between rest period and recovery period. The rest period is the time animals are not grazing a paddock. The recovery period is the time required for plants, particularly desirable species, to recover from defoliation — that is to regenerate leaf area following a grazing event. If little or no growth occurs between grazing events or growth is less than expected then the recovery period is too short and stock movements must be slowed.

Calculation of graze period

The graze period for any paddock must always be based on the required recovery period. For a given recovery period the average graze period for paddocks allocated to each mob is calculated by:

$$\frac{\text{Required recovery period}}{\text{(Number of paddocks - 1)}} = \text{Average graze period}$$

If a range of recovery periods are required then do this calculation for the minimum and maximum recovery period needed. Adjustments to the average graze period will be needed for each paddock based on the feed quality and grazeable area of each paddock.



Paddock utilisation

With the adoption of planned grazing it will quickly become clear which areas of a paddock are either under or over utilised by livestock. This may be a cue to look at potential gains through subdivision of a paddock or the option of using stock density or animal impact to correct the situation. Using temporary fencing, animals may be confined to an area to either encourage intake or increase trampling of excessive feed. On bare or capped areas hay or supplementary feed could be placed on the area to increase organic matter or nutrient input to the site and/or stimulate hoof action to disturb the soil surface. Once the area is rehabilitated the temporary fence may then be removed or the feed cart moved to an alternative area of the paddock.

Planning for critical periods

Timing of activities such as joining, lambing, and weaning should be identified and planned in accordance with pasture growth cycles. Planning the grazing will help to ensure animal nutrition requirements are met and ewes are in adequate condition to maximise conception, lambing and weaning rates. Once identified, those paddocks planned for specific use should be set aside well in advance to ensure feed quality and quantity is available to meet stock requirements during these critical periods.



An AIMS monitoring site at Thistlebeds. Photo Judi Earl.

Water and fencing

The greatest limitation to combining mobs is likely to be water supply. There must be an adequate volume of water supplied to stock to ensure all animals can obtain sufficient water without delay. The size of the trough is relatively less important than the rate of delivery of water to the point. The provision of water to large mobs of stock must be carefully planned and the supply must be adequate to meet potential livestock requirements during periods of peak demand. A minimum flow rate into the trough of 1 litre/second per 2000 DSEs is required.



Pictured are AIMS researchers Judi Earl and Lewis Kahn (centre) demonstrating how to estimate ground cover with Thistlebeds property owners Jane and Greg Kellock. Photo Kylie Nicholls.

Where dams are used to provide water to large mobs for extended periods of time water quality can decline and become an important issue.

If the existing infrastructure does not meet management requirements, internal subdivision fences can be erected using semi permanent structures or temporary electric fencing. Monitoring will show where subdivision will provide the greatest return for time and money spent on fencing and/or water points.

More permanent developments should ideally be planned in phases over a period of time. It is important that actions which will give the greatest marginal return are carried out first.

Many people use far more wire than is necessary to contain livestock and particularly Merino sheep. For sheep, three wire fences, two hot and one earth, are sufficient to contain most animals and in many cases two wires will do once animals are educated. Cattle will usually require only a single wire.



Greg and Jane Kellock case study

For South Australian woolgrowers Greg and Jane Kellock, adopting a change in grazing management through the Land, Water & Wool – Rivers project has already had a range of benefits on their family's 10,049 hectare pastoral properties, near Burra.

According to Greg, despite the continuing dry conditions, the productivity and health of the land has significantly improved, with lambing percentages more than doubling, along with an increase in ground cover and the perennial grass population.

The Kellock family run three farms totalling about 10,000 hectares in the mid north. This includes the adjoining pastoral properties Thistlebeds and North Kings Well, and a further 640 hectares which they lease.

The Kellock family's main enterprise on their higher rainfall country between Farrell Flat and Burra is a self-replacing Kelvale Poll Merino stud and commercial flocks of 6600 sheep, with about 3500 breeding ewes. They crop about 1000 hectares of wheat, barley, oats, triticale, peas, canola and beans. Greg and Jane also run a small off-farm party hire business in Burra.



At Thistlebeds and North Kings Well the sole enterprise is a commercial self-replacing Merino flock. The current average micron is 22.5 and the wool cut is 6.5 kilograms per head.

In the past, these properties had been run at a set stocking rate of one sheep per 4 hectares giving a carrying capacity of 2300 sheep across the grazed area. In 2004, 2200 ewes were run over the whole property and lambing percentages were 60%.

Making a change to planned grazing has helped South Australian wool growers Jane and Greg Kellock, to increase ground cover and perennial grass numbers on their pastoral properties, near Burra. Photo Kylie Nicholls.

Right: A planned grazing trial at one of the Kellock family pastoral properties, North Kings Well, Burra, South Australia, significantly improved perennial grass populations in only eight months.

Photo Kylie Nicholls.

After attending a Resource Consulting Services Grazing for Profit course in 2004, Greg convinced his family to trial planned grazing in the pastoral country at North Kings Well. With only four paddocks on the property, sheep were moved every fortnight, which Greg admitted was not really a sufficient rest period but the improvement in the land has been unbelievable.

The 2005 lambing percentage at North Kings Well increased to 86% and the increase in ground cover and perennial grasses has been significant, according to Greg and Jane.

After seeing these results, Greg and Jane were keen to become involved in the Land, Water & Wool project and apply planned grazing principles across both Thistlebeds and North Kings Well.

Financial assistance was provided to upgrade the livestock stock watering supplies as the Kellocks decided this was more of a priority than paddock subdivision.

Water has been a major issue for Thistlebeds with a heavy reliance on dams, but with the dry conditions in the past few years, dams have started to dry up and water levels have dropped in the bores.

Through the Land, Water & Wool funding, the water resources on Thistlebeds have been significantly increased which will ensure the Kellock



family can continue with planned grazing and have the confidence that they have sufficient water to supply the larger mobs. They have been able to link all their water supplies together on Thistlebeds and plans are now underway to link Thistlebeds and North Kings Well water supplies.

As part of the Land, Water & Wool project, livestock are being grazed according to pasture growth rates, with emphasis on adequate rest periods to allow the perennial plants to recover.

Currently both properties comprise a total of 18 paddocks. On these areas, smaller mobs of sheep were aggregated to form larger mobs and Greg and Jane worked closely with the project researchers from Agricultural Information and Monitoring Services to develop grazing plans and feed budgets to maximise rest periods.



Typically, grazing periods (excluding lambing) were planned to provide rest periods which were shortest during the peak pasture growth season (about 60–80 day rest periods) and longest over summer and autumn (about 110–140 day rest periods).

The lambing time was also changed from the traditional two lamb drops in April and August, to a single lambing in the first week of July to make management easier and the shearing has been switched from February to April.

In 2005, two mobs of approx. 1100 ewes each were run, one on Thistlebeds and one on North Kings Well in 2005. However with less than 90 millimetres of rainfall recorded for 2006, which was significantly less than the long-term annual average of 200 millimetres, lambs were weaned earlier, cull ewes sold and the remaining sheep combined into a single mob to use the 18 paddocks and the rest period. The rest period has also increased to more than 140 days and if the dry conditions continue, will be further extended.

In the future Greg and Jane are planning to subdivide some of the larger paddocks on both properties to better control the sheep grazing and provide each paddock with a longer rest period.

The Baldina Creek channel, which runs through Thistlebeds will also be fenced off to provide improved weed control and reduce the risk of creek bank erosion.

Despite the tough conditions, Greg and Jane are still enthusiastic and encouraged by the results they have had, although they realise it will take a long time to see significant improvements in perennial grass populations and ground cover.

The lamb marking rate further increased in 2006, up to 90%, while Greg said the planned grazing has significantly improved their management with less time required to inspect water troughs and move stock.

They believe that grazing management tools such as the grazing chart which has been used to better plan and record grazing periods and stocking rates in each paddock has given them increased confidence in their management.

Greg said the way they look at their grazing management and the pasture has changed, as they now check the plants and their growth rates, rather than watching the sheep and their performance.

According to Greg and Jane, their plan for Thistlebeds and North Kings Well is a plan for their sustainable future. They want to be able to improve the land and do it in a way that is good for their profits, management and environment and to encourage others to look at planned grazing and hopefully benefit from it. The long-term goal is to leave the property in a better state for their children and future generations than its previous condition.



Land, Water & Wool has been working with woolgrowers to implement planned grazing management on-farm to optimise both productive and environmental outcomes. Photo Kylie Nicholls.

Pasture management checklist

Traditionally land managers have used the condition of animals to indicate the success of their management practices. But animal performance is a poor indicator of pasture condition, particularly in the short term.

Monitoring to determine the amount of available feed present at the start of the slow- or non-growing season can help to calculate the number of stock that can safely be carried for this period.

If destocking is necessary the action can be taken earlier, before the land manager is forced to sell when the market has already dropped. At other times, monitoring may indicate the rate of pasture regrowth after grazing is either slower (or faster) than anticipated and appropriate action, such as adjusting the length of recovery and graze periods, can be taken.

Agricultural Information and Monitoring Services researchers Lewis Kahn and Judi Earl have developed a pasture monitoring method to record pasture response to changes in grazing management. The method has been trialled in the mid north of South Australia at Burra, as part of the Land, Water & Wool – Rivers project.

The monitoring method has been modified for use in pastoral areas and will help woolgrowers improve their pasture assessment skills, pasture management, profitability and sustainability of their grazing enterprise.

There are 10 key categories in assessing pasture condition and these are:

1. Available feed (kilograms of dry matter per hectare)
2. Ground cover (%)
3. Diversity of perennial grass species
4. Perennial grass contribution to available feed (% of available feed)
5. Legume contribution to available feed (% of available feed)
6. Annual grass contribution to available feed (% of available feed)
7. Herbs contribution to available feed (% of available feed)
8. Cover of bushes (%)
9. Height of bushes
10. Health of bushes



A blank recording sheet is provided in this fact sheet for you to photocopy and use to regularly assess pasture condition.

Conducting the pasture management checklist

- Ideally, the assessment should be carried out at the start of the growing season and the non-growing season each year. The recording sheet can be used more frequently if required — for example before and after each grazing event.
- Within each paddock choose up to three locations which represent the variation in the paddock. In large paddocks more than three locations may be required. Variation may include such factors as soil type, pasture species, aspect or tree cover.
- At each location perform the pasture assessment over an area of about 10 metres x 10 metres.
- Record the assessment in the blank recording sheet provided at the back of this fact sheet.
- Remember to take a photograph at each site as this provides useful visual evidence of the changes at the site.
- Mark the site on a property map and with a steel post to ensure it is easy to locate again for each seasonal monitoring.

Pasture management checklist categories

1. Available feed

- Available feed is the quantity of pasture in the paddock. It is measured as kilograms of dry matter per hectare (kg DM/ha).
- Available feed controls feed intake of animals and pasture regrowth rate. It is also used to calculate feed budgets and set appropriate stocking rates.

Too little: Less than 500 kg DM/ha

- Feed intake and pasture growth rate will be greatly restricted and desirable species may not persist.

Marginal: 500–1000 kg DM/ha

Ideal: more than 1000 kg DM/ha

Calculating available feed

- For measurements of pasture, estimate handfuls (an average man's single handful size) of pasture in an area the size of one square foot (0.33 m x 0.33 m).
- See table below for an approximate guide to the calculation of available feed (kg DM/ha) from the handfuls of pasture in an area of one square foot.

Number of average man's single handfuls of pasture in a square foot			
	Half	One	One and a half
Available feed (kg DM/ha)	500	1000	1500

Use the available feed and ground cover estimate photographs as a guide.

2. Ground cover (%)

- Ground cover is the area of the soil surface covered by plant material, bushes, litter or dung (i.e. not bare).
- Measured as a percent of area (%).
- Ground cover reduces rainfall run-off and increases water infiltration, allowing maximum conversion of rainfall to feed.

Low: less than 50%

Marginal: 50–80%

Ideal: greater than 80%

Use the available feed and ground cover estimate photographs as a guide.

3. Diversity of perennial grass species

- Count the number of perennial grass species in the pasture.
- Provides year-round stability to pasture and animal production, ensures healthy pasture ecosystems. Stability is provided by the presence of perennial species with different growth cycles which maximise the conversion of sunlight into feed.
- Space is provided in the recording sheet to detail the different species present, for example Spear grass or Wallaby grass.

Low: less than 2

Marginal: 3–4

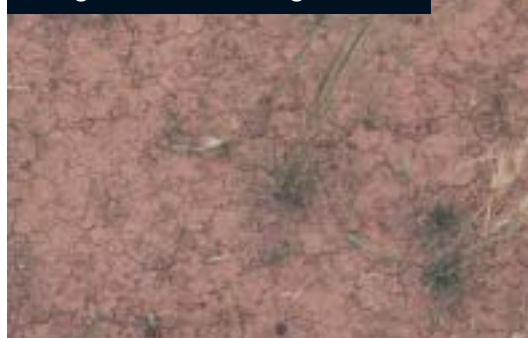
Ideal: more than 5

See the useful publications listed in the fact sheet for native plant identification guides.

50 kg of DM/ha and 5% ground cover



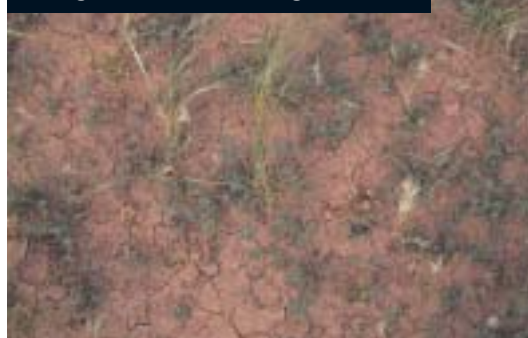
125 kg of DM/ha and 15% ground cover



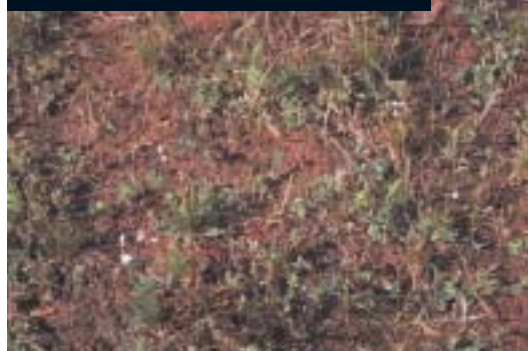
300 kg of DM/ha and 30% ground cover



650 kg of DM/ha and 50% ground cover



950 kg of DM/ha and 75% ground cover





4. Perennial grass contribution to available feed

- Percentage of available feed provided by perennial grass species. Identification tip: Perennial grass species are difficult to pull out of the ground, annual grass species pull-out easily.
- Measured as percentage of available feed (%).
- Provides year round stability to pasture and animal production.

Low: less than 20%

Marginal: 20–45%

Ideal: 50%

5. Legume contribution to available feed (% of available feed)

- Legumes include clovers and medics.
- Measured as percentage of available feed (%).
- Legumes enhance the quality of the feed (i.e. digestibility, crude protein and mineral content). In association with certain bacteria, they have the ability to transform nitrogen from the atmosphere into plant material which will eventually improve soil nitrogen.
- During spring to early summer:

Low: less than 20%

Marginal: 20–25%

Ideal: 30–50%

- Medic burr provides a valuable source of protein although with too much, greater than 50%, there is a risk of creating excessive bare ground during dry times when legumes disappear.



Seasonal conditions are a key factor in determining planned grazing management strategies. These two photos show the difference between spring and summer on 'Mullaby'.

6. Annual grass contribution to available feed (% of available feed)

- Annual grasses include barley grass or silver grass.
- Percentage of available feed provided by annual grass species.
- Measured as percent of available feed (%).
- Annual grasses provide seasonal feed and are most evident during late winter and spring. Results for this measure will depend on when the monitoring is carried out.

Low: less than 10%

Marginal: 10–15%

Ideal: 20%

7. Herbs contribution to available feed (% of available feed)

- Herbs include geranium, turnip, mallow, fat hen and native daisies such as yellow buttons, copperwire daisy and fuzzweed.



The grass is always greener on the other side (of the fence). 'Mullaby' photos Kylie Nicholls, sheep photo Land, Water & Wool.

- Percentage of available feed provided by herb species.
- Measured as percent of available feed (%).
- Herbs enhance the quality and diversity of pasture and have a tap root structure which aids soil structure and nutrient cycling.

Low: less than 5%

Marginal: 5–10%

Ideal: 10–15%

Please note that additional space has been included on the recording sheet for the contribution of other plant species to available feed, for example Onion Weed.

8. Cover of bushes (%)

- Bushes include blackbush, pearl blue bush, other bluebushes, bindii, saltbush, roly poly.
- Percentage of bushes providing cover.

- Measured as percent of available feed (%).
- Bushes provide ground cover, protection of the soil surface from wind erosion and shelter for organisms. The leaf fall also creates litter banks which can enhance the germination and establishment of other plant species.

Low: less than 10%

Marginal: 10–20%

Ideal: 25%

Too much: greater than 30%

9. Height of bushes

- Height of bushes is measured in three categories, less than calf height, calf-knee height and greater than knee height.
- This measure provides an indication of the age structure of the population.
- Ideally an even mix of a range of plant heights should be present with individual plants having few dead branches; this indicates a healthy population of bushes.

10. Health of bushes

- Health of bushes measured in a scale from 1–5 with 1 being the best score for health and 5 the worst.
- This measure provides an indication of the general condition of the plants.
- Indicators of health include the presence of new growth shoots, good colour in the leaves with few dead woody branches apparent.

See page 22 for an example pasture management checklist recording sheet.



Resources

There are a number of organisations that produce information for woolgrowers. Useful contacts at the national, state and local level are listed below.

Land, Water & Wool SA Rivers Project

Kylie Nicholls
Project Officer
Full Bottle Media
Tel: 08 8842 3275
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SA Murray-Darling Basin Natural Resources Management Board

Sarah Kuchel
Senior Project Officer,
Mallee & Burra Water Resources
Tel: 08 8582 4477 / 0427 394 719
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Web: www.rivermurray.sa.gov.au and
www.samdbnrm.sa.gov.au

Rural Solutions SA

Tel: 08 8842 6256
Fax: 08 8842 3775
E-mail: info@ruralsolutions.sa.gov.au
Web: www.ruralsolutions.sa.gov.au

Greening Australia

Anne Brown
Biodiversity Support Officer
Tel: 08 8668 4312 / 0409 684 312
Fax: 08 8668 4312
E-mail: brown@greeningsa.org.au

Mick Durant
Environmental Services Officer
South Australia Murray-Darling Basin
Tel: 08 8372 0193 / 0427 182 779
E-mail: durant@greeningsa.org.au

Todd Berkinshaw
Environmental Services Manager
Tel: 08 8372 0109 / 0407 407 520
Fax: 08 8372 0122

Mid North Grasslands Working Group

Helen Weckert
Tel: 08 8846 6086
E-mail: eulunga@rbe.net.au
Web: www.nativegrass.org.au

Agricultural Information & Monitoring Services

Lewis Kahn
Tel: 02 6771 1273
E-mail: lewiskahn@bigpond.com

Judi Earl
Tel: 02 6779 2286
E-mail: judiearl@auzzie.net

Principle Focus

Chris Scheid
Tel: 1800 190 012
E-mail: info@principlefocus.com.au
Web: www.principlefocus.com.au

Northern & Yorke Natural Resources Management Board

Tel: 08 8636 2361
E-mail: nynrm@bigpond.com
Web: www.nynrm.sa.gov.au

Land, Water & Wool program

Tel: 02 6263 6000
E-mail: Land&WaterAustralia@lwa.gov.au
Web: www.landwaterwool.gov.au

Australian Wool Innovation

Tel: 1800 070 099
E-mail: info@woolinnovation.com.au
Web: www.wool.com.au

Meat & Livestock Australia

Tel: 1800 023 100
E-mail: info@mla.com.au
Web: www.mla.com.au

Holistic Management International/Australia

Judi Earl
Tel: 02 6779 2286
E-mail: hmia@holisticmanagement.org.au
Web: www.holisticmanagement.org.au

Useful publications

How to make money out of grass — A farmer's guide to grazing management in the Northern Agricultural Districts of SA, Mid North Grasslands Working Group, Custom Press. Further information: Kylie Nicholls, PO Box 488, Clare SA 5453, Tel: 08 8842 3275, E-mail: fullbottlemedia@rbe.net.au

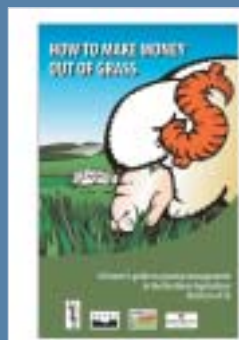
Native Vegetation of the Murray Region, February 2006, Todd Berkinshaw, Greening Australia (South Australia) Inc., ISBN 0 9775143 0 7. A guide to the identification, protection and restoration of native vegetation communities and plant species of the South Australian Murray Darling Basin.

Field Guide to the Plants of Outback South Australia, Frank Kutsche and Brendan Lay, Openbook Print. Further information: The Manager, Pastoral Program, Department of Water, Land and Biodiversity Conservation, GPO Box 2834, Adelaide SA 5000.

Grasses, Gums & Groundcovers, a field guide to the common native plants of the Northern Agricultural Districts of South Australia, Mid North Grasslands Working Group, Custom Press. Further information: Kylie Nicholls, PO Box 488, Clare SA 5453, Tel: 08 8842 3275, E-mail: fullbottlemedia@rbe.net.au

Holistic Management: A new framework for decision making, Allan Savory, Island Press.

Native Grasses: An Identification Handbook for Temperate Australia, Meredith Mitchell, Landlink Press.



'Preventing creek erosion', *Land, Water & Wool fact sheet*, 2007, Land & Water Australia.

'Managing weeds in riparian areas', *Land, Water & Wool fact sheet*, 2007, Land & Water Australia.



Managing creeks and waterways in the mid north of South Australia: A woolgrowers guide, 2007, Land & Water Australia.

Rapid Appraisal of Riparian Condition, Technical guideline for the mid north of South Australia, Jansen, A., Robertson, A., Thompson, L., Wilson, A. & Nicholls, K. 2006, Land & Water Australia, Canberra.



Example recording sheet

Date: 5 October 2006		Paddock name: Quarry		
		Site 1	Site 2	% of paddock
Paddock area (ha)	500			
Available feed (kg DM/ha)		709	1041	
Ground cover (%)		50	60	
Perennial species (names)				
1		Spear grass	Spear grass	
2		Wallaby grass		
3				
4				
5				
Perennial contribution (% of available feed)		47	10	
Legume contribution (% of available feed)		50	80	
Annual contribution (% of available feed)		3	5	
Herbs contribution (% of available feed)				
Contribution (% of available feed)			(Onion weed) 5	
Cover of bushes (%)		25	40	
Height of bushes		<input type="text" value="50"/> <calf <input type="text" value="50"/> calf-knee <input type="text" value=""/> >knee	<input type="text" value="100"/> <calf <input type="text" value=""/> calf-knee <input type="text" value=""/> >knee	
Health of bushes		1 2 3 4 5	1 2 3 4 5	
Health of bushes	Health 1 = best, 5 = worst			

Date:		Paddock name:			
		Site 1	Site 2	% of paddock	% of paddock
Paddock area (ha)					
Available feed (kg DM/ha)					
Ground cover	(%)				
Perennial species	(names)				
	1				
	2				
	3				
	4				
	5				
Perennial contribution	(% of available feed)				
Legume contribution	(% of available feed)				
Annual contribution	(% of available feed)				
Herbs contribution	(% of available feed)				
Contribution	(% of available feed)				
Cover of bushes	(%)				
Height of bushes		<input type="text"/> <calf <input type="text"/> calf-knee <input type="text"/> >knee	<input type="text"/> <calf <input type="text"/> calf-knee <input type="text"/> >knee		
Health of bushes	Health 1 = best, 5 = worst	1 2 3 4 5	1 2 3 4 5		



1



2



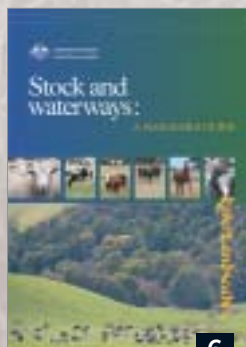
3



4



5



6

Publications for woolgrowers

The *Wool industry river management guides* bring together the latest science and recommended management practices for riparian areas within the context of a commercial wool-growing property. The Guides are available for the high rainfall regions (above 600 mm) and sheep/wheat regions (300–600 mm) of Australia. Each book has over 200 full-colour pages.

In addition www.rivers.gov.au/lww will offer an active contents list which will give you a snapshot of what is in each section.

1. High rainfall zone: product code PX050951
2. Sheep/wheat zone: product code PX050952

Managing rivers, streams and creeks: A woolgrowers guide — is a summary of the key recommendations from the 'Wool industry river management guides' and provides an introduction to river and riparian management issues on farm.

3. Product code PX051003

Are my waterways in good condition? — a checklist that provides colour coded pictures that you can use to assess the condition of your stream or creek. It is a quick and easy way to work out the health of the streams or creeks running through your property, and it suggests management actions to improve or maintain these vital parts of your farm.

4. Product code PB061114

River Insights — a publication featuring the stories of ten woolgrowers and what has motivated them to manage their rivers, creeks and streams in ways that make both economic and environmental sense.

5. Product code PK050950

Stock and waterways: a manager's guide — offers practical advice on how stock farmers can manage riparian land both productively and sustainably, and includes a number of case studies from farmers throughout Australia who have seen the benefits of changing their management practices.

6. Product code PR061132

These products are available from CanPrint Communications on freecall 1800 776 616 in hard copy, or can be downloaded from — www.landwaterwool.gov.au or www.rivers.gov.au

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 Land, Water & Wool fact sheet
 Prepared by Kylie Nicholls, Judi Earl, Lewis Kahn, Siwan Lovett, Phil Price
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South Australian
Murray-Darling Basin
Natural Resources
Management Board